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**Network Analysis of the Editorial Boards in Management of Technology and Innovation
Journals: The Network of the Journals**

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Diploma Thesis

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**Ανάλυση Δικτύων των Συντακτικών Ομάδων στα Περιοδικά Διοίκησης Τεχνολογίας
και Καινοτομίας: Το Δίκτυο των Περιοδικών**

Διπλωματική Εργασία για το Προπτυχιακό Πρόγραμμα Σπουδών

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Summary

In this thesis, certain characteristics of the 150 journals listed in the Management of Technology and Innovation field of the SCImago Journal Rank list for 2015 are analyzed.

We start by presenting some bibliometric characteristics of those journals and then we investigate their editorial boards through the use of descriptive statistics.

Using common members of their editorial boards we construct several networks of the journals. The characteristics of those networks (connectivity, degrees, centrality measures) are then analyzed.

Περίληψη

Στην παρούσα διπλωματική, αναλύονται ορισμένα χαρακτηρίστηκα από 150 επιστημονικά περιοδικά της SCImago Journal Rank λίστας στο πεδίο της διαχείριση τεχνολογίας και καινοτομίας για το έτος του 2015.

Αρχικά παρουσιάζουμε κάποια βιβλιογραφικά χαρακτηριστικά των περιοδικών και έπειτα ερευνούμε την συγγραφική επιτροπή τους με την χρήση της περιγραφικής στατιστικής.

Τέλος χρησιμοποιώντας τα κοινά μέλη των επιτροπών σχεδιάστηκαν τα δίκτυα των περιοδικών και αναλύθηκαν τα χαρακτηριστικά των δικτύων (connectivity, degrees, centrality measures).

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1. Introduction

1.1 Editorial Boards and their Importance

This thesis examines the editorial boards, the journals and two journals indicators, SJR and H index, in the management of technology and innovation category of SCImago list 2015. The target is to show the top journals in the category of management of technology and innovation for 2015 by analysing the journals network.

This research is based on Scientometrics, before scientometrics there was bibliometrics which is *“the branch of information science dealing specifically with the statistical study of publications and citations”* [55]. Scientometrics can be defined as the *“quantitative study of science, communication in science, and science policy”* [31] aims as empirical unit analysis on texts (documents) [49]. Unlike the behavioural sciences and mainstream philosophy of science, scientometrics focuses on texts (documents) as empirical units of analysis [45]. Authors are able to increase the impact of science, technology and innovation from a quantitative perspective.

During the 17th century the first scientific journals have appeared, these journals created a communication mechanism where it remains unchanged until today and this process is made through the publish houses. A scientific journal is a publish house product, but not their property (most journals are properties of scientific societies or similar organizations, although the printing and marketing activities belong to publish houses under contract). This communications process doesn't rely on dissertations but on selective publications which enables sciences to work successfully [75]. This selection is made by the journal's editorial board; they control and screen the papers the journal receives and decide which papers are worthy of publication after consulting anonymous referees. The editorial board is fulfilled by some scientists who have the judgment role by accepting or declining manuscripts, this selection has a filtering process which evaluates the quality of the paper by peer review; these judges are the journals Gatekeepers [11].

Braun in the 80s has initiated the “Gatekeepers indicator” which is an alternative indicator instead of literature characteristics *“They specifically measure a form of scientific power, expected to be strongly correlated with citation indicators or also excellence measures of various kinds.”* [15].

“These gatekeepers have powerful strategic positions in the collective activity of science” [19].

Gatekeepers are the members of an editorial board and they hold a higher position than authors and this is based on their scientific past. Braun answers in two questions first how many scientist publish their papers domestically and how many internationally. Secondly does the status of a Gatekeeper influences the journal.

According to Braun some scientists are likely to be more famous than others due to their *“efficient international relationships and communication strategy”* and so on have more chances to be part of the editorial board of an international journal. Gatekeeper's impact can be measured by the number of citations to all of their previously published papers but only in a common field of science. There is a small increase in the journal's status as the gatekeeper's prestige grows. Although scientist may have same scientific achievements, the more familiar a scientist is the more reward is given [15]. Editors are seeking to increase the journal's reputation by being cited in other journals literature and the only way to achieve it is to have high quality papers. On the other side authors seek to be referred as much as the can and increase their impact of their work and as we have seen in Faria's model, *“are interested in publishing their*

article in high reputation journals” [4]. So, there is interdependence between the authors, gatekeepers and journals.

Because of the internet expansion on the decade passed there was a high increase in gaining access to the large datasets and thus contributed in the development of network sciences. [55]. A network is a link between points and many systems can be defined as a network from biological to social and internet to structural. One definition of a network is “*a group or system of interconnected people or things*”. In the case of the scientometrics, we have a social network that overall connects the published papers, authors and the journals. “The connections in a social network affect how people learn, form opinions, and gather news, as well as affecting other less obvious phenomena, such as the spread of disease.” [55].

The reason these science networks were produced is to measure the influence -connections- authors and journals have through some indicators such as Impact Factor, H index and SJR. Baccini introduces us to the world of journals networks where he tries to explain the journals connections through network analysis. In his articles, he focuses on which journals have a central position and why and how they can be divided into subgroups. In order to calculate these results a bipartite network, or so called two mode networks or also called affiliation network, is needed. In this type of networks, we have two vertices, actors and events, (dual-mode) and the affiliation connects these vertices.

In our analysis, such as in baccini’s, the journals are considered to be the vertices or also called nodes of the bipartite network and an undirected bond is created between a pair of journals when a seat is held by the same person. Actors and events are the journals and their editorial boards respectively and the affiliation is their bond. This duality refers to an editor who holds a seat in a journal’s editorial board and he creates a link between him and the journal. This creates the idea that “*one of editors linked by journals (networks of co-membership), or as one of journals linked by editors (interlocking of events).*” [5].

In the occasion where one editor holds also a position in another editorial board creates the idea that these journals are linked and *be explained as the result of a strategic decision of the firms, as collusion, or cooptation or monitoring of sources of environmental uncertainty* [54]. We can measure the journals links by calculating the journal’s centralities (Degree, Betweenness, Closeness, Harmonic Closeness, Hubs & Authorities, PageRanks) and an analysis is being conducted in chapter 3 by comparing also the SJR and H index to see how the journals reputation by its indicators, SJR or H index, affects the network.

1.2 Overview of the Thesis

The thesis is divided in four chapters, introductory chapter is the first chapter. Chapter 2 introduces the SCImago list in management of technology and innovation category for 2015 and a descriptive statistical analysis takes place about the lists contents. Chapter 3 analyses the journal’s volumes and pages, how many volumes did a journal published the year 2015, by what means did the papers submitted, how many special issues did it had. Finally, chapter 4 describes the network of the journals, in the SCImago list and examines which journals are more centralized, using different type of network measurements. Generally, the in order to tackle the most important journals in that field the most important measures calculated was degree, eigenvector and PageRank. SJR and H-Index rank are important as well.

2. SCImago List

2.1 Data collection and data clearing

2.1.1 Examination of 4 different lists

Data about the 2015 journals in the management of technology and innovation category were collected from the SCImago Journal & Country Rank which is a publicly available portal that includes the journals and country scientific indicators developed from the information contained in the Scopus® database (Elsevier B.V.). These indicators can be used to assess and analyze scientific domains. Journals can be compared or analyzed separately. Country rankings may also be compared or analyzed separately. Journals can be grouped by subject area (27 major thematic areas), subject category (313 specific subject categories) or by country. Citation data is drawn from over 21,500 titles from more than 5,000 international publishers and country performance metrics from 239 countries worldwide. The SJCR allows you also to embed significant journal metrics into your web as a clickable image widget. This platform takes its name from the SCImago Journal Rank (SJR) indicator (PDF), developed by SCImago from the widely-known algorithm Google PageRank™. This indicator shows the visibility of the journals contained in the Scopus® database from 1996. SCImago is a research group from the Consejo Superior de Investigaciones Científicas (CSIC), University of Granada, Extremadura, Carlos III (Madrid) and Alcalá de Henares, dedicated to information analysis, representation and retrieval by means of visualisation techniques. SCImago Journal & Country Rank <http://www.scimagojr.com/aboutus.php> (last access 11/11/2016). Our study is interested in the management of technology and innovation that's why the domain chosen was the business management accounting and the subdomain was the management of technology and innovation. Those domains were chosen in the webpage <http://www.scimagojr.com/>. Plus, the year 2015 was chosen. SCImago uses the SJR and the H-Index as measures of the journals. SJR expresses the average number of weighted citations received in the selected year by the documents published in the selected journal in the three previous years, --i.e. weighted citations received in year X to documents published in the journal in years X-1, X-2 and X-3 and the SJR rank. H – index is created by the physicist Jorge Hirsch in 2005. H – index is a new measure which combines publication and citation counts. This new measure raised huge interest among informetricians. Some tried to apply it, others criticized it and suggested improvement and some suggested ways to model the h-index. One of the first applications, suggested by Braun, Glänzel, and Schubert (2005, 2006) was to apply the h-index to journals. Glänzel and Schubert (2007) tested a theoretical model of dependence of the journal-type h-index on the JIF and the number of publications. The h index expresses the journal's number of articles (h) that have received at least h citations. It quantifies both journal scientific productivity and scientific impact and it is also applicable to scientists, countries, etc. [SCImago http://www.scimagojr.com/help.php#understand_countries (last access 13-11-2016)]. The h index is a measure of the number of highly impactful papers a scientist has published. The larger the number of important papers, the higher the h-index, regardless of where the work was published. To count this index, we need two pieces of information from our data. First the total number of papers published (Np) and second the number of citations (Nc) for each paper. The h-index is defined by how many h of a researcher's publications (Np) have at least

h citations each. In order to understand this index better we can ask ourselves, “Have I publishes one paper that’s been cited at least once?” If yes, we have got H-index is 1. Consequently “Have I published two papers that have each been cited at least twice? If answer is yes our H-index is 2” According with J.E Hirsch.

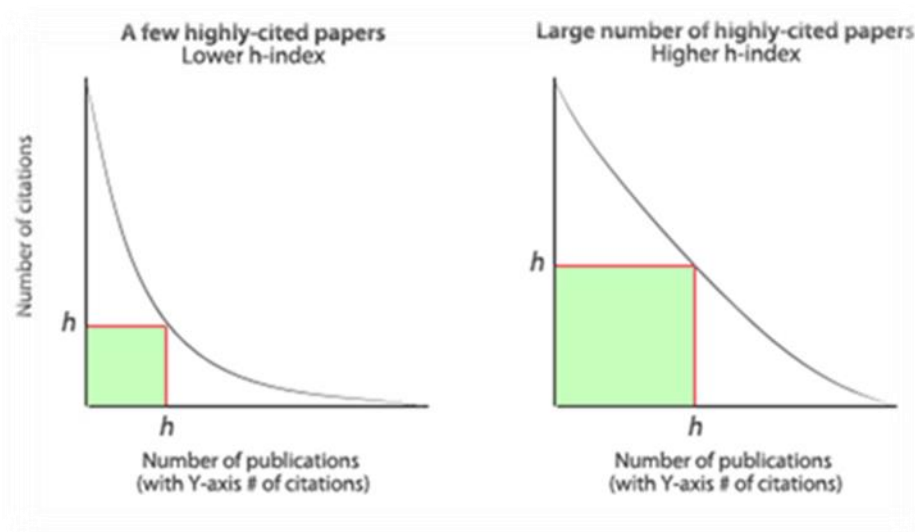


Figure 1

Other reports about journals existed also such as the Journal Citation Reports of Science, which *offers a systematic, objective means to critically evaluate the world's leading journals, with quantifiable, statistical information based on citation data* (Thomson Reuters <http://thomsonreuters.com/en/products-services/scholarly-scientific-research/research-management-and-evaluation/journal-citation-reports.html> LAST ACCESS 12/11/2016) but unfortunately our category wasn't listed in this report. Our category was listed in the Association of Business Schools' Academic Journal. Association of Business Schools' Academic Journal *is based upon peer review, editorial and expert judgements following the evaluation of many hundreds of publications, and is informed by statistical information relating to citation. It is a guide to the range, subject matter and relative quality of journals in which business and management academics publish their research.* (Chartered Association of Business Schools <https://charteredabs.org/academic-journal-guide-2015/Chartered> Association of Business Schools last access 11-11-2016). Still, the Comité National de la Recherche Scientifique (CNRS) published a categorization of Journals in Economics and Management. In this list, they are examining about 800 titles from 24 fields disciplinary. They review each year a sixth journals of each field. More, VHB which is the German Academic Association for Business Research is publishing a report with the categories Banking and Finance (WK BAFI), Business Taxation (WK STEU), Services Management (WK DLM), Academic Management (WK HSM), International Management (WK INT), Logistics (WK LOG), Marketing (WK MARK), Sustainability Management (WK NAMA), Public Business Administration (WK ÖBWL), Operations Research (WK OR), Organization (WK ORG), Human Resources Management (WK PERS), Production Management (WK PROD), Accounting (WK RECH), Strategic Management (WK SM), Technology, Innovation and Entrepreneurship (WK TIE), Business Information Systems (WK WI), Economic Science (WK WEW).

2.1.2 Data about the Management of Technology and Innovation field (LISTS ANALYSIS)

A while later, data from the SCImago Journal & Country Rank edition 2015 tried to be analyzed via some diagrams and boxplots so that we can understand the general environment of management of technology and innovation. From the SCImago Journal & Country Rank site with the same domain and subdomain data were redownloaded. That excel contained the title of the data proceeding in the first column. Also, the type (journal, book series, conference and proceeding) and the ISSN of them. After it was the SJR. The SCImago site had calculated the quartiles based on the SJR. Quartile one is concerned with the top 25% data, Quartile two with the next 25% data and so on. The data with the highest SJR was in the first quartile. The quartiles weren't calculated for the conference and proceeding. The SCImago site also provides as with the H index and the H index rank. The other eight columns contained firstly the total documents 2015 which is the output of the 2015 published papers. All types of documents are considered, including citable and non-citable documents. The other column contains the total docs. (3years) which is published documents in the three previous years (selected year documents are excluded), i.e. when the year X is selected, then X-1, X-2 and X-3 published documents are retrieved. All types of documents are considered, including citable and non-citable documents. Also, another column contained the total refs. which includes all the bibliographical references in a journal in the selected period. Also, the excel contained the Total Cites (3years) and the Citable Docs. (3years) which are the number of citations received in the selected year by a journal to the documents published in the three previous years, --i.e. citations received in year X to documents published in years X-1, X-2 and X-3. All types of documents are considered and the number of citable documents published by a journal in the three previous years (selected year documents are excluded). Exclusively articles, reviews and conference papers are considered respectively. Further the other two columns contained, the Cites / Doc. (2years) and the Ref. / Doc. which are the average citations per document in a 2-year period. It is computed considering the number of citations received by a journal in the current year to the documents published in the two previous years, --i.e. citations received in year X to documents published in years X-1 and X-2 and the average number of references per document in the selected year respectively. Finally, in the last column there was the country. Countries and regions were easily browsable through the world regions list and country list displayed in Country Rankings.

Title	Type	Issn	SJR	SJR rank	SJR Quartile	H index	H index rank	Total Docs. (2015)
Academy of I journal	journal	ISSN 000142	10,317	1	Q1	227	1	66
Academy of I journal	journal	ISSN 036374	8,83	2	Q1	193	2	37
Organization journal	journal	ISSN 104770	7,037	3	Q1	167	3	65
Research Pol journal	journal	ISSN 004873	3,536	4	Q1	160	4	144
Journal of Inte journal	journal	ISSN 147869	4,208	5	Q1	130	5	56
Harvard Busir journal	journal	ISSN 001780	0,401	6	Q2	130	6	33
Journal of Ma journal	journal	ISSN 146764	4,931	7	Q1	119	7	56
Journal of Bu journal	journal	ISSN 088390	4,923	8	Q1	116	8	49
Organization journal	journal	ISSN 017084	4,047	9	Q1	102	9	65
Journal of Prc journal	journal	ISSN 073767	2,337	10	Q1	101	10	96

Image 1

Total Docs. (3years)	Total Refs.	Total Cites (3years)	Citable Docs. (3years)	Cites / Doc. (2years)	Ref. / Doc.	Country
224	6378	1809	219	6,4	96,64	United States
111	3539	902	97	6,78	95,65	United States
302	5747	1340	297	3,39	88,42	United States
426	10491	2240	406	4,46	72,85	Netherlands
148	5208	790	148	4,32	93	United Kingdom
733	0	822	286	2,66	0	United States
175	3561	1060	161	5,53	63,59	United Kingdom
137	5219	965	134	6,4	106,51	United States
212	5966	844	202	3,4	91,78	United Kingdom
318	5060	940	275	2,81	52,71	United Kingdom
178	5396	620	177	2,93	89,93	United Kingdom
196	5737	709	191	3,06	67,49	United Kingdom

Image 2

Based on that excel another excel on our research has been constructed. In that excel based on the previous one the conference and proceeding had been deleted. Also, the data sorted based on their H-index so another column had been added the H-index quartile. In the H-index quartile the quartile competed based on H-index. So, except from the H-index quartile the column H-index rank added. The data were ranked by decreasing H-index as well as SJR.

Title	Type	Issn	SJR	SJR rank	SJR Quartile	H index	H index rank	H index Quartile
Academy of Management Journal	journal	ISSN 000142	10,317	1 Q1		227	1 Q1	
Academy of Management Review	journal	ISSN 036374	8,83	2 Q1		193	2 Q1	
Organization Science	journal	ISSN 104770	7,037	3 Q1		167	3 Q1	
Research Policy	journal	ISSN 004873	3,536	9 Q1		160	4 Q1	
Journal of International Business Studies	journal	ISSN 147869	4,208	7 Q1		130	5 Q1	
Harvard Business Review	journal	ISSN 001780	0,401	77 Q2		130	5 Q1	
Journal of Management Studies	journal	ISSN 146764	4,931	5 Q1		119	7 Q1	
Journal of Business Venturing	journal	ISSN 088390	4,923	6 Q1		116	8 Q1	
Organization Studies	journal	ISSN 017084	4,047	8 Q1		102	9 Q1	

Image 3

H index Quartile	Total Docs. (2015)	Total Docs. (3years)	Total Refs.	Total Cites (3years)	Citable Docs. (3years)	Cites / Doc. (2years)	Ref. / Doc.	Country
Q1	66	224	6378	1809	219	6,4	96,64	United States
Q1	37	111	3539	902	97	6,78	95,65	United States
Q1	65	302	5747	1340	297	3,39	88,42	United States
Q1	144	426	10491	2240	406	4,46	72,85	Netherlands
Q1	56	148	5208	790	148	4,32	93	United Kingdi
Q1	33	733	0	822	286	2,66	0	United States
Q1	56	175	3561	1060	161	5,53	63,59	United Kingdi
Q1	49	137	5219	965	134	6,4	106,51	United States

Image 4

Finally, based on the previous excel another excel has been constructed. That excel included only the journals. Therefore, all the quartiles (SJR, H-index) and the ranks had been competed again as above.

2.1.3 Method

On that three excels various descriptive statistics has been made and especially a two levels analysis was conducted as follow:

- From the overall level, statistics were computed over the 284 data for journals, book series and the conference and proceedings, also over the 154 journals and book series and finally over the 150 journals. Such coarse-grained statistics supports the understanding of characteristics related to research in management of technology and innovation as a whole. For example, a coarse-grained statistic reported us the top 20 journals of management of technology and innovation and the most frequent countries.
- For the Quartile level, statistics were computed on one fourth of the 284 data, 154 data and finally the 150 journals. Quartiles one, two, three and four derived from the SJR and the H-index were considered in turn for fine-grained analysis.

For example, fine-grained statistics are involved when comparing the 10 best journals from the first quartile based on the SJR with the 10 best journals from the first quartile based on the H-index.

Statistics are reported with supporting charts. Diagrams, bar charts and box-plots were used for reporting statistics about the distribution of the data. They show the spread of the data, the median value and the outliers. But before, the statistical analysis was made data about the other three lists that was previously referred was collected.

2.1.4 Association of Business Schools' Academic Journal, Comité National de la Recherche Scientifique (CNRS), German Academic Association for Business Research

In order to compare the three other organizations lists, we first worked on the Association of Business Schools' Academic Journal. Every year this association published a report about the best journals. We choose the 2015 guide and the category innovation. In another excel the names of the journals were pasted as well as their ISSN. There were total 30 journals in that category. Also, there was a ranking which was called AJG. AJG ranges between 4 and 1, 4 represents the best and 1 the worst. For those 30 journals, the SJR and the H-index rank was searched in order to compare the different ways of ranking the same journals. But at this point, we discovered that there were journals that the Association of Business Schools considered as innovation journals but the SCImago put them a different category. Therefore, we added other columns which contained the categories that SCImago is giving them. The comparison was made with line diagrams.

ISSN	Journal Title	AJG 2015	SJR	SJR rank	SJR (site)	H index	Domain 1	Domain 2
0737-6782	Journal of Product Innovation Management	4	1,834	2	2,337	101	Management of Technology and Innovation	Strategy and Manu
0048-7333	Research Policy	4	2323	1	3,536	160	Management of Technology and Innovation	Strategy and Manu
0033-6807	R and D Management	3	0,876	4	0,939	70	Management of Technology and Innovation	Business and Inter
0166-4972	Technovation	3	0,812	5	1,794	82	Management of Technology and Innovation	Engineering
0963-1690	Creativity and Innovation Management	2			0,654	10	Management of Technology and Innovation	Strategy and Manu
1366-2726	Industry and Innovation	2	0,209	9	1,298	41	Management of Technology and Innovation	Business, Manage
1447-9338	Innovation: Management, Policy and Practice	2	-0,536	18	0,276	14	Management of Technology and Innovation	
1363-9196	International Journal of Innovation Management	2	-0,686	14	0,412	22	Management of Technology and Innovation	Business and Inter
0923-4748	Journal of Engineering and Technology Management	2	-0,009	10	1,079	48	Industrial Relations	Strategy and Manu
1047-8330	Journal of High Technology Management Research	2	-0,77	15	0,342	32	Management of Technology and Innovation	Marketing
0892-9932	Journal of Technology Transfer	2	0,552	6	1,518	50	Accounting	Business and Inter

Image 5

Afterwards, we worked with the the Comité National de la Recherche Scientifique (CNRS) catalog. In that list, we choose the category Innovation and Entrepreneurship. CNRS considers 34 journals in that category. We constructed an excel with the 34 titles, the ISSN of every journal and the cat. Cat is the ranking that CNRS is giving to the journals. Cat range is between 1 and 4, 1 is the best and 4 the worst. So, at this point we added the SJR and the H - index of those journals but also the domain that SCImago gives them. Also, the AJG was added and the domain that the Association of Business Schools was giving to those journals. Again, the comparison was made with line diagrams.

Nom	ISSN	Domaine	Cat	sjr	h-index	domain1	domain2	domain3	domain4	domain5	AJG	DOMAIN AJG
Entrepreneurship: Theory and Practice	1042-2587	Innov	1	4,24	80	Business a Economics and Econometrics						
Journal of Business Venturing	0883-9026	Innov	1	4,923	116	Business a Management of Technology and Innovation						
Journal of Product Innovation Managem	0737-6782	Innov	1	2,337	101	Managem Strategy a: Engineering (miscellaneous)						4 innovation
Research Policy	0048-7333	Innov	1	3,536	160	Managem Strategy a: Management Science and Operations Rese						4 innovation
Economics of Innovation and New Techn	1043-8599	Innov	2	0,841	18	Managem Economics, Econometrics and Finance (miscellaneous						2 BUSINESS HISTO
Family Business Review	0894-4865	Innov	2	5,882	55	Business, Finance						3 ENTREPRENEURS
International Small Business Journal	0266-2426	Innov	2	2,054	46	Business and International Management						3 ENTREPRENEURS
Journal of Small Business Management	0047-2778	Innov	2	1,368	67	Business, Finance Management Strategy and Management						3 ENTREPRENEURS
Small Business Economics	0921-898X	Innov	2	2,013	82	Business, Finance Economics and Econometrics						3 ENTREPRENEURS
Strategic Entrepreneurship Journal	1932-4391	Innov	2	3,377	12	Business a Strategy a: Economics and Econometrics						4 ENTREPRENEURS
Technological Forecasting and Social Ch	0040-1625	Innov	2	1,348	68	Business a Managem Applied Psychology						
Entrepreneurship and Regional Develop	0898-5626	Innov	3	1,397	56	Business a Economics and Econometrics						3 ENTREPRENEURS

Image 6

Next, we examined the VHB which is the German Academic Association for Business Research. In that list, the category chosen was the Teilrating Technologie, Innovation und Entrepreneurship. Fifty journals were in that category. JQ3 was the rating that this association is giving to the journals. The best journals get the A and the worst the C, B is the middle ranking. Also, at this category we searched the journals in the SCimago list in order to find their SJR and their H-index but also the category that SCimago was putting them. The same was repeated for the AJG and the Cat as well as their categories. Repeatedly, the comparison was made with line diagrams.

Zeitschrift	JQ3 SJR	H Index	Domain 1	Domain 2	Domain 3
Research Policy (RP)	A	3,536	160 Management of Technology and Innovation	Management Science and Operations Research	Engineering (miscellaneous)
Journal of Business Venturing (JBV)	A	4,923	116 Business and International Management	Management of Technology and Innovation	
Entrepreneurship: Theory and Practice (ET&P)	A	4,24	80 Business and International Management	Economics and Econometrics	
Journal of Product Innovation Management (JPI)	A	2,337	101 Management of Technology and Innovation	Strategy and Management	Engineering (miscellaneous)
Strategic Entrepreneurship Journal (SEJ)	A	3,377	12 Business and International Management	Strategy and Management	Economics and Econometrics
IEEE Transactions on Engineering Management	B	1,093	69 Strategy and Management	Electrical and Electronic Engineering	
Journal of Small Business Management (JSBM)	B	1,368	67 Business, Management and Accounting (miscellaneous)	Management of Technology and Innovation	Strategy and Management
Energy Policy	B	2,436	123 Energy (miscellaneous)	Management, Monitoring, Policy and Law	
Small Business Economics	B	2,013	82 Business, Management and Accounting (miscellaneous)	Economics and Econometrics	
Industrial and Corporate Change (ICC)	B	1,37	81 Economics and Econometrics		
Technological Forecasting and Social Change	B	1,368	68 Business and International Management	Management of Technology and Innovation	Applied Psychology
International Journal of Innovation Management	B	0,412	22 Business and International Management	Management of Technology and Innovation	Strategy and Management
The Journal of Technology Transfer	B	1,118	50 Accounting	Business and International Management	
Industry & Innovation	B	1,298	41 Business, Management and Accounting (miscellaneous)	Management of Technology and Innovation	
R&D Management	B	0,936	70 Business and International Management	Business, Management and Accounting (miscellaneous)	Management of Technology and Innovation
Economics of Innovation and New Technology	B	0,841	18 Management of Technology and Innovation	Economics, Econometrics and Finance (miscellaneous)	

Image 7

Domain 3	Domain 4	Domain 5	AJG 2015	AJG Domain	Cat=1 BEST	Domain 1
Engineering (miscellaneous)	Strategy and Management		4 innovation	3 innovation and entrepreneurship	3 innovation and entrepreneurship	
			4 entrepreneurship and small business	3 innovation and entrepreneurship	3 innovation and entrepreneurship	
			4 innovation	3 innovation and entrepreneurship	3 innovation and entrepreneurship	
Engineering (miscellaneous)			4 innovation	3 innovation and entrepreneurship	3 innovation and entrepreneurship	
Economics and Econometrics			4 entrepreneurship and small business	2 innovation and entrepreneurship	2 innovation and entrepreneurship	
Strategy and Management			3 operations and technology	2 management information systems	2 management information systems	
			3 entrepreneurship and small business	2 innovation and entrepreneurship	2 innovation and entrepreneurship	
			2 sector studies	2 agricultural, environmental and energy economics	2 agricultural, environmental and energy economics	
			3 entrepreneurship and small business	2 innovation and entrepreneurship	2 innovation and entrepreneurship	
Applied Psychology			3 social science	2 industrial organization	2 industrial organization	
Strategy and Management			2 innovation	2 innovation and entrepreneurship	2 innovation and entrepreneurship	
				4 innovation and entrepreneurship	4 innovation and entrepreneurship	
				3 innovation and entrepreneurship	3 innovation and entrepreneurship	
Management of Technology and Innovation	Strategy and Management		3 innovation	3 innovation and entrepreneurship	3 innovation and entrepreneurship	
Strategy and Management			2 economics econometrics and finance	2 innovation and entrepreneurship	2 innovation and entrepreneurship	

Image 8

Finally, the last comparison that was made was based on the SCimago list. At that list with the 283 data the AJG and the domain that was given was written in columns. The same happened with the Cat and the JQ3. If they were data that weren't in any other list, we left that columns empty. These comparisons were made with line diagrams. With this comparison, we intended to understand the different ways of ranking of this three associations and why they put the same journals into different categories from SCimago.

2.2 Findings about management of technology and innovation journals

2.2.1 Association of Business Schools' Academic Journal, Comité National de la Recherche Scientifique (CNRS), German Academic Association for Business Research Data Analysis

In this section, we discuss several characteristics of management of technology and innovation, such as their SJR, H-index and the rankings that the other lists gave them. We only analyze the journals that are at the SCImago list. So, all this analyzes was based on the last excel of SCImago which was 283 data and the last columns contented the AJG, Cat and JQ3 and their domains as is shown on the screenshots below.

Title	Type	Year	SJR	SJR rank	SJR Quartile	H index	H index rank	Total Docs.	Q1 Docs.	Total Docs.	Q1 Total Docs.	Total Cites
Academy of Management Journal	journal	ISSN 000142	10,317	1 Q1		227	1	88	224		6378	19
Academy of Management Review	journal	ISSN 036374	8,83	2 Q1		193	2	37	111		3639	9
Organization Science	journal	ISSN 104770	7,837	3 Q1		167	3	66	302		5747	13
Research Policy	journal	ISSN 004873	3,536	4 Q1		160	4	144	426		10491	22
Journal of International Business Studies	journal	ISSN 147869	4,208	5 Q1		130	5	56	148		5208	7
Harvard Business Review	journal	ISSN 001790	0,401	6 Q2		130	6	33	733		0	8
Journal of Management Studies	journal	ISSN 146764	4,931	7 Q1		119	7	56	175		3561	10
Journal of Business Venturing	journal	ISSN 088390	4,923	8 Q1		116	8	49	137		5219	9
Organization Studies	journal	ISSN 017084	4,547	9 Q1		102	9	65	212		5966	8
Journal of Product Innovation Management	journal	ISSN 073767	2,337	10 Q1		101	10	96	318		5060	9
International Journal of Operations and Production Management	journal	ISSN 014435	2,198	11 Q1		94	11	60	178		5396	6
Human Relations	journal	ISSN 001872	2,117	12 Q1		90	12	85	196		5737	7
International Journal of Project Management	journal	ISSN 026378	1,497	13 Q1		88	13	160	319		10229	12
Technovation	journal	ISSN 016649	1,794	14 Q1		82	14	49	219		3875	6
Decision Sciences	journal	ISSN 001173	1,586	15 Q1		82	15	60	118		2166	2

Image 9

CiteScore	CiteS	Doc.	1987	Doc.	Country	AJG	AJG Domain	JQ3	VHB Domain 1	VHB Domain 2
219	6,4	96,54	United States			4	GENERAL MANAGEMENT, ETHICS AND SOCIAL RESPONSIBILITY	A+	General Business Administration	
97	6,78	95,65	United States			4	GENERAL MANAGEMENT, ETHICS AND SOCIAL RESPONSIBILITY	A+	General Business Administration	
297	3,39	88,42	United States			4	ORGANISATION STUDIES	A+	Organization and human resources	
406	4,46	72,85	Netherlands			4	INNOVATION	A	Technology, innovation and entrepreneurship	
168	4,32	93	United Kingdom			4	INTERNATIONAL BUSINESS AND AREA STUDIES	A	Organization and human resources	International manag
286	2,66	6	United States			3	GENERAL MANAGEMENT, ETHICS AND SOCIAL RESPONSIBILITY	C	General Business Administration	
181	5,53	63,59	United Kingdom			4	GENERAL MANAGEMENT, ETHICS AND SOCIAL RESPONSIBILITY	A	General Business Administration	
134	6,4	106,51	United States			4	ENTREPRENEURSHIP AND SMALL BUSINESS MANAGEMENT	A	Technology, innovation and entrepreneurship	Entrepreneurship
202	3,4	91,78	United Kingdom			4	ORGANISATION STUDIES	A	General Business Administration	
276	2,81	62,71	United Kingdom			4	INNOVATION	A	Technology, innovation and entrepreneurship	Marketing
177	2,93	89,93	United Kingdom			4	OPERATIONS AND TECHNOLOGY MANAGEMENT			
191	3,06	67,49	United Kingdom			4	ORGANISATION STUDIES	B	Organization and human resources	
302	3,7	63,93	United Kingdom			2	OPERATIONS AND TECHNOLOGY MANAGEMENT	C	General Business Administration	
179	2,63	79,08	United Kingdom			3	INNOVATION	C	Technology, innovation and entrepreneurship	Entrepreneurship production
112	1,53	36,1	United Kingdom			3	OPERATIONS RESEARCH AND MANAGEMENT SCIENCE	B	Operations Research	
322	2,1	33,74	United States			4	OPERATIONS AND TECHNOLOGY MANAGEMENT	A	production	

Image 10

VHB Domain 2	VHB Domain 3	VHB Domain 4	Cat	Domaine
			1g	1 General Economics, General Management
				General Economics, General Management
				1 Organization Studies
				1 Innovation and Entrepreneurship
International management				1 Business Strategy and International Management
				1 General Economics, General Management
Entrepreneurship				1 Innovation and Entrepreneurship
				1 Organization Studies
Marketing				1 Innovation and Entrepreneurship
				2 Production and Operations Management
				2 Human Resources Management
				3 Production and Operations Management
Entrepreneurship production	business informatics			3 Innovation and Entrepreneurship
				2 Operations Research
				1 Production and Operations Management
				3 Human Resources Management
				1 Labor and population Economics

Image 11

First, the relationship between the SJR and H-index was examined.

2.2.2 SJR and H-index

The line diagram in figure 1 represents the comparison between the SJR and the H-index for the 283 data (included the book series and the conference and proceedings). The SJR values lie between 10,317 and 0. The H-index values between 227 and 0. For that reason the data has normalized in order to compare them.

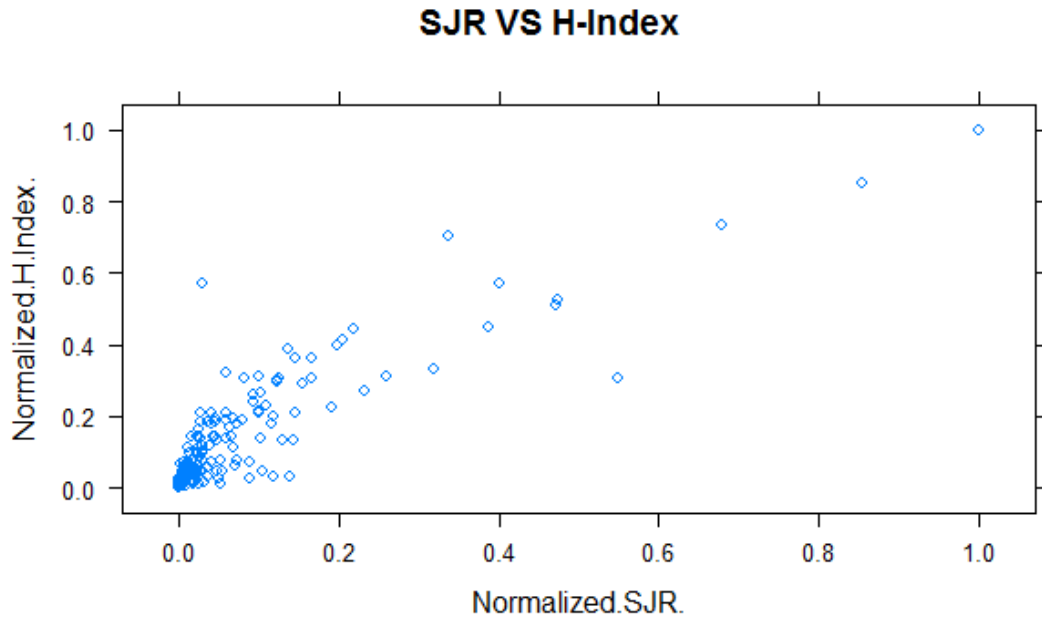


Figure 2

Even though, SJR and H-index have different ways of ranking because they use different scales they are proportional as we can see from the diagram. In other words, most of the journals have the same SJR rank and the H-index rank. Because of that, a question has been raised on whether the other three ways of ranking that is been given from the three associations are proportional as the SJR and H-index are but also if they are sparing the journals in other categories. Below, further examinations of this subject has been made. The relationship between the SJR and the AJQ was examined first.

2.2.3 SJR and AJQ

AJQ as we mentioned above is the ranking that the Association of Business Schools' Academic Journal is using. But what relationship does it have with SJR? In the line diagram below it is obvious that SJR don't have the same rankings as AJQ. AJQ is equals with 0 when there are missing values (journal rankings). So as a conclusion, we can draw that even when, AJQ gives a ranking in a journal that the SCImago list have, it is different from SJR most of the time.

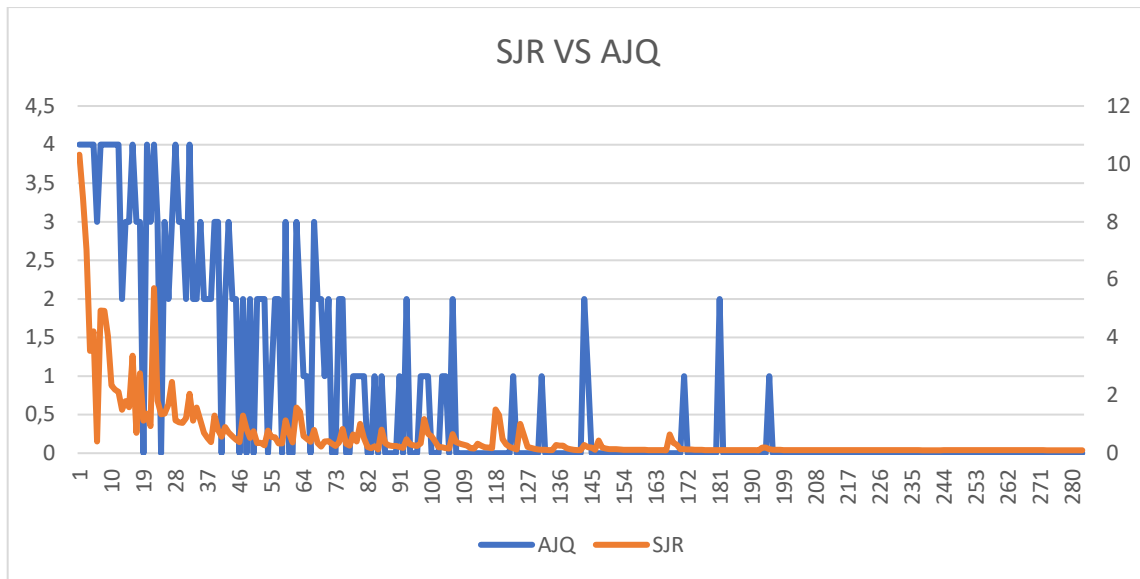


Figure 3

Also, this diagram represents the AJQ nonmatter into what category the list was putting them. In the pie chart below, it is shown how many were the journals that these two lists had in common and into what category Association of Business Schools' Academic Journal was putting them.

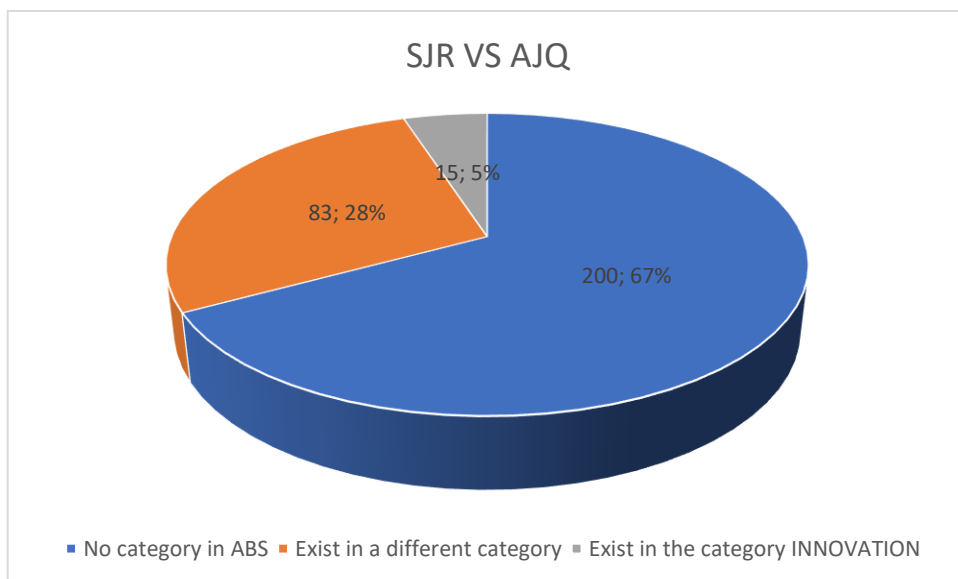


Figure 4

The pie chart, shows as that 67% of the data of SCimago wasn't in the Association of Business Schools' Academic Journal list, 28% was and only 5% was at the list and was also listed in the innovation category. We could have done the same proceeding and compare the H-index with the AJG but because SJR and H-index are propositional we would have come to the same conclusion. But, why AJQ ranking is different from SJR and H-index? Probably, because they don't put the same journals in same category but mainly because they use different paraments of ranking. Afterwards, the SJR and the Cat link was studied.

2.2.4 SJR and Cat

Cat is the ranking that Comité National de la Recherche Scientifique (CNRS) is giving to the journals. Below, we try to investigate the relationship between the Cat and the SJR. At this point, it should be mentioned that Cat ranking is opposite from SJR, Cat best rank is 1 and worst is 4. But in order to show it clear in the line diagram we reversed the ranking only to make it more readable. The zeros represent the journals that don't exist in the CNRS list. In the line diagram below it is obvious that SJR don't have the same rankings as Cat. So as a conclusion, we can draw that even when Cat gives a ranking in a journal that the SCimago list have it is different from SJR most of the time probably because they use different ranking proceedings and criteria. Cat gives better rankings in the majority of the journals shared with SCimago. This diagram represents the Cat nonmatter into what category the CNRS list was putting them.

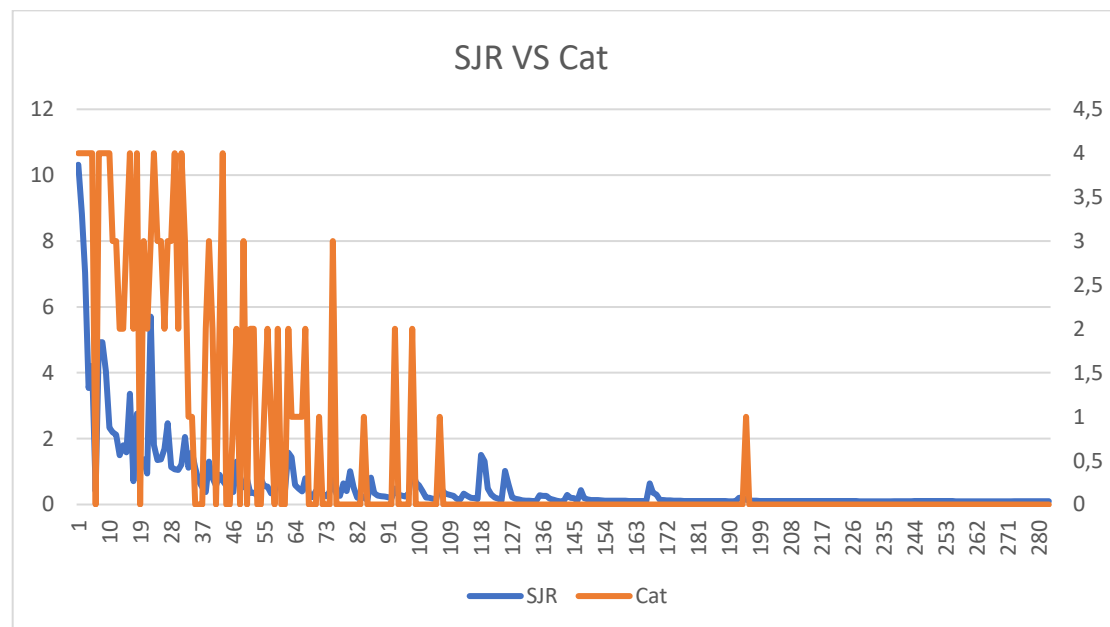


Figure 5

In the pie chart below, it is shown how many were the journals that these two lists had in common and into what category Comité National de la Recherche Scientifique (CNRS) was putting them.

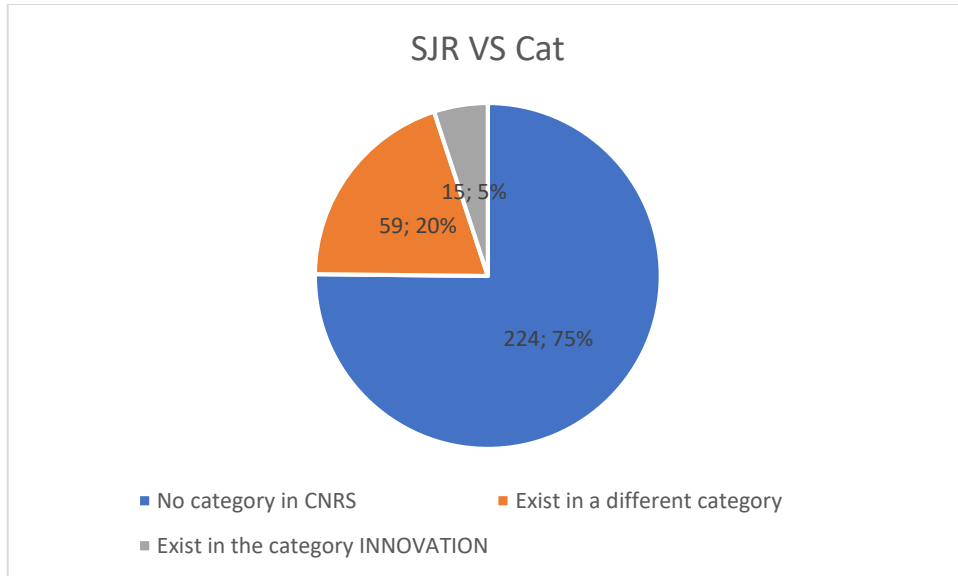


Figure 6

The pie chart, shows as that 75% of the data of SCimago wasn't in the Comité National de la Recherche Scientifique (CNRS) list, 20% was and only 5% was at the list and was also listed in the Innovation and Entrepreneurship category. We could have done the same proceeding and compare the H-index with the Cat but because SJR and H-index are propositional we would have come to the same conclusion. Subsequently, SJR and JQ3 correlation was researched.

2.2.5 SJR and JQ3

JQ3 is the rank that the German Academic Association for Business Research is using to rate their journals. It has a peculiarity that the ranks are letters and not numbers as in the previous cases. A+ is the best, A, A/B, B and B/C are in the middle and last is the C. As we did before in order to make it more readable we transfer this letters into numbers. The zeros represent the journals that don't exist in the German Academic Association for Business Research list. SJR and JQ3 have more similarities in rankings than the Cat and the AJQ. But we can distinguish some discrepancies mainly at the first journals (top journals). JQ3 gives better rankings in the majority of the journals shared with SCimago This diagram represents the JQ3 nonmatter into what category the German Academic Association for Business Research list was putting them.

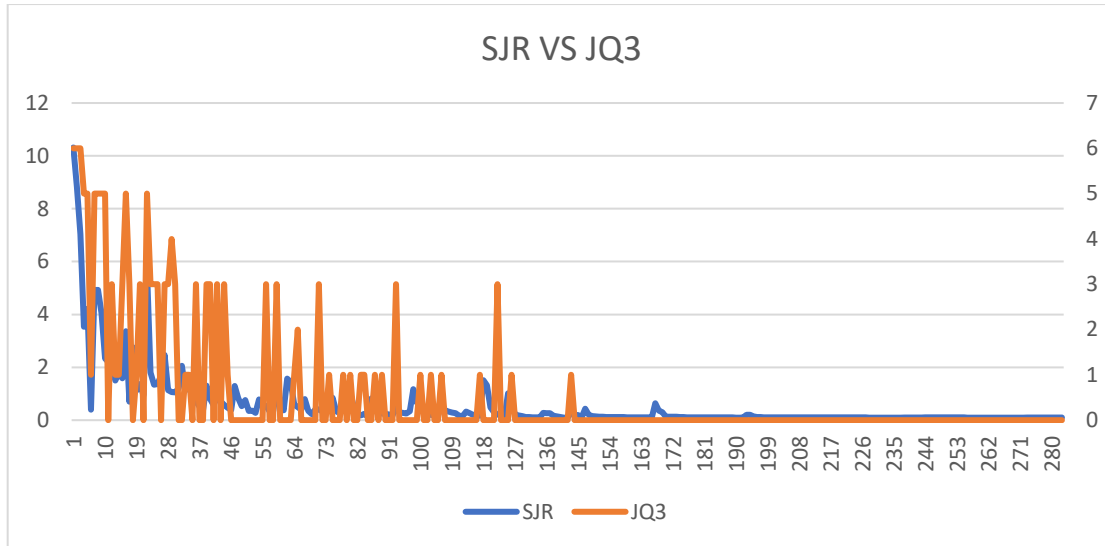


Figure 7

Another peculiarity in this list is that a journal can be into multiple categories simultaneously. For example, Decision Sciences is in Operations Research category (Domain 1), in the production category (Domain 2) and at the business informatics category (Domain 3). In our case the max categories that a journal can be is 4 (Domain 1,2,3,4). Below, a bar chart has been made in order to represent that. The first column of each domain represents the journals that SCimago has but the German Academic Association for Business Research list don't have. The second column of each domain shows how many journals the German Academic Association for Business Research list includes in any category and the last column of each domain represents the journals that are in the list and in our category. The 1,2,3 and 4 are the 4 domains that German Academic Association for Business Research list can give to a journal. It is obvious that, the Technology, innovation and entrepreneurship category that interests us can only be found in the first domain.

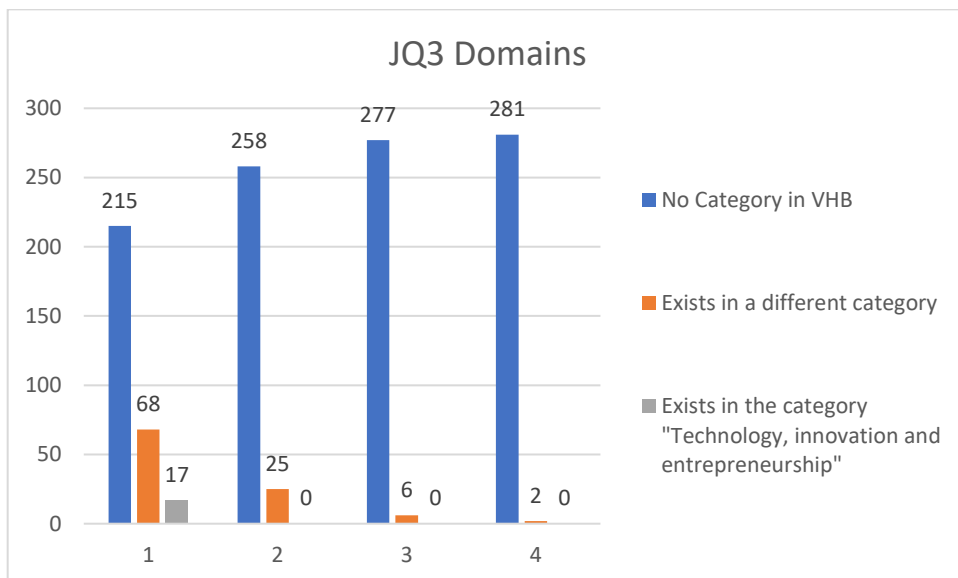


Figure 8

In the pie chart below, it is shown how many were the journals that these two lists had in common and into what category the German Academic Association for Business Research list was putting them. Because our category of interest the pie chart takes into consideration the data from the first domain.

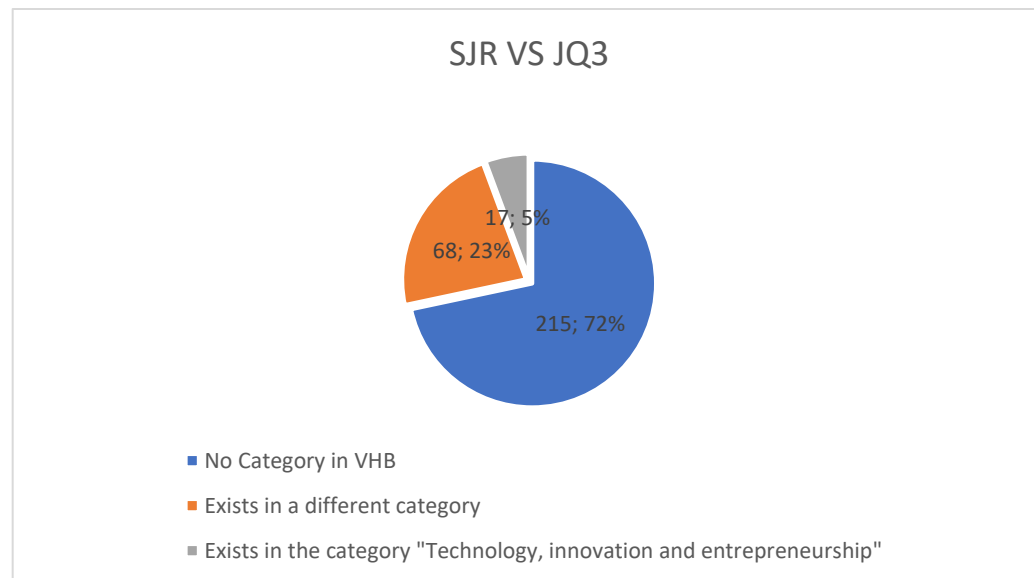


Figure 9

The pie chart, shows as that 72% of the data of SCimago wasn't in the German Academic Association for Business Research list, 23% was and only 5% was at the list and was also listed in the Technology, innovation and entrepreneurship category. We could have done the same proceeding and compare the H-index with the JQ3 but because SJR and H-index are propositional we would have come to the same conclusion.

As a comment from this section, it is observed that in these three lists only the 5% of each list is the same as the SCimago list, namely proportionally only 5% of each list was at the SCimago list in the innovation category. As it is mentioned above this could be happening due to the fact that the three lists use a different ways and different criteria of rating journals. Also, the ranking has been made by people in some lists and maybe the viewpoint is different from person to person that's why we observe some differentiations.

2.3 Data Analysis about the Management of Technology and Innovation field

First and foremost, in this section we gathered our data from the web and particularly from the webpage <http://www.scimagojr.com/journalrank.php>. As it is mentioned above the year 2015 was selected as also the domain business management and accounting and the subdomain management of technology and innovation. At this list, we had three types of data, the journals, the conference and proceedings and finally the book series as we discussed above. We tried to make some assumptions from that data. Firstly, at the pie chart below an attempt to understand how many of the data were in each type was made.

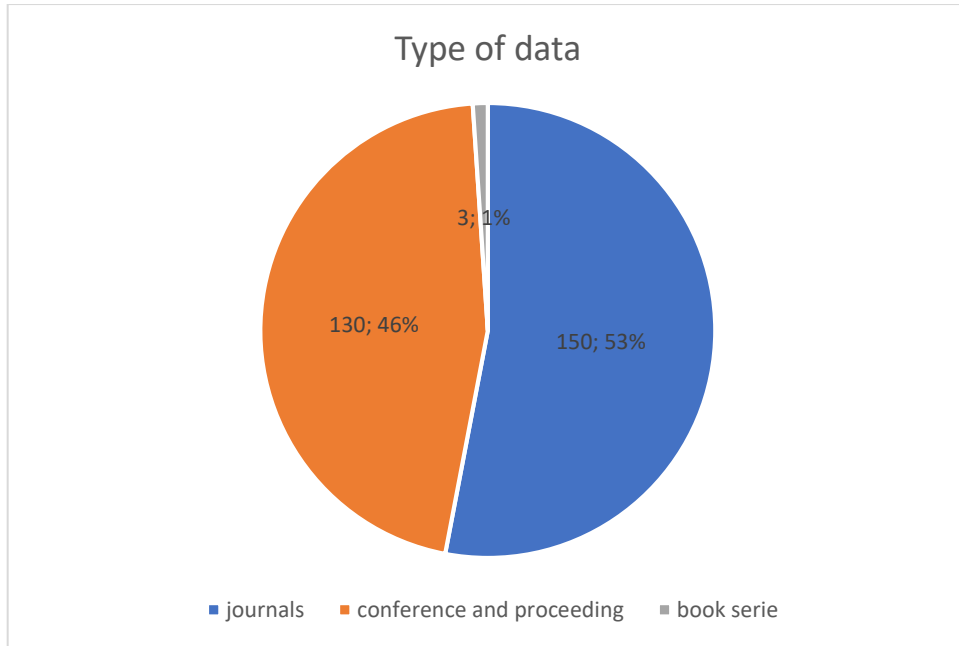


Figure 10

This pie chart shows us that the majority of our data is journals and conference and proceeding and only 1% of our data is book series.

2.3.1 Journals, Conference and Proceedings and Book Series

All the diagrams below refer to the raw data (initial excel) which contains the journals the conference and proceedings and the book series.

2.3.1.1 Data Analysis Based on SJR

Afterwards, we separated our data in four categories based on SJR (Quartile 1, Quartile 2, Quartile 3 and Quartile 4), each category was computed on one fourth of the whole data set. By that it has been tried to understand what type of data I have in the top 25% and also in the others 25%. The chart below represents that. More, it is observed that the Q1 has only journals, the Q2 has mostly journals and some conference and proceedings and book series. But the Q3 has mostly conference and proceedings and some journals and book series. The Q4 has only book series.

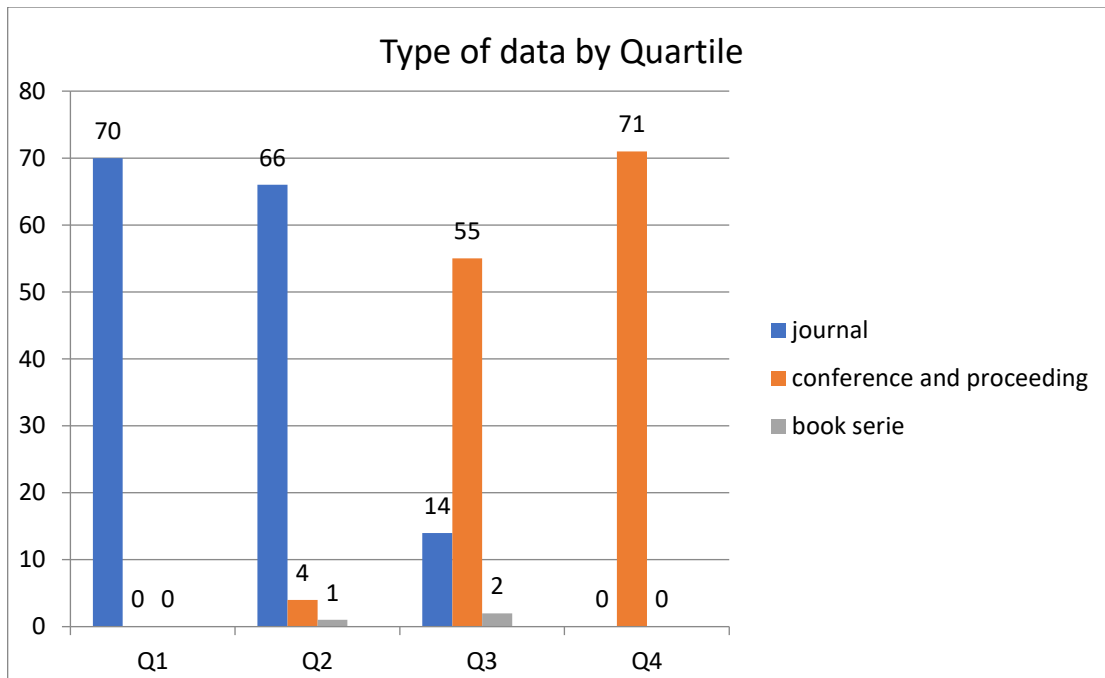


Figure 11

Because of that another pie chart was constructed in order to understand how many of the journals were in each Quartile. This pie chart shows us something interesting. In the Quartile 4 there isn't any journal. The majority of the journals is in the first Quartile 47% and 44% are in the second Quartile. That shows us that the journals generally have high SJR ranking.

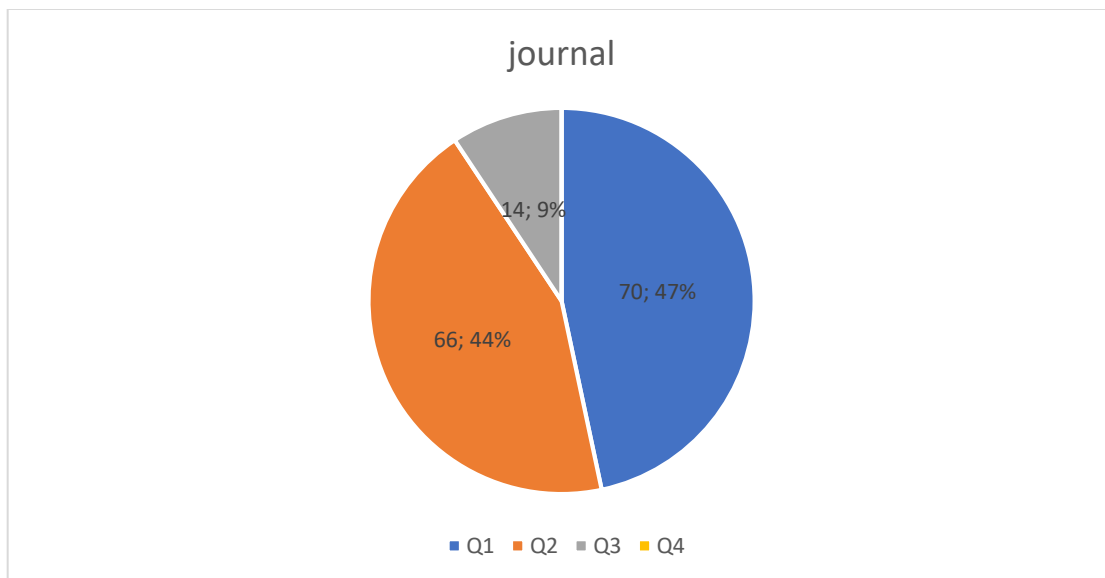


Figure 12

The same pie charts were made also for the conference and proceeding and for the book series, as we can understand how our data were distributed.

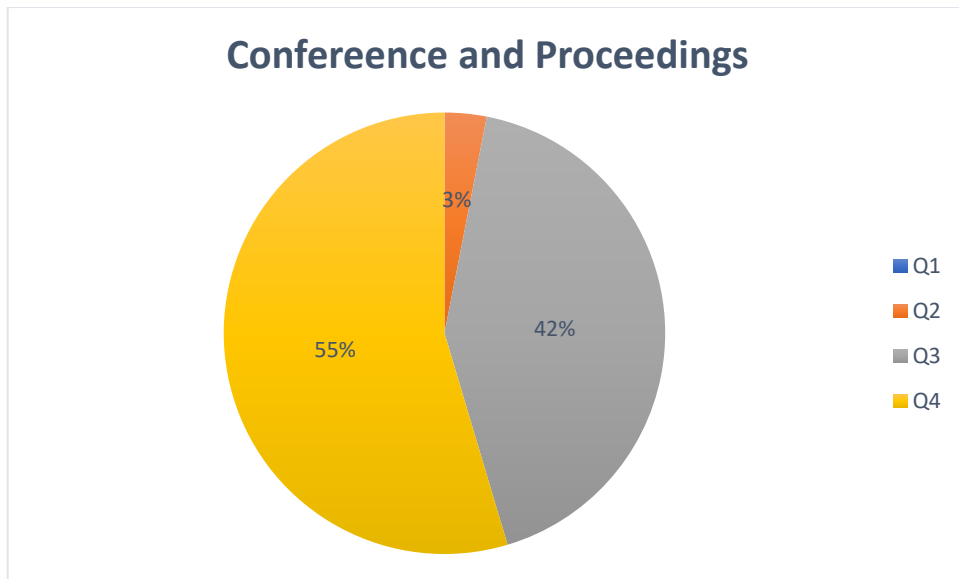


Figure 13

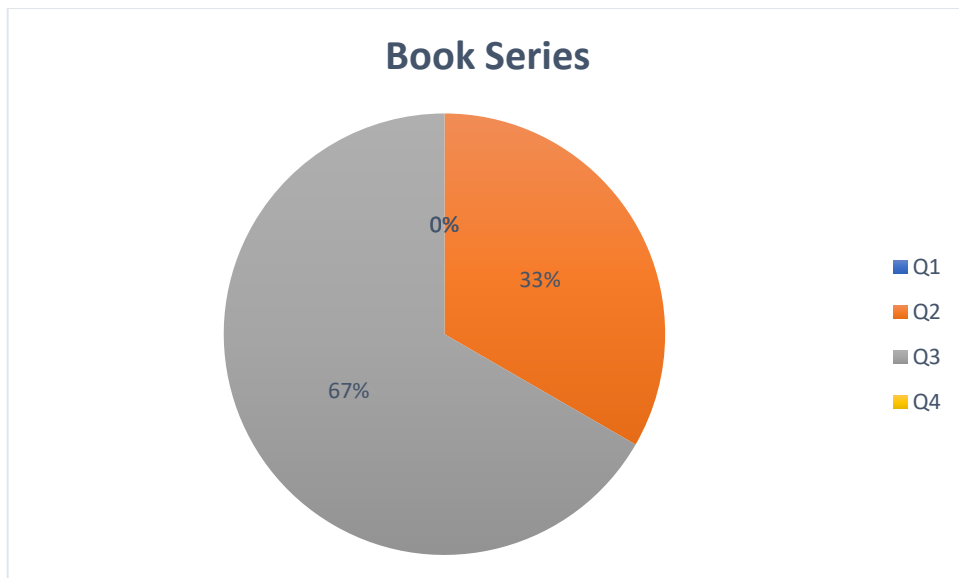


Figure 14

As an inference, we can say that our data are composed mostly from journals and conference and proceedings. Additionally, the journals have the highest SJR ranking and the conference and proceedings are following. At the end the book series, are few and have really low SJR rank.

Furthermore, box plots were constructed in order to be able to figure out how our data was distributed inside the quartiles. They show the spread of data, the median value, and outliers. The first box plot shows us in the axis y the SJR and in the axis x the four quartiles and the total. It is clear, that the majority of our data is gathered at the bottom of our boxplot that's because we have a lack of cohesion due to the fact that our values have big differences between them. As it is shown in the boxplot below the Q1 is not proportional with the other quartiles. The max of the Q1 is 8,573 and the min is 0,481 in contrast with the Q2, Q3 and Q4. Q2 has as max 0,128 and as min 0,154, the Q3 has as max 0,0275 and as min 0,103 and

finally the Q4 has as max 0,03 and as min 0,1. For this reason, we constructed boxplots with weak outliers and strong outliers as it shown below.

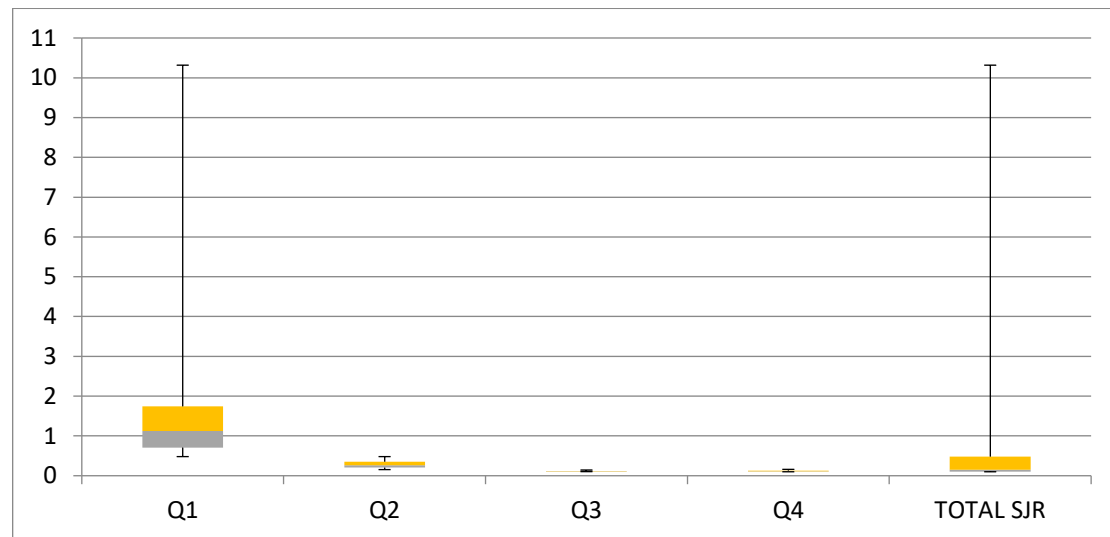


Figure 15

Outliers (k=1.5)

Moreover, we considered in the boxplot below the outliers that we had. An outlier is an observation point that is distant from other observations. An outlier may be due to variability in the measurement or it may indicate experimental error, the latter are sometimes excluded from the data set. In order to find the outliers, we used Tukey's test. Tukey's test is based on measures such as the interquartile range. For example, if Q1 and Q3 are the lower and upper quartiles respectively, then one could define an outlier to be any observation outside the range: $[Q1 - k(Q3 - Q1), Q3 + k(Q3 - Q1)]$ for some nonnegative constant k . John Tukey proposed this test, where $k=1.5$ indicates an "outlier", and $k=3$ indicates data that is "far out".

Wikipedia. Available at <https://en.wikipedia.org/wiki/Outlier> (last access 15-10-2016)

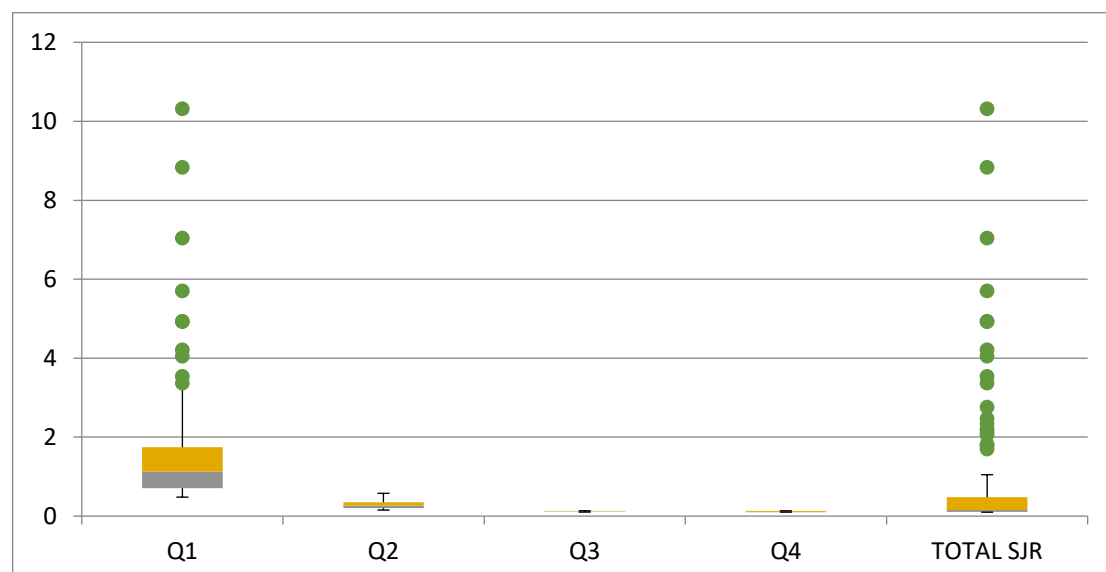


Figure 16

Outliers(k=3)

Additionally, for $k=3$ the boxplot chart transformed into the chart below.

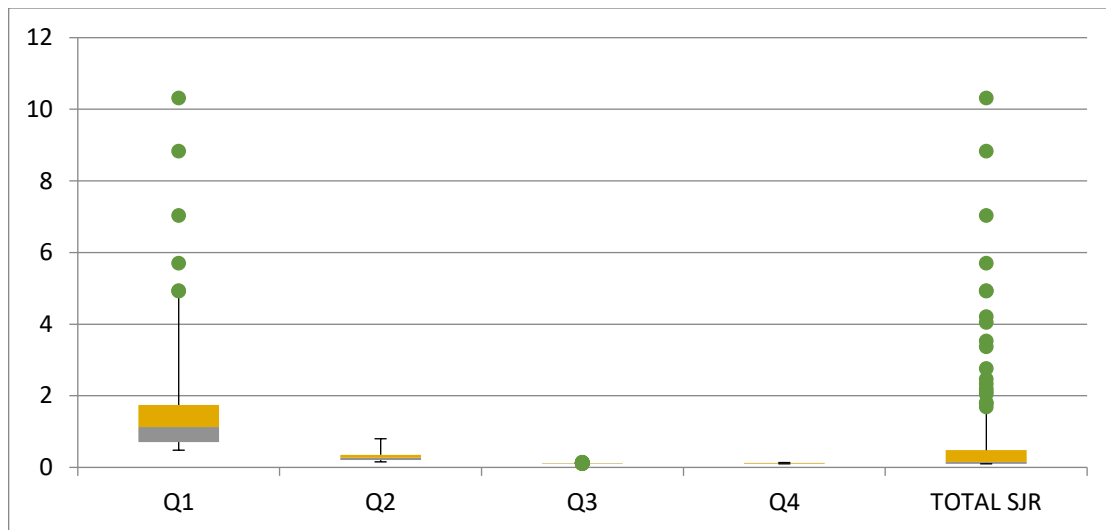


Figure 17

Finally, normal distribution frequency chart was used in order to identify how our data is distributed without taking in any consideration the quartiles. The axis x shows the range of our data and the axis y shows the frequency.

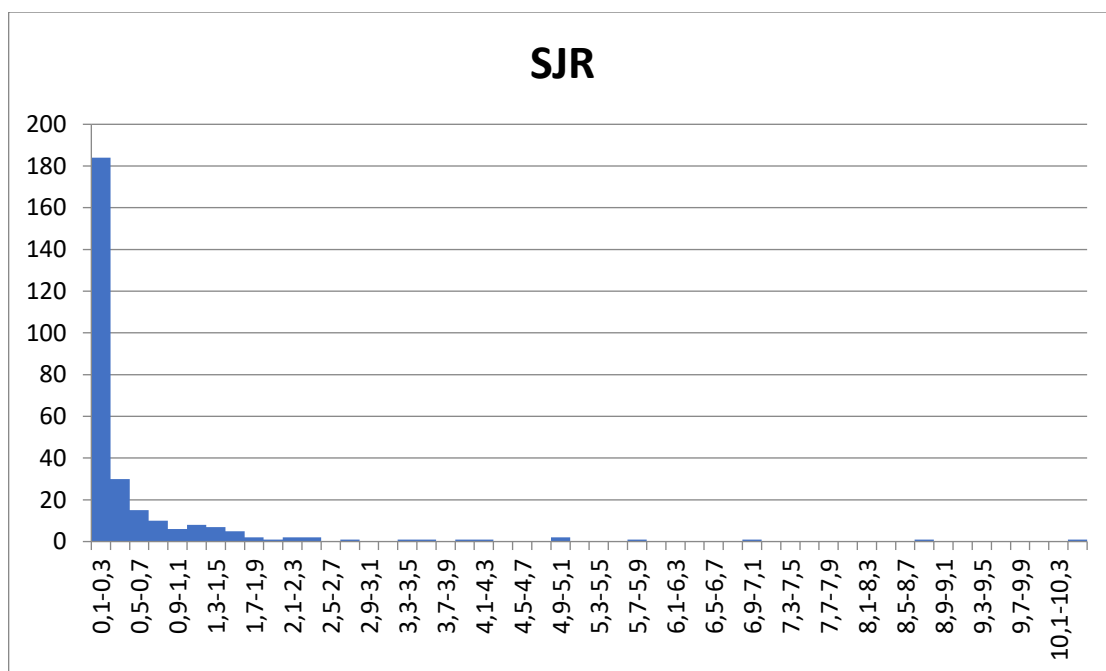


Figure 18

2.3.1.2 Data Analysis Based on H- index

As it has been mentioned above another way to separate our data in four categories is to categorize them based on H index. That is why below the same proceedings were made but the separation of our data has based on H-index. Again, each category was computed on one fourth of the whole data set. In figure 18 we have analyzed H index in boxplots as SJR and we realize that we have the same problems. At this first boxplot, the axis y shows the H index and the axis x shows the four quartiles and the total. At this case also, the majority of our data is gathered at the bottom of our boxplot.

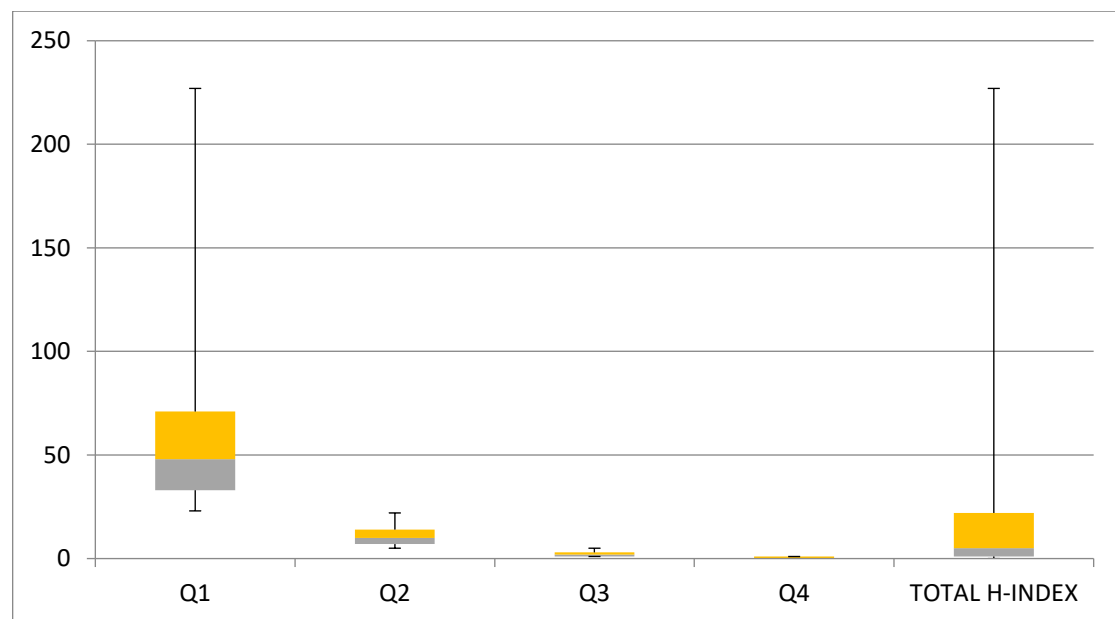


Figure 19

Outliers (k=1.5)

Afterwards, we considered in the boxplot below the outliers that we had for k=1.5.

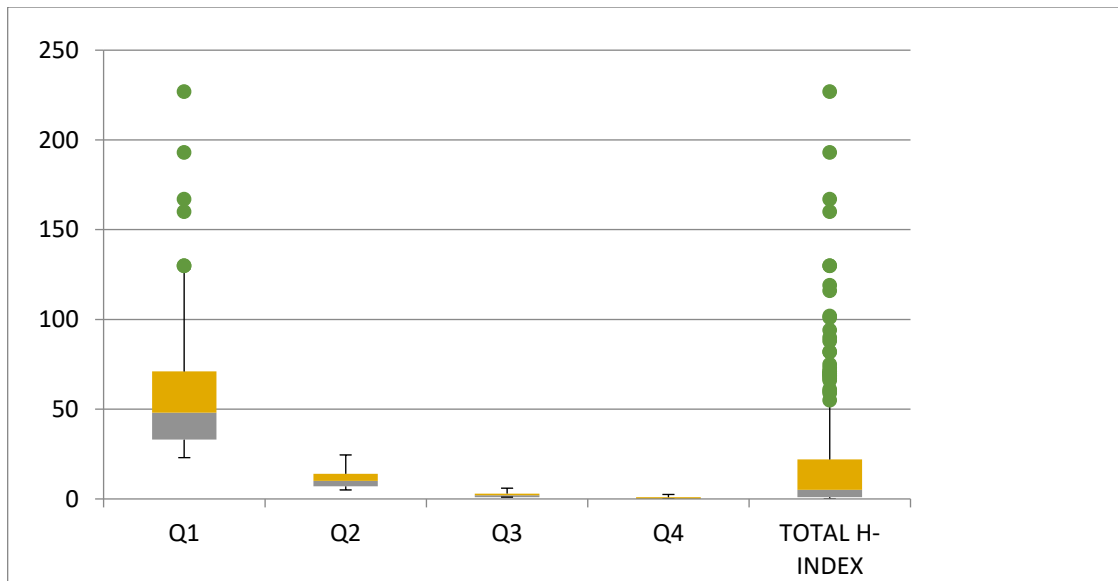


Figure 20

Outliers(k=3)

Finally, for $k=3$ the boxplot becomes like the one below.

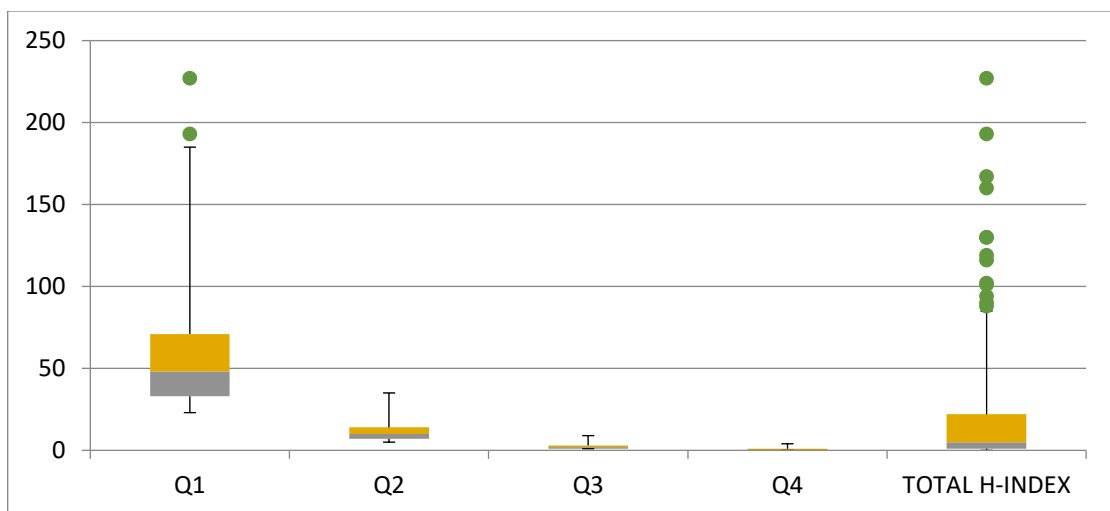


Figure 21

Moreover, the same calculation has made in order to construct the normal distribution frequency chart as to identify how our data was distributed without taking in any consideration the quartiles. The axis x shows the range of our data which is different from before because we used the H index and the axis y shows the frequency which is also different.

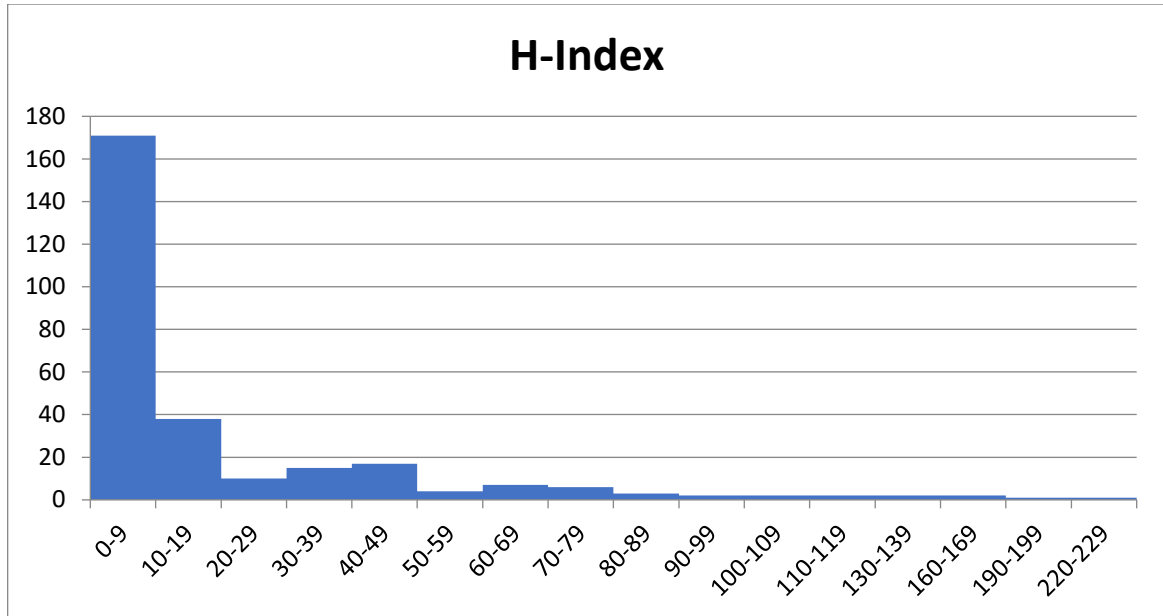


Figure 22

2.3.1.3 SJR VS H-index

Finally, considering that we had two ways to measure our data we decided to compare the top 20 of our data based on SJR and based on H index in order to find the correlation between SJR and H index. In the diagram below, the top 20 of our data are shown based on SJR. Before we constructed this diagram, our data was sorted based on SJR and the top 20 of them was selected. From this diagram, a conclusion can be drawn. The SJR top 20 is not the same with H index top 20 and that's because the H index line is not following SJR line.

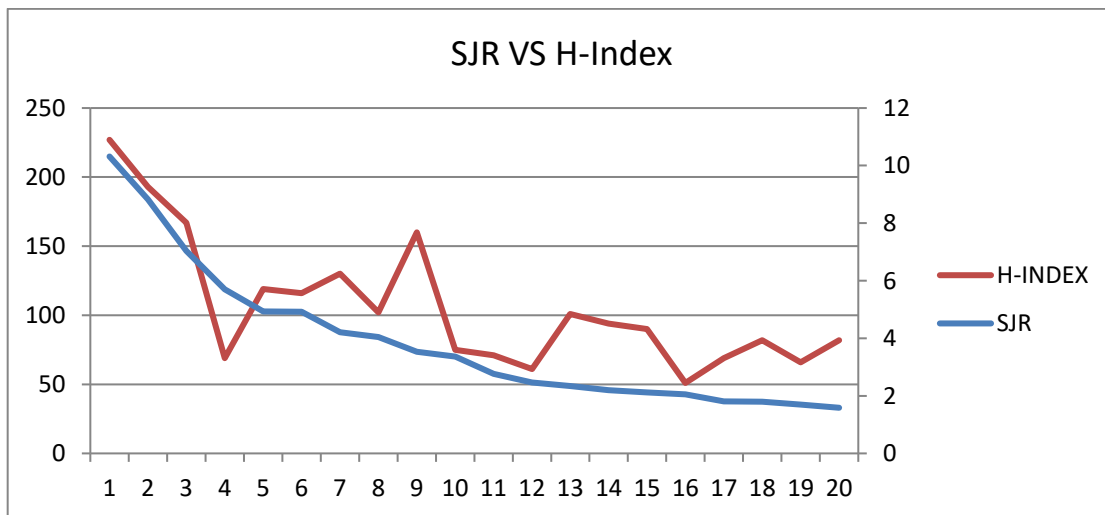


Figure 23

Indeed, we observe that also at the following graph where our data were sorted based on H index and the top 20 of them were selected again. This is happening because H index is calculating the scientist's most cited papers and the number of citations that they have received and SJR is calculating the weighted citations received in year X at our case in the year 2015 to documents published in the journal in years X-1, X-2 and X-3 at our case the

years 2014,2013,2012. So as a conclusion, we can observe the correlation between SJR and H-index is null.

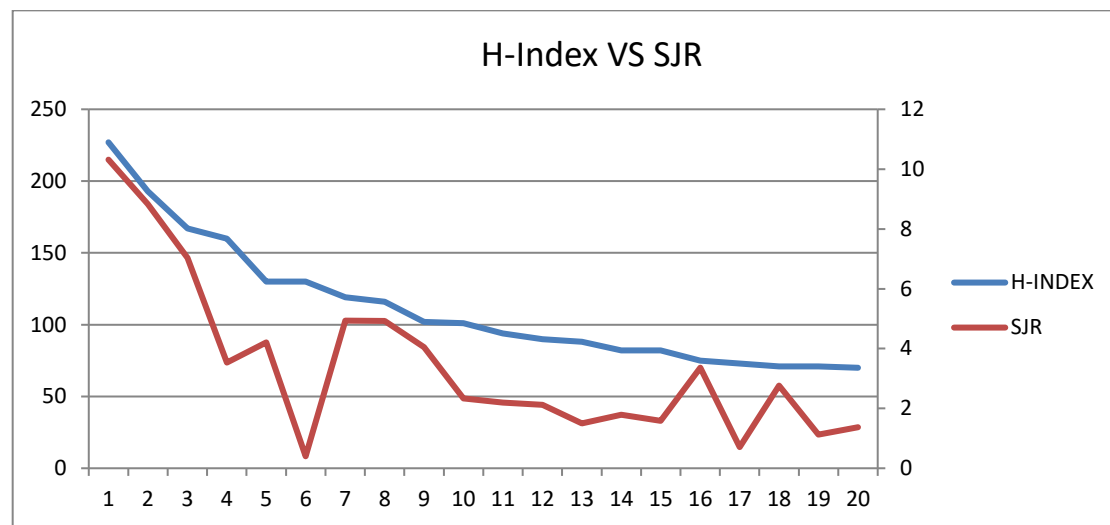


Figure 24

2.3.2 Journals and Book Series

Afterwards, we decided to delete all the conference and proceedings from our data and keep only the book series and the journals. From those data, we tried again to come to assumptions.

2.3.2.1 Data Analysis Based on SJR

Firstly, we recalculated the quartiles based on their SJR as it has been shown in the bar chart below. This bar chart also points us out how many of our data were journal and how many were book series.

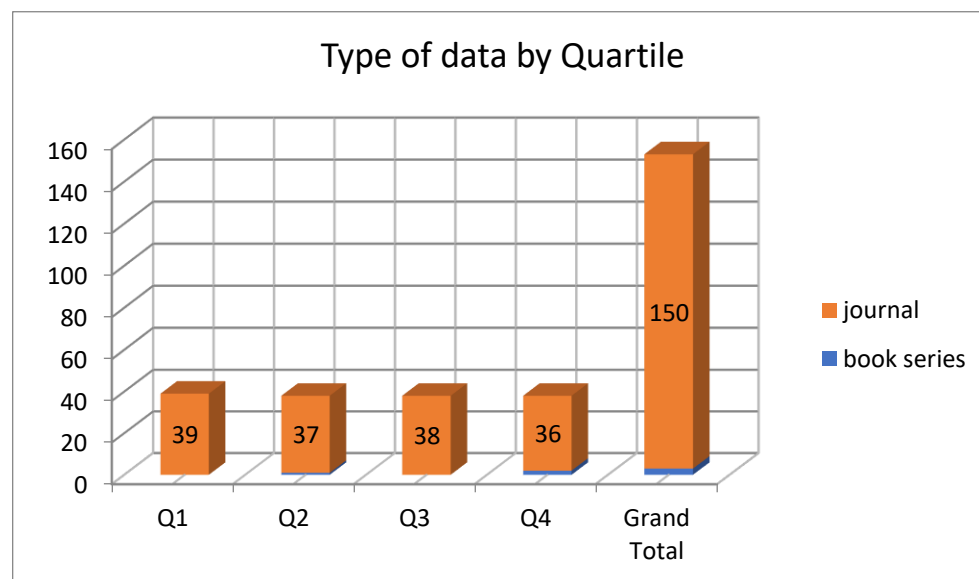


Figure 25

Furthermore, two pie charts were created in order to shows more accurate how many of the journals and the book series were in each quartile.

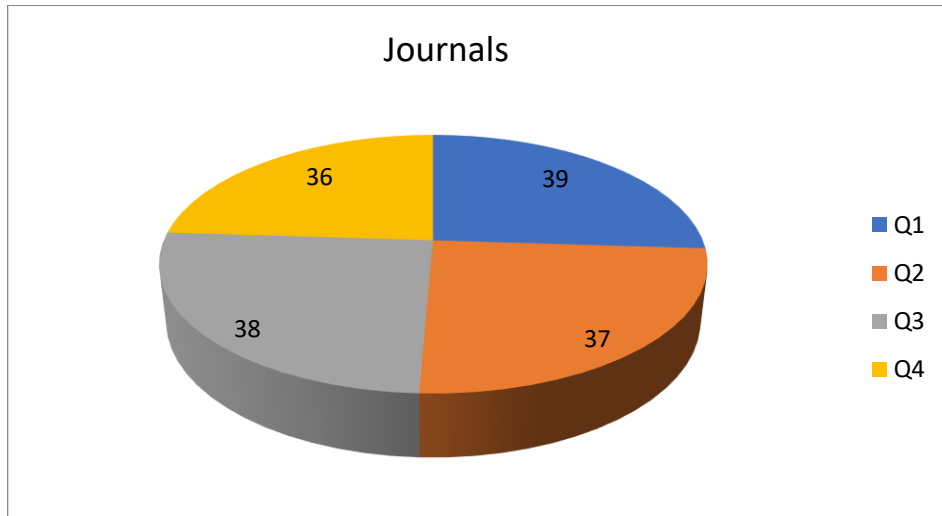


Figure 26

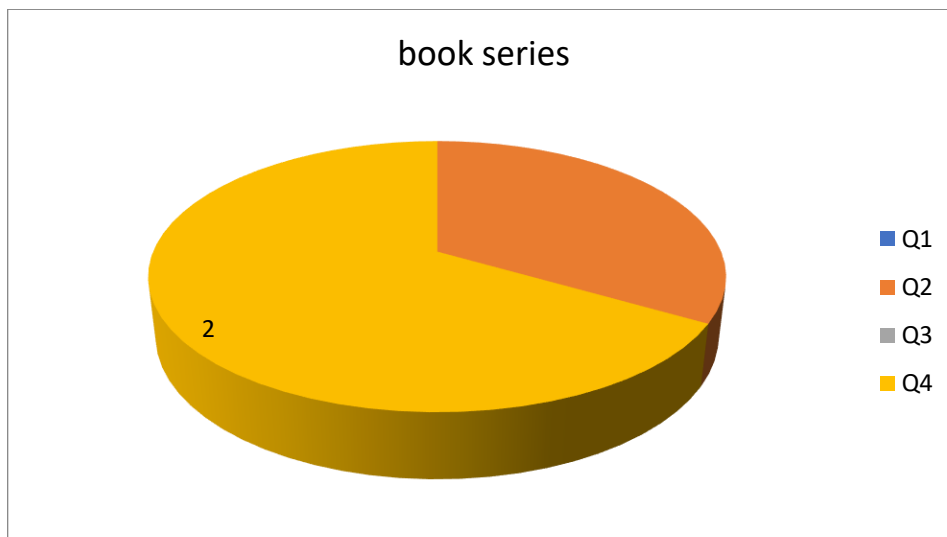


Figure 27

As it was expected at this pie charts we don't have book series in quartile 1 and we have book series only in quartile 2 and quartile 4. On the other hand, we have journals in all the other Quartiles.

Similarly, with before we deviated our data again in four more quartiles in order to analyze better our data. The axis y shows the SJR and the axis x shows the four quartiles and the total. At this case, also our data is gathered at the bottom and have the same problems as before with the max and min.

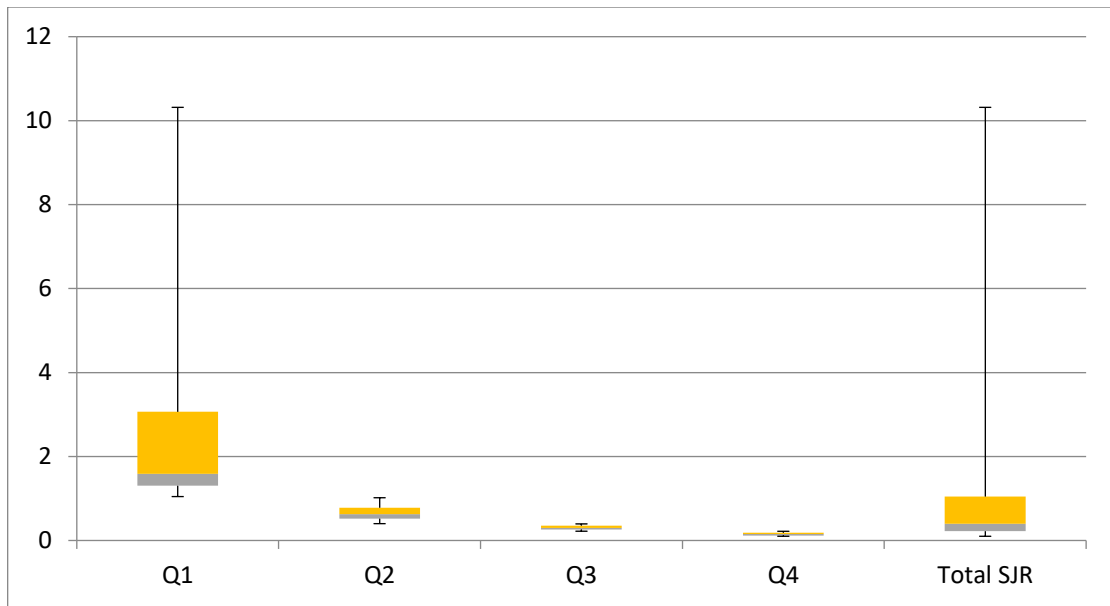


Figure 28

Outliers (k=1.5, k=3)

Furthermore, we considered in the boxplots below the outliers with $k=1.5$ (FIG.30) and $k=3$ (FIG.31).

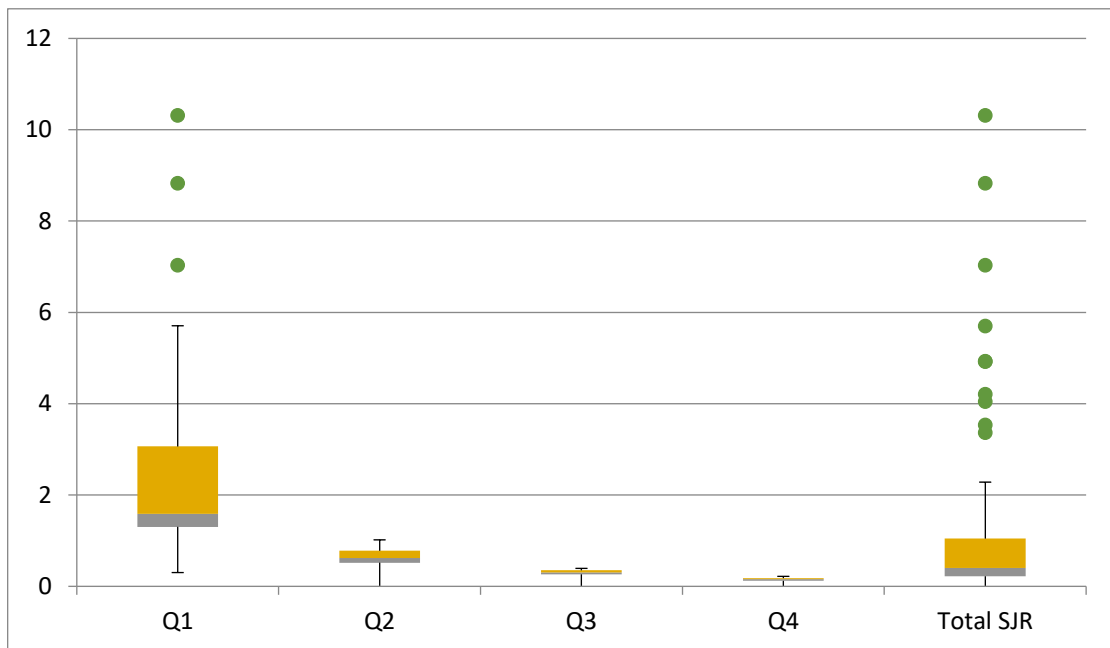


Figure 29

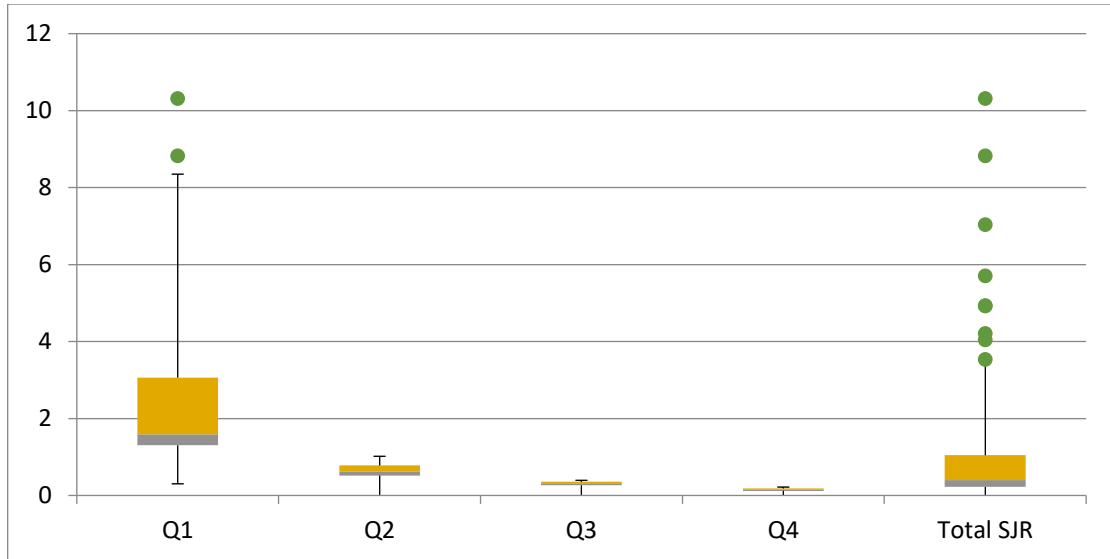


Figure 30

Also, according to SJR we constructed the normal frequency distribution chart that is attached below.

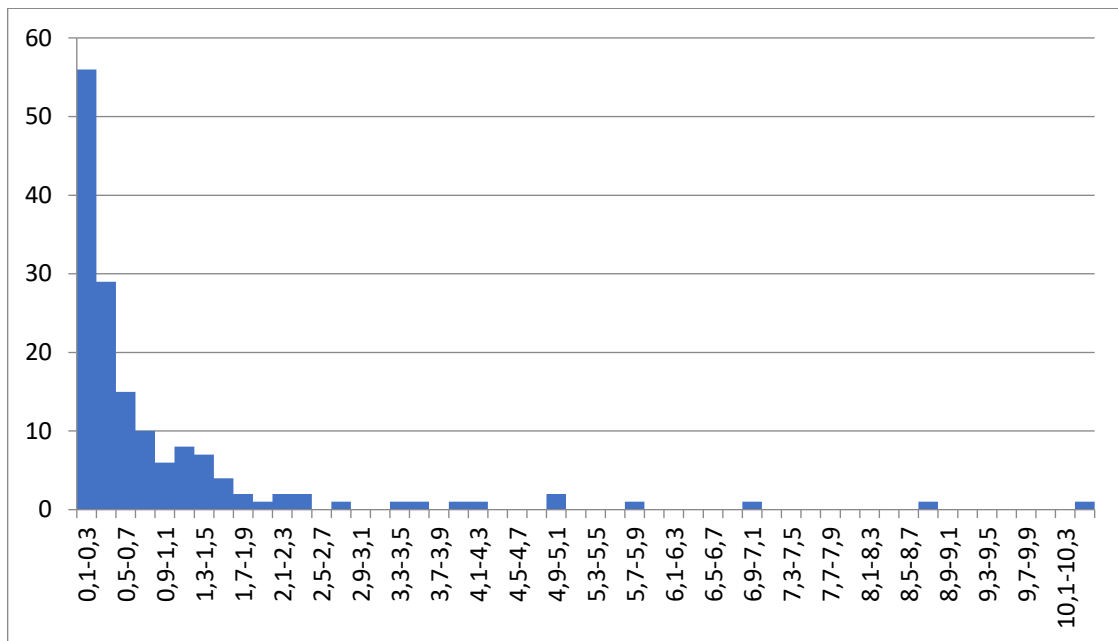


Figure 31

2.3.2.2 Data Analysis Based on H- index

Afterwards, we sorted our data based on H index and we constructed the boxplots below. The axis y shows the H index and the axis x shows the four quartiles and the total.

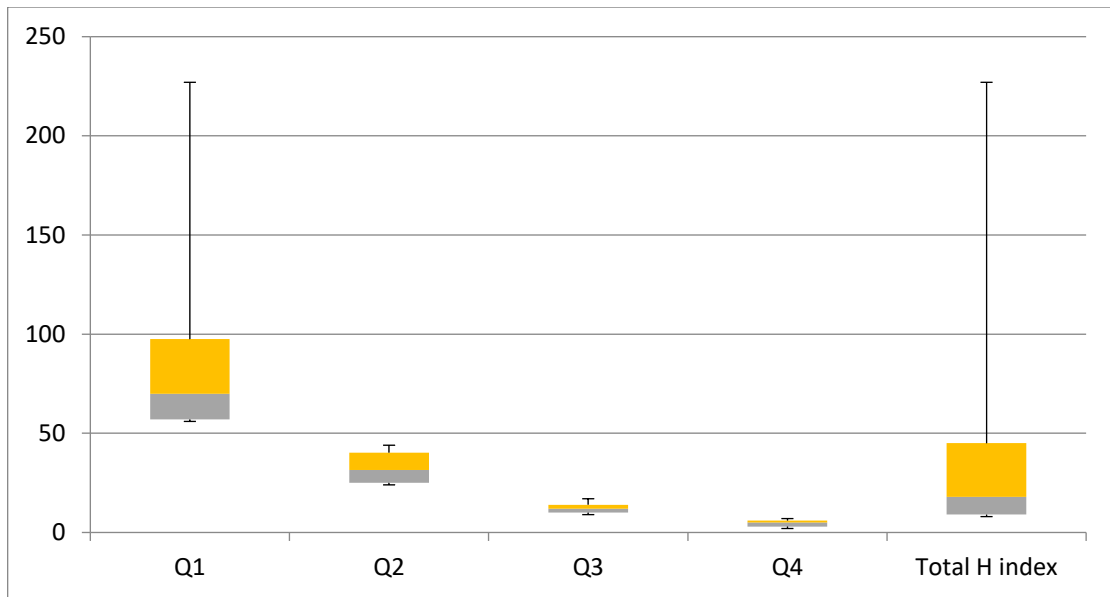


Figure 32

Outliers (k=1.5, k=3)

The following boxplots are taking into consideration the outliers. The first one is with $k=1.5$ (FIG.32) and the second one is with $k=3$ (FIG.33).

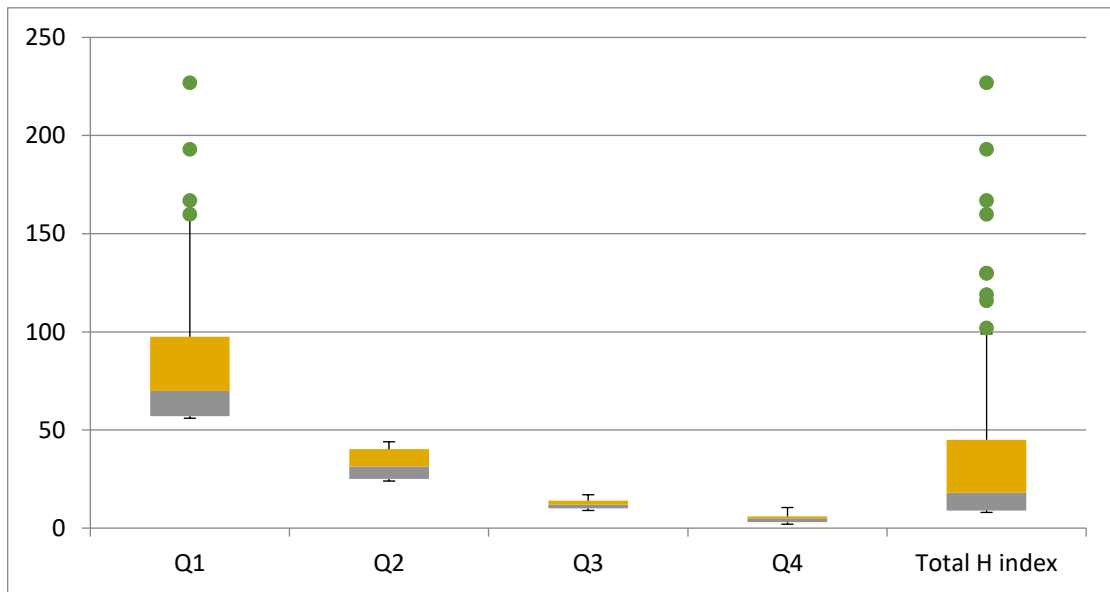


Figure 33

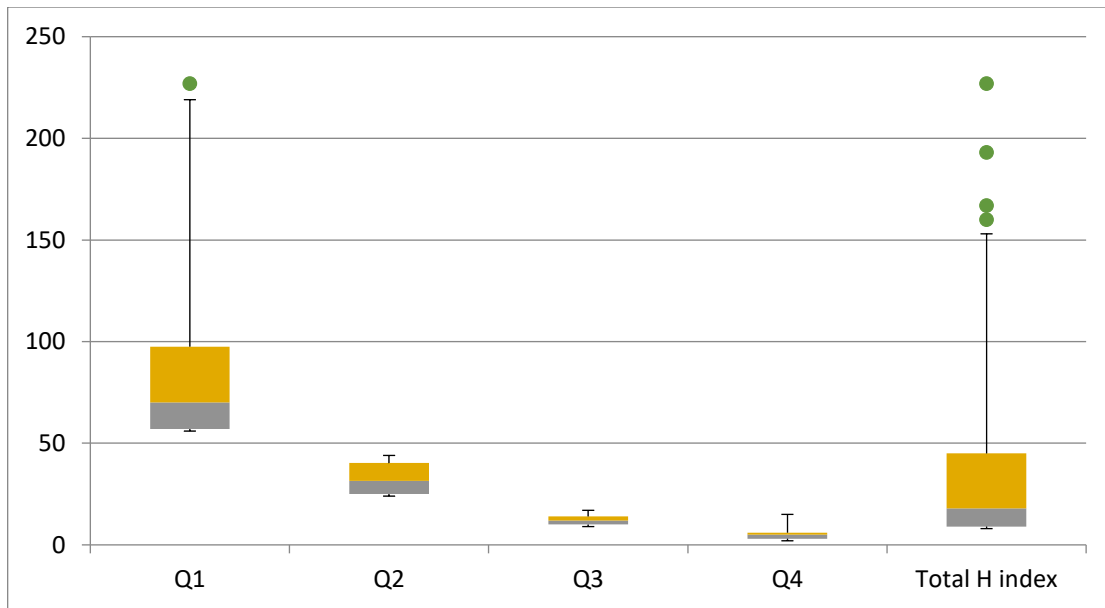


Figure 34

Over and above, we constructed a histogram based on H index.

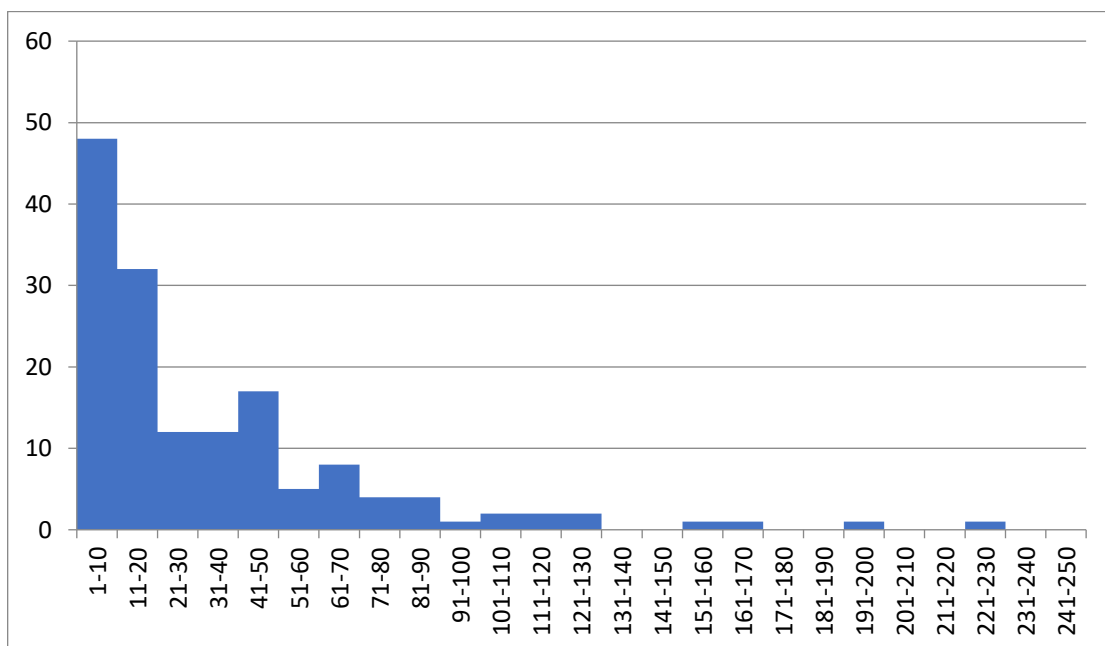


Figure 35

2.3.2.3 SJR VS H-index

Finally, we recalculated the top 20 of our data based on SJR(FIG.37) and the top 20 based on H index(FIG.38). From those diagrams, a conclusion can be made. The top 20 data based on SJR but also on H index were all journals. On the second column of both diagrams the sum of the top 20 journals SJR sorted by SJR(FIRG.37) and on H index(FIG.38) has been shown. At the third column of the first diagram the sum of the top 20 H index but sorted by SJR it has been also shown. And at the second diagram at the third column the sum of top 20 H index but sorted by H index is represented.

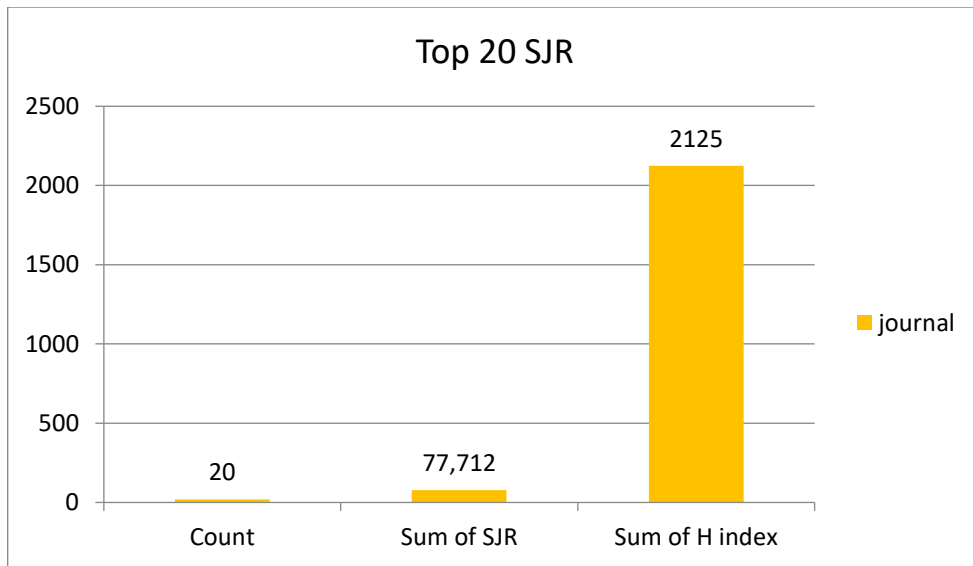


Figure 36

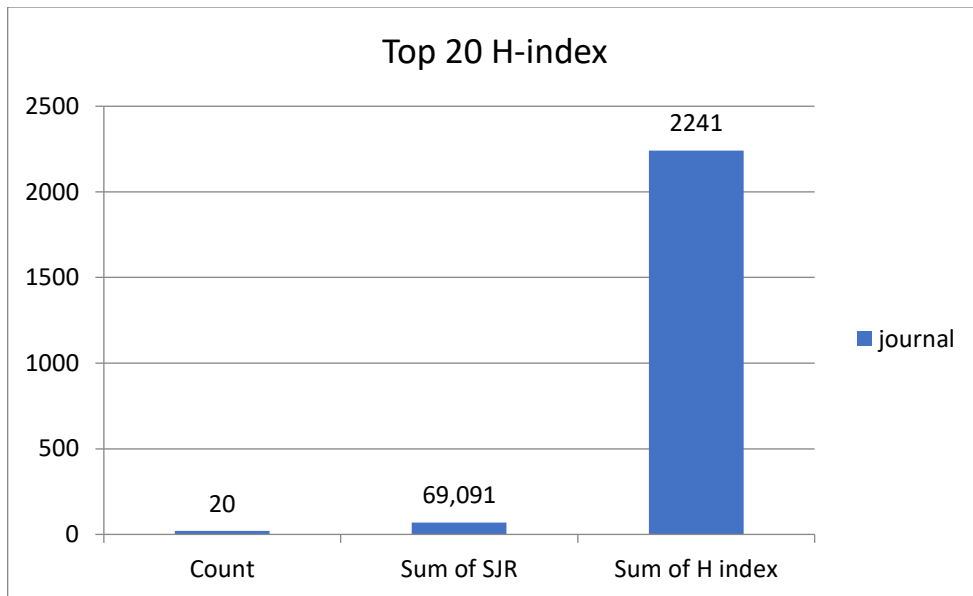


Figure 37

2.3.3 Journals

Furthermore, at this section all the book series were deleted. From those data that were containing only the journals, some assumptions have made.

2.3.3.1 Data Analysis Based on SJR

Firstly, we recalculated the quartiles based on their SJR and we constructed the boxplots below. In the first boxplot, the axis y shows the SJR and the axis x shows the four quartiles and the total. Also, at this point the majority of our data are gathered at the bottom of our boxplot and the same problem have occurred.

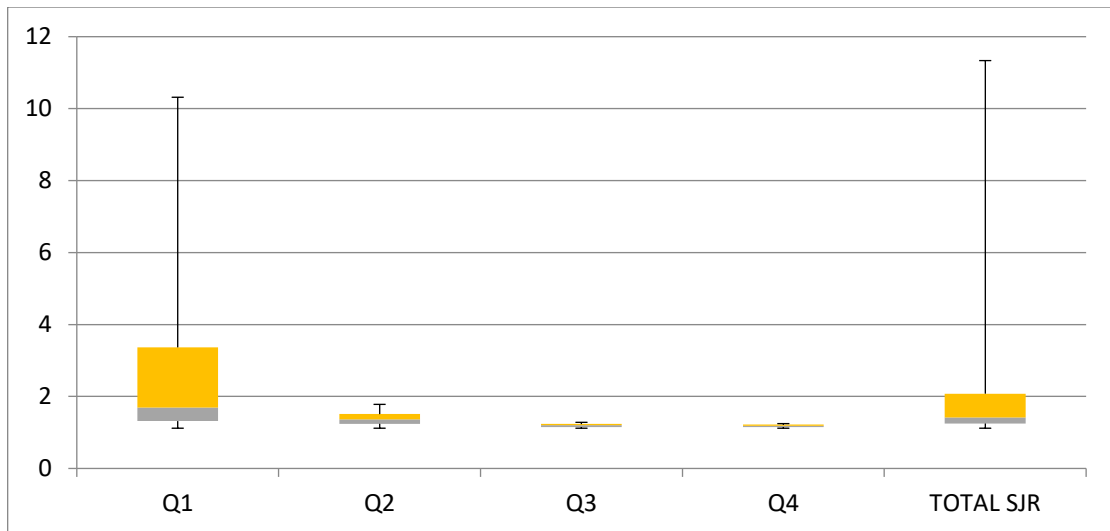


Figure 38

Outliers (k=1.5, k=3)

In addition, we considered in the boxplot below the outliers with k=1.5 (FIG.40) and k=3(FIG.41).

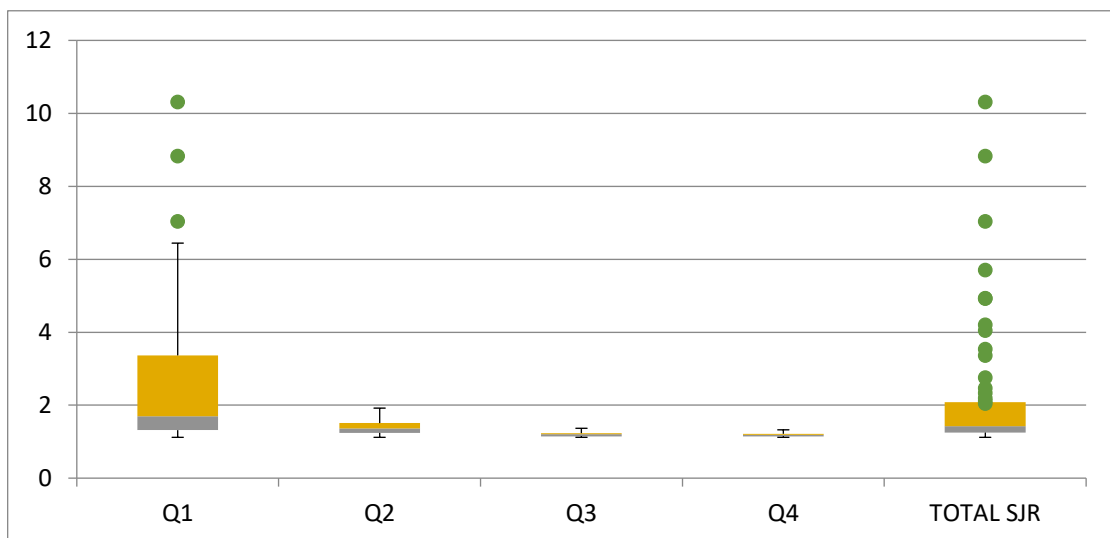


Figure 39

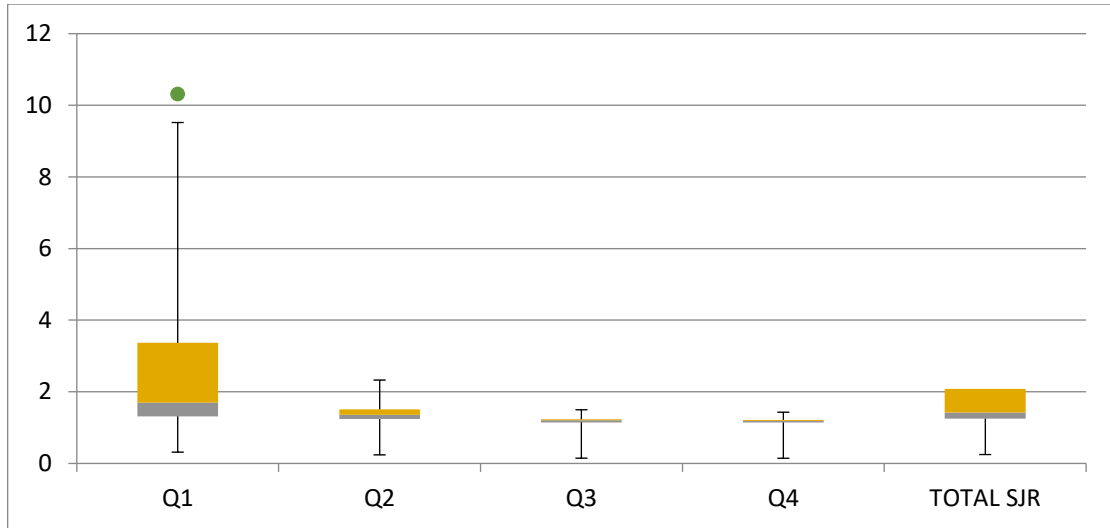


Figure 40

Moreover, a frequency diagram based on SJR was created.

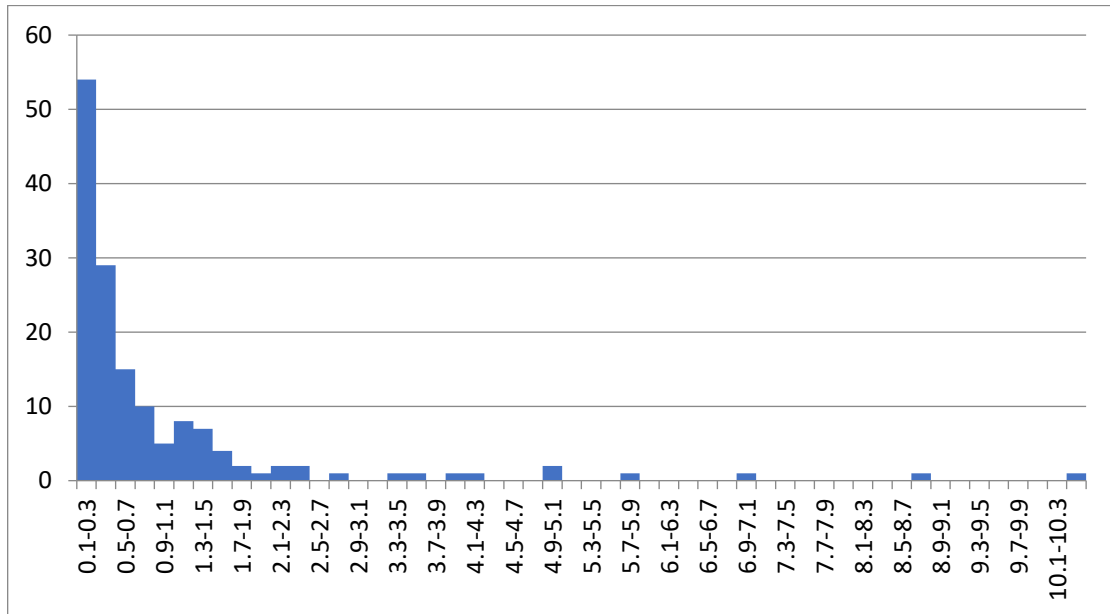


Figure 41

2.3.3.2 Data Analysis Based on H- index

Subsequently, we sorted our data based on H index and we constructed the boxplots below.

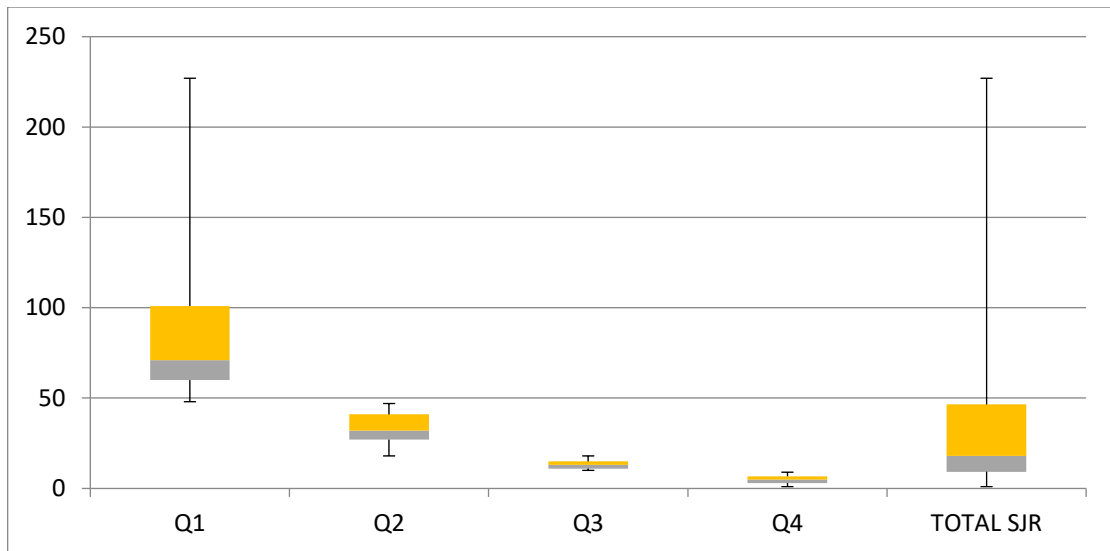


Figure 42

Outliers (k=1.5, k=3)

Afterwards, we considered in the boxplot below the outliers with $k=1.5$ (FIG.44) and $k=3$ (FIG.45).

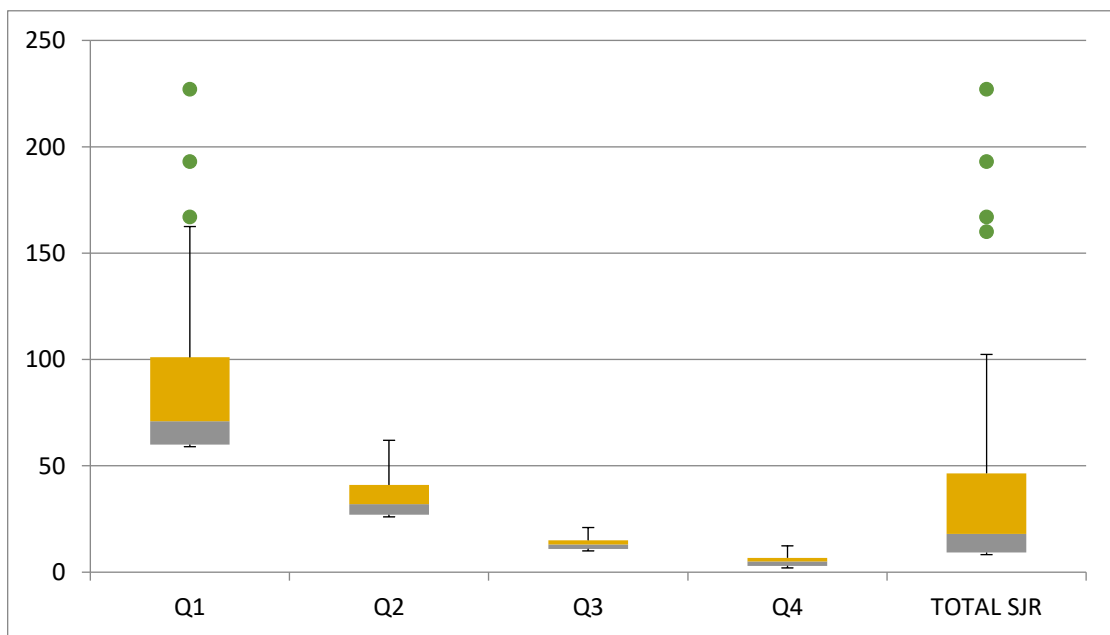


Figure 43

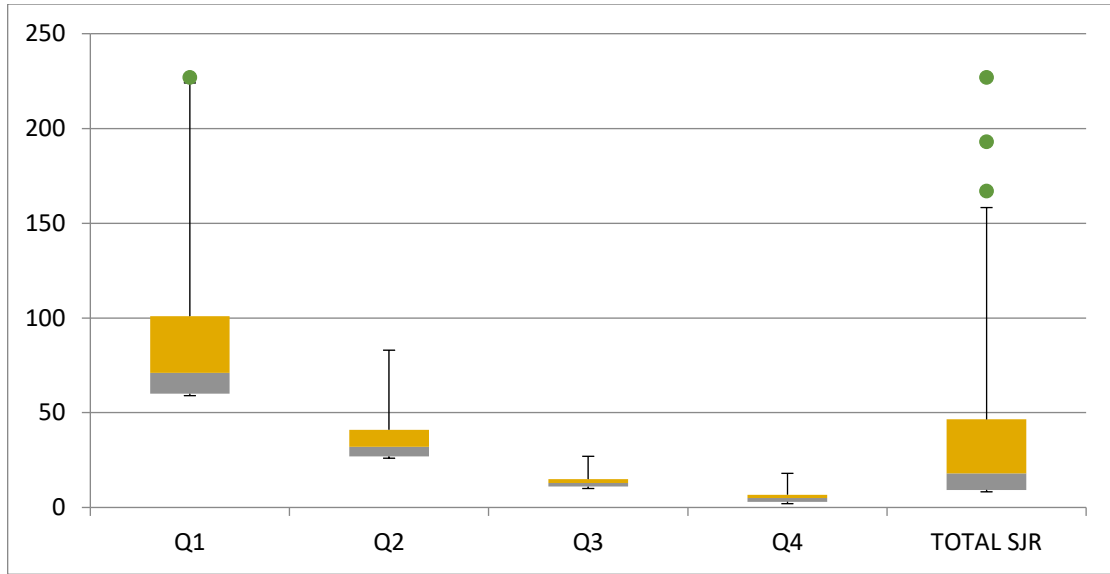


Figure 44

Then, the frequency diagram based on H index were created.

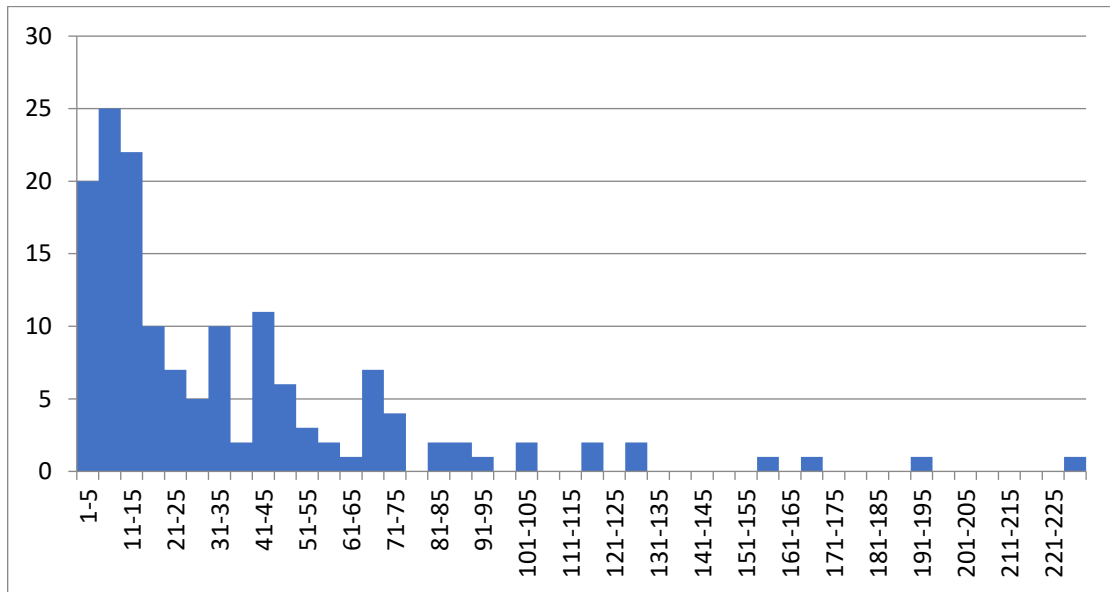


Figure 45

2.3.3.3 SJR VS H-index

Finally, a comparison was made between the top 20 of our data based on SJR and based on H index. In the diagram below, the top 20 of our data are shown based on SJR. Before we constructed this diagram, we sorted our data based on SJR and we took the top 20 of them. In this diagram, the blue line represents the SJR and the orange line the H index top 20 based on SJR.

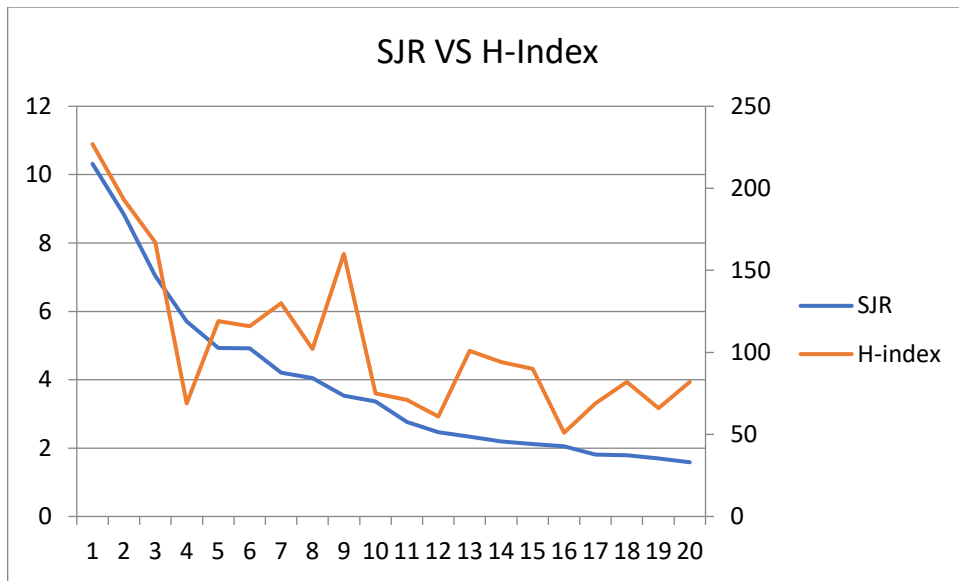


Figure 46

Figure 46 shows again the top 20 of our data but sorted by H index. In this diagram, the blue line represents the H index and the orange line the SJR top 20 based on H index.

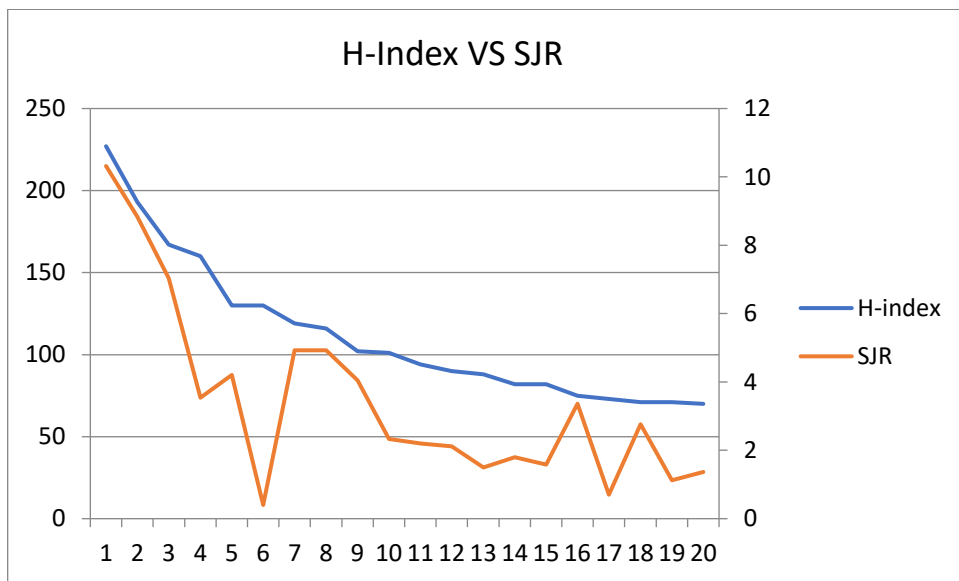


Figure 47

So as a conclusion, we can observe again that the correlation between SJR and H-index is null.

2.4 Research Output

In our attempt to lift the covers on the internal workings of the journals, we tried to examine the relationships between SJR and total docs, total references, total cites and finally citable docs. This information was taken from the first excel we downloaded. There were the last 4 columns in that excel if we exclude the country. The same procedure was made for the H-index respectively. In the first occasion, the data were sorted by SJR in ascending order and at the second occasion the data were sorted by H-index also in ascending order.

2.4.1 Total Docs

The diagram below shows the relationship between the SJR and the total docs. From this diagram, it's obvious that the journals with Q1 had more documents published the year 2015, 2761 documents. In general, we can conclude that journals with higher SJR have more document published each year. This may be happening because they may have bigger editorial board but that will be examined in other chapters.

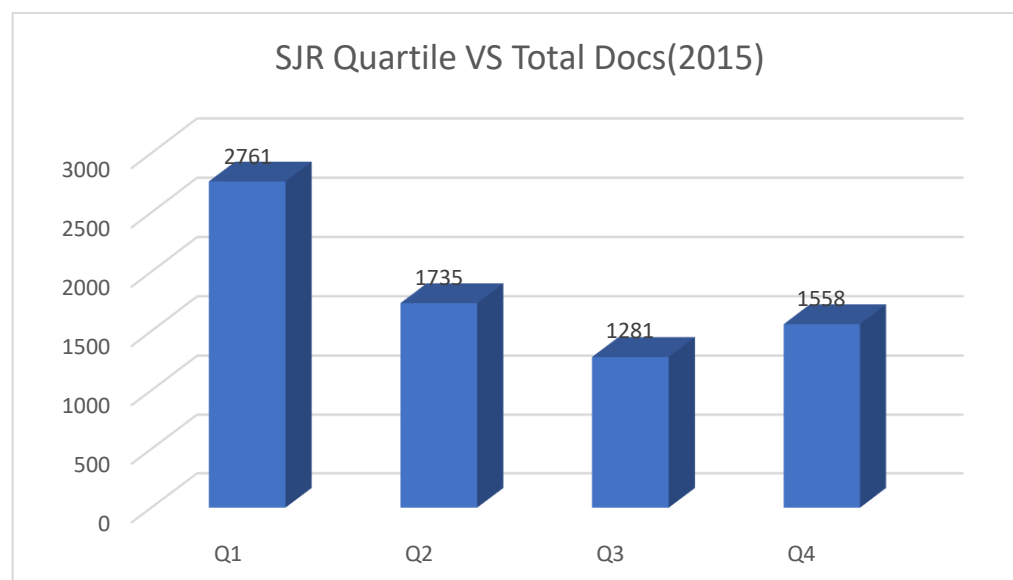


Figure 48

2.4.2 Total References

Afterwards, the same procedure was continued in order to capture the relationship between SJR Quartile and total. But what is total references? Total references include all the bibliographical references in a journal in the selected period. [Scimago Journal & Country Rank. Available at <http://www.scimagojr.com/help.php> (last access 01-11-2016)]. The diagrams below show the relationship between SJR and total references. At this case, we come to the same conclusion that the highest quartile a journal has the more references it uses.

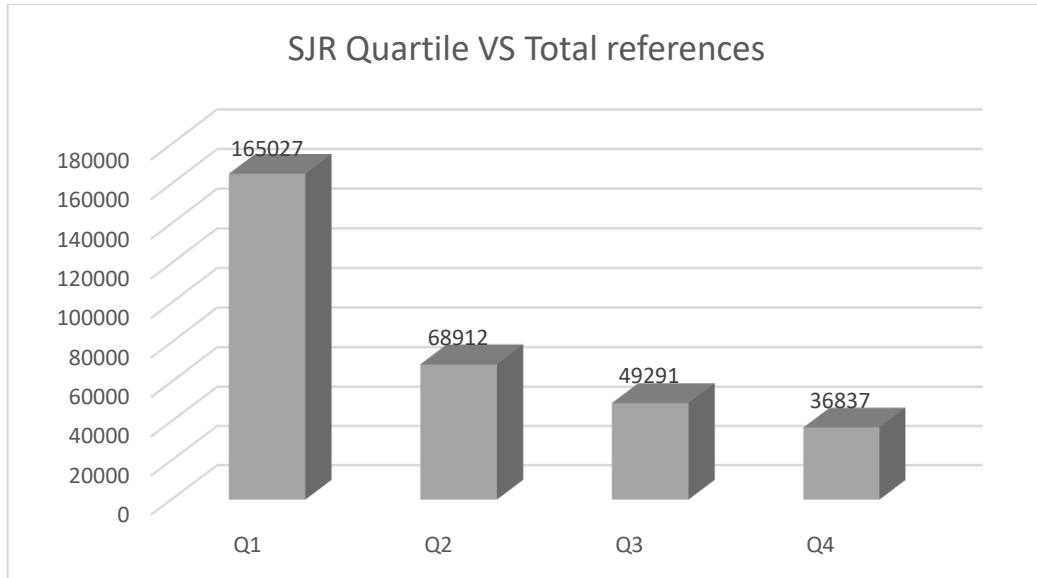


Figure 49

2.4.3 Total Cites

Total cites is the number of citations received in the selected year by a journal to the documents published in the three previous years, --i.e. citations received in year X to documents published in years X-1, X-2 and X-3. All types of documents are considered. [Scimago Journal & Country Rank. Available at <http://www.scimagojr.com/help.php> (last access 01-11-2016)]. At our case, the years that was used were 2015, 2014, 2013 and 2012. The same diagram was constructed as you can see below. As well as above the highest quartile a journal has the more cites it has from other journals.

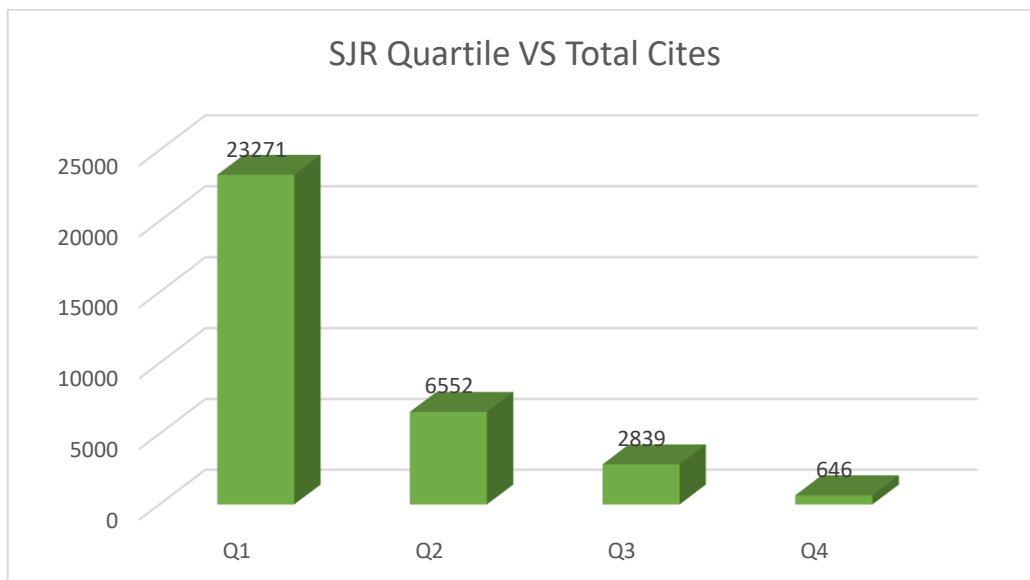


Figure 50

2.4.4 Citable Docs

Citable docs are the number of citable documents published by a journal in the three previous years (selected year documents are excluded). Exclusively articles, reviews and conference papers are considered. [Scimago Journal & Country Rank. Available at

<http://www.scimagojr.com/help.php> (last access 01-11-2016)]. At this case, the same diagrams were made and we come to the conclusion that the highest quartile a journal has the more cites it gets from other journals.

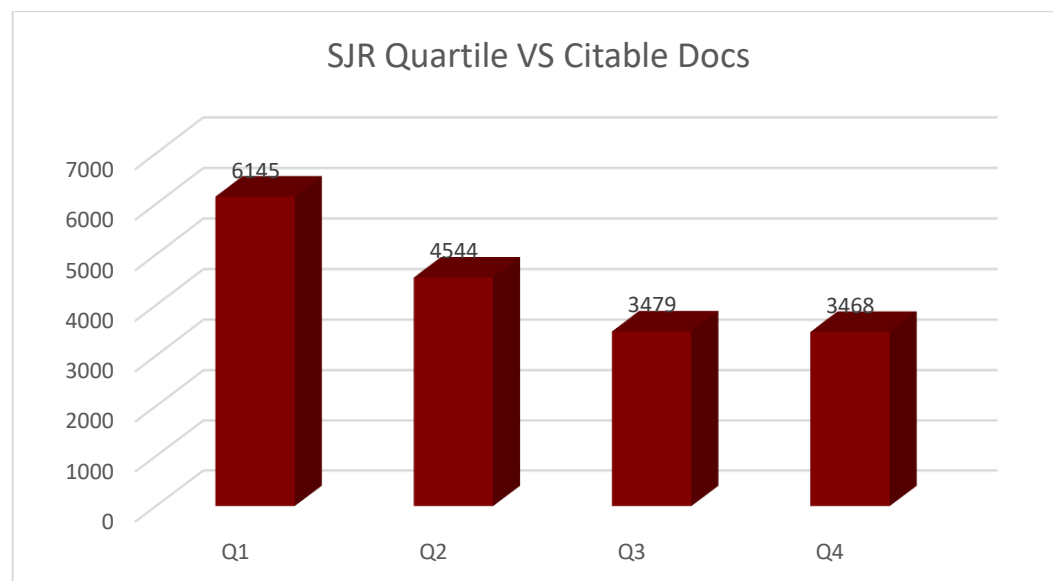


Figure 51

From all this section above we can conclude that only total cities have linear manner with SJR as well as with H-index. All the other capture shows us that they're not any particular relationship between SJR or H-index with the measurements that have been examined above except from the total cities.

3. Journal Overview

3.1 Data about the 151 journals

The second part of our data collection started by searching for every journal separately there publishing house. Those data were found simply by searching the web and trying to find the official -page for each journal. Their URL were saved in an excel file which contained at the beginning in the first column the name of all 150 journals, the second column had the ISSN of each journal and at the third and fourth column had the URL and the publishing house. In some cases, a journal had more than one publishing houses so extra columns were added in order to put those publishing houses.

Title	ISSN	Publisher 1	Publisher 2	Publisher 3	Website
Academy of Management Journal	ISSN 00014273	academy_of_management			http://ami.sagepub.com
Academy of Management Review	ISSN 03637425	academy_of_management			http://amr.sagepub.com
Asian Journal of Shipping and Logistics	ISSN 20925212	elsevier	korean_association_of_shipping_and_logistics		http://www.journals.elsevier.com/the-asian-journal-of-shipping-and-logistics
Asian Journal of Technology Innovation	ISSN 19761597, 21586100	routledge_taylor_&_francis_group	korean_society_for_innovation_management_and_economics		http://www.tandfonline.com/loi/asi20#V2yp05SL71
AutoTechnology	ISSN 16168216				
Baltic Journal of Management	ISSN 17465265	emerald_group_publishing	baltic_management_development_association		http://www.emeraldinsight.com/journal/bjmr
British Journal of Industrial Relations	ISSN 14678543, 00071011	wiley	london_school_of_economics		http://onlinelibrary.wiley.com/journal/10.1111/ISSN
British Journal of Management	ISSN 14678551, 10453100	wiley	british_academy_of_management		http://onlinelibrary.wiley.com/journal/10.1111/ISSN
Canadian Journal of Administrative Sciences	ISSN 08250383	wiley	administrative_sciences_association_of_canada		http://onlinelibrary.wiley.com/journal/10.1002/ISSN

Image 12

Subsequently, the archives for the year 2015 of all 150 journals were searched. From those data were extracted such as the volumes and the issues that each journal had the year 2015. Volumes and Issues were the other two columns added. When this procedure took place some differences between journals ways of counting volumes and issues was observed. Firstly, the volumes were counted based on how many different volumes had each journal the year 2015 and not focusing in the number of volumes that the journal had since it published the first time. Also, in some journals except from their issues they had supplements which is special issues that are not counting in this research as issues. So, an extra column was added and contained the number of supplements that each journal had if it had otherwise it contained 0. As a consequence, a new column was created and it was the sum of issues and supplements. Next, from the table of content of each journal for the year 2015 thirteen new columns were created. That's because a way of separating the papers and counting each journal pages was attempted. The basic separation has focusing in regular papers and special issues. If the journal had special issues those were counted separately and same happed with their pages. *A special issue focuses on a specific area of research that has a broad appeal and falls within the aims and scopes of the journal. It also provides an excellent opportunity to review a particular theme, examine previously unaddressed aspects, propose and develop new approaches, exchange perspectives and encourage new lines of research (Elsevier <https://www.elsevier.com/editors/guest-editors> (last access 13-11-2016))*. The separation between special issues and regular papers was made based on the sub title that an issue may had or because it had guest editorial or simply because it was telling us that it was a special issue. All the other papers were considered as regular papers and there were counted in a separate column same as their pages. But, besides papers in the content of the journals other section was observed. Corrigenda or Errata was one of them. Corrigenda is synonyms with Errata that's why the number of them and the number of pages of them were counted in two other columns. *An erratum or corrigendum (plural: errata, corrigenda) (comes from Latin: errata corrige) is a correction of a published text. An erratum is most commonly issued shortly after its original text is published. Patches to security issues in a computer program are also sometimes called errata. As a general rule, publishers issue an erratum for a production error (i.e., an error introduced during the publishing process) and*

a corrigendum for an author's error. (Wikipedia <https://en.wikipedia.org/wiki/Erratum> [Last Access 12-11-2016]). Also, retractions were found and counted in separate columns, their number and their number of pages. A retraction is a public statement made about an earlier statement that withdraws, cancels, refutes, or reverses the original statement or ceases and desists from publishing the original statement. The retraction may be initiated by the editors of a journal, or by the author(s) of the papers (or their institution). Retractions may or may not be accompanied by the author's further explanation as to how the original statement came to be made and/or what subsequent events, discoveries, or experiences led to the subsequent retraction. They are also in some cases accompanied by apologies for previous error and/or expressions of gratitude to persons who disclosed the error to the author. Retractions always negate the author's previous public support for the original statement. Like original statements, retractions are in some cases incorrect. Retractions share with original statements the attribute that they are in some cases made insincerely, in some cases for personal gain, and in others under duress. (Wikipedia <https://en.wikipedia.org/wiki/Retraction> [Last Access 12-11-2016]). All the other that didn't belong in any other category were counted as other and their pages as other pages. And that was all the new thirteen new columns. It should be mentioned also that the index, the editorial boards and other non-important parts wasn't counted at all. Then, in this excel two other new columns were added which contained the sum of all the documents and the sum of all the pages. The sum of all the documents was compared with the Total Docs 2015 which the SCImago Journal & Country Rank had provided us in the first data about the journals. Finally, the last column of that excel was the submission. In the column submission, the way that an author submits their paper is described. Three ways of submission was observed. The submission via webpage, via email and finally via mail. Additionally, in some journals there weren't any pages in that cases pages were counted as 0. That happened most of the time because those journals were only existed online. Afterwards, a statistical analysis was made in order to represent this data.

3.2 Publishing Houses

Firstly, the publishing houses were considered. Every journal may have had one, two or three publishing houses. For 5 journals, their publishing houses was not found. So, 105 journals had only one publishing house which represents the 69.54% of our journals, 41 journals had a second publishing house which is the 27.15% of our journals and finally only one journal had a third publishing house which is just the 0.66% of our journals. In the table below the 33 different publishing houses is shown as well as the number of journals they have published in this category. The total sum at the end of the table is not 151 because the publishing houses of 5 journals was found.

Publisher	Number of Journals
wiley	22
inderscience_publications	22
routledge_taylor_&_francis_group	18
emerald_group_publishing	15
elsevier	12
springer	12

sage_publications	10
palgrave_macmillan	4
igi_global	3
institute_for_operations_research_and_the_management_sciences	2
world_scientific_publishing_co	2
academy_of_management	2
harvard_business_publishing	1
informs_pubsonline	1
project_management_institute	1
printed_circuit_&_engineering_publications	1
university_of_hong_kong_publications	1
universidad_alberto_hurtado	1
revista_espacios	1
allied_academies	1
university_of_wisconsin_press	1
academic_journals_inc	1
informs_pubs_online	1
north_university_of_china	1
universitas_indonesia	1
multi_science_publishing	1
genetic_engineering_&_biotechnology_news	1
mit_sloan_school_of_management	1
quality_innovation_prosperity	1
ippublishing	1
intellect	1
ore_and_metals	1
open_journal_systems_at_nc_state_university	1
omniascience	1
(blanc)	
Sum	146

At the bar chart below the top 10 publishing houses is shown. Inderscience publications and Wiley are the most popular publishing houses with 22 journals published the year 2015 in the field of management of technology and innovation. Wiley from those 22 journals have 11 in

the Q1 of SJR, 7 in the Q2, 4 in the Q3 and 0 in the Q4. Also, Wiley have 4 journals in Q1 of H-Index, 7 in Q2, 2 in Q3 and 9 in the Q4. On the other hand, Inderscience publications have 0 journals in Q1 of SJR, 2 in Q2, 7 in the Q3 and 13 in the Q4. When the data are sorted by H-Index quartiles Inderscience publications have 7 journals in the Q1, 7 in the Q2, 5 in the Q3 and 3 in the Q4. So, when the data are sorted by SJR Wiley has the most journals published and belonging in the higher quartiles. On the contrary, when the data are sorted by H-Index Inderscience publications have the most journals that belong in the higher categories.

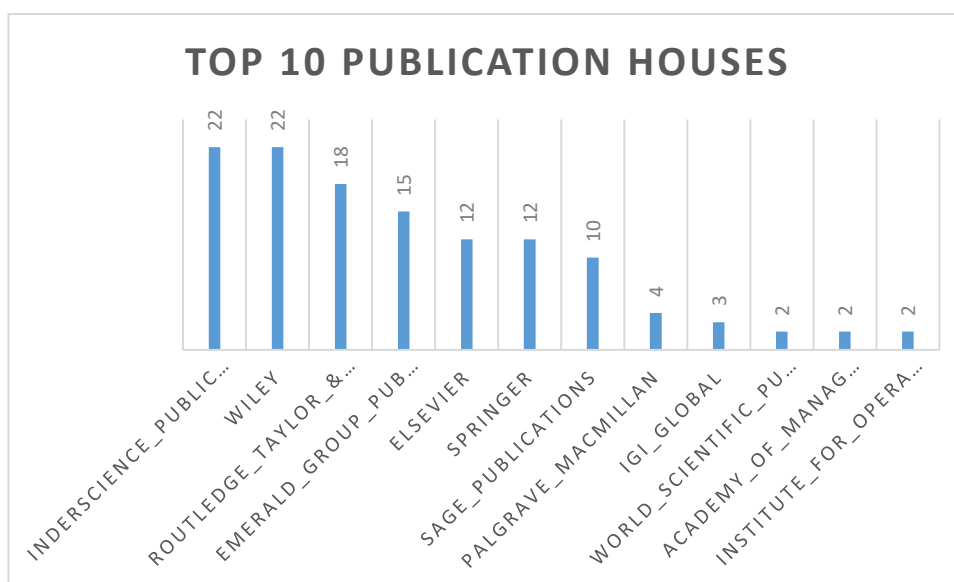


Figure 52

3.3 Submission

The 151 journals had three possible ways to submit an article via email, via mail and finally via website. In the diagram below it is shown that 10 journals had as a method of submission the email, 1 journal had the mail and 133 had the website. Null represents the 7 journals that it was not possible to find the method of submission. The website submission is more popular, probably because it is easier for the publishing houses to review them. When the submission was via email the email that was used most of time was the email of the publisher so if the journal had a lot of submission I guess that it was not really convenient to manage so many emails. It is worth mentioning that the journal that has as a method of submission the mail belongs in the Q3 in both SJR and H-Index. Also, the majority of the journals that have as a submission method the email belong in the Q4 in SJR and in the Q2 in H-Index.

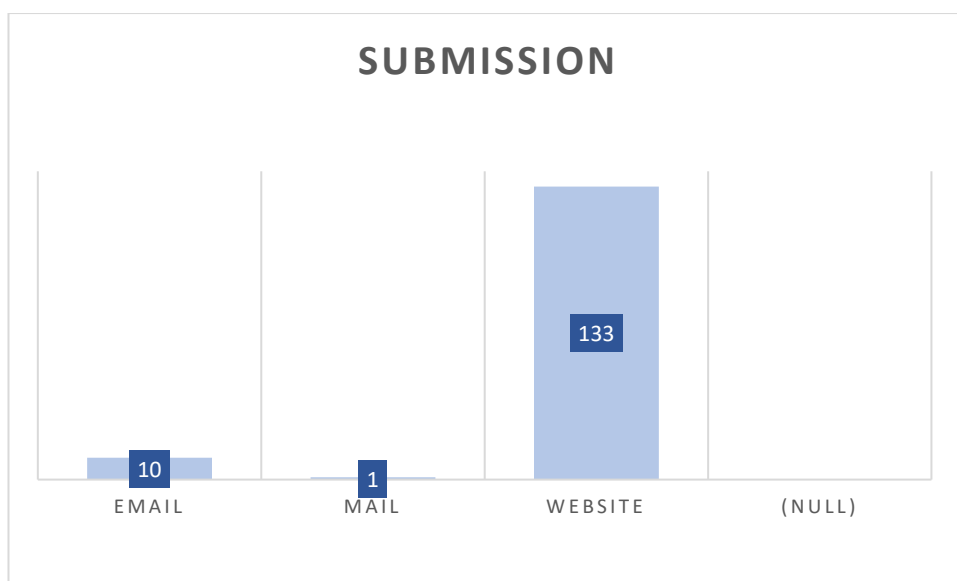


Figure 53

3.4 Volumes

Volumes were analyzed as well. From the frequency diagram below it is evident that the majority of our journals have number of volumes between 0 and 1. Never the less, there some journals who have 12 number of journals for example Technological Forecasting and Social Change which belongs in the Q1 in refer to SJR and in Q3 in refer to H-Index.

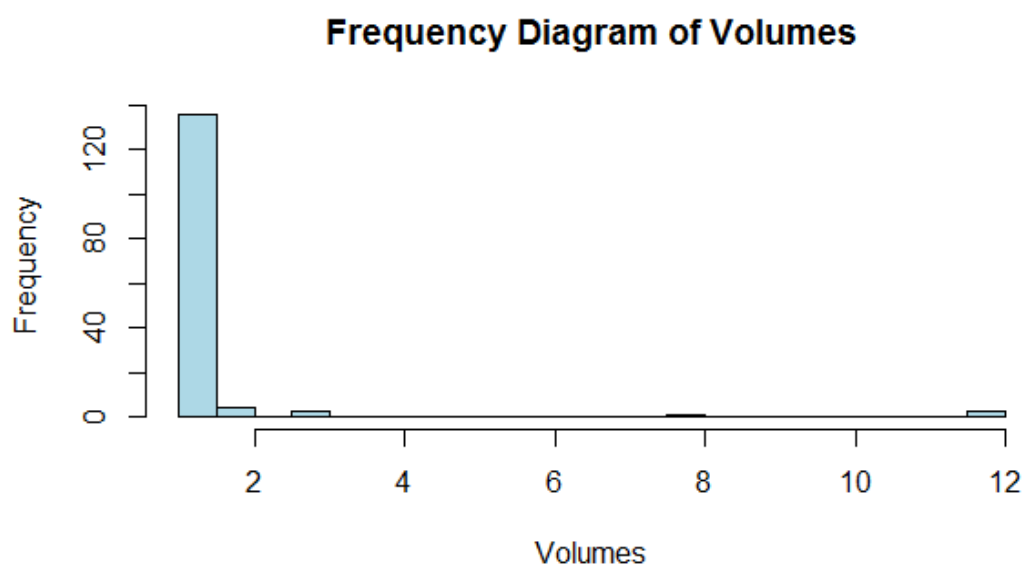


Figure 54

Furthermore, we tried to understand how the amount of volumes that a journal may have affects the SJR and H-index rank. We did that by analyzing the quartiles and the volumes that a journal has as it is being shown below. From that we can conclude that the number of volumes that a journal may have do not affect the SJR or the H-Index ranking.

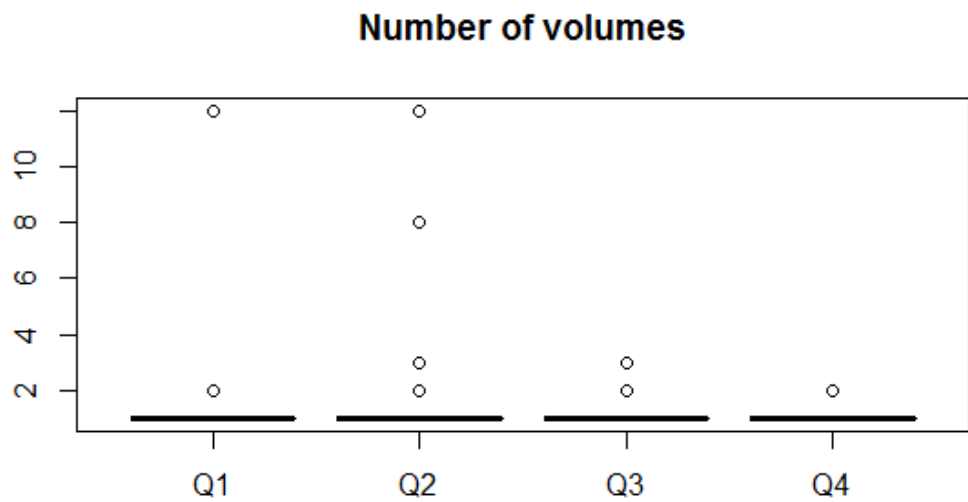


Figure 55

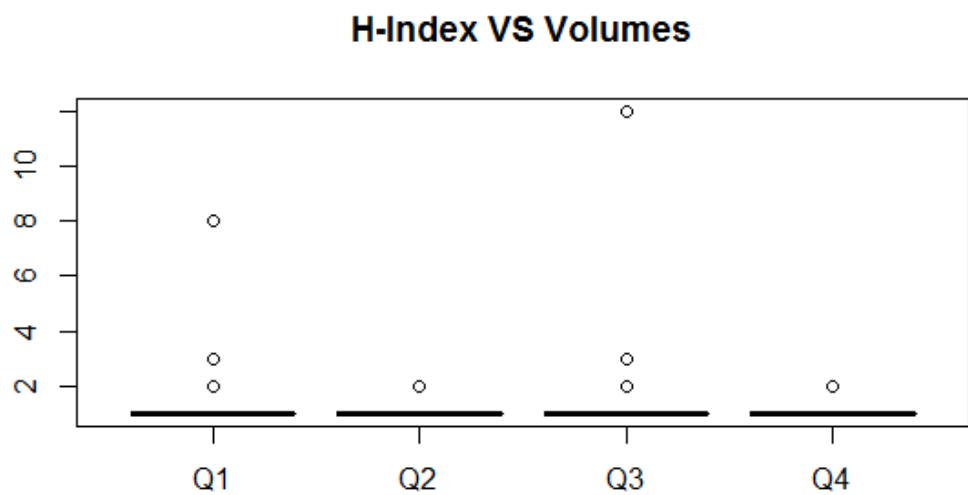


Figure 56

3.5 Regular Issues, Special Issues, Total Issues, Supplements

Moreover, in this section all the issues that a journal had are going to be analyzed. Firstly, the regular issues are examined. From the frequency diagram, it is obvious that the majority of our journals have between 2 and 3 regular issues the year 2015. Also, there are a lot which have 5 to 6 regular issues a year.

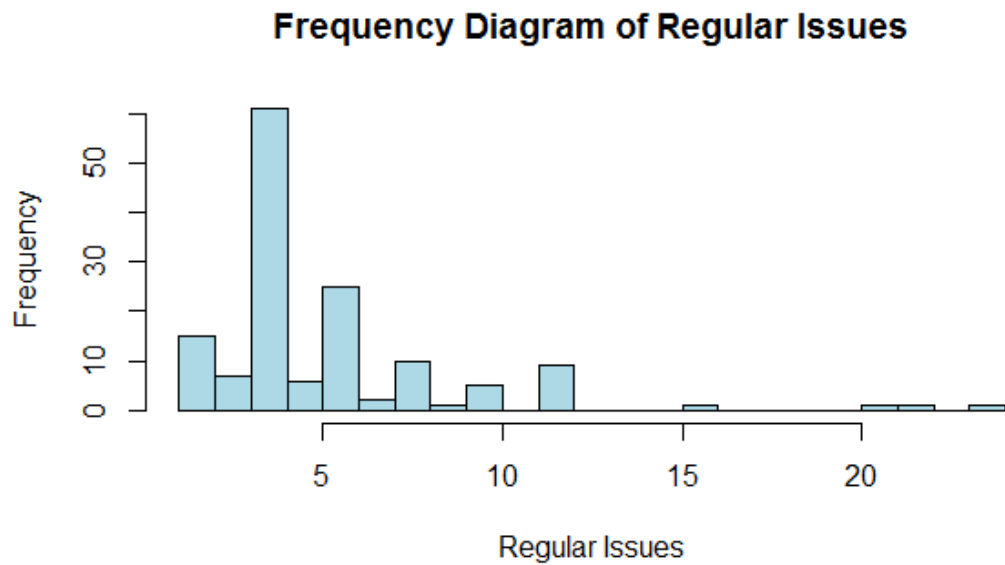


Figure 57

Afterwards the same procedure, as in volumes, was made in order to answer the question of whether the quartile is affected by the number of the regular issues that a journal had for the year 2015. In both boxplots, the journals that belong in the Q1 have more regular issues. From that we can come to the conclusion that the journal who have more regular issues tend to have higher ranking and belong in the Q1 and Q2. There are some outliers for example journals who have more than 12 regular issues a year and those outliers belong in the categories 2,3 and 4. That shows us that the best journals in that field have more issues published. Another good sign is that despite that Q1 is first in both boxplots all the other quartiles are distributed pretty well.

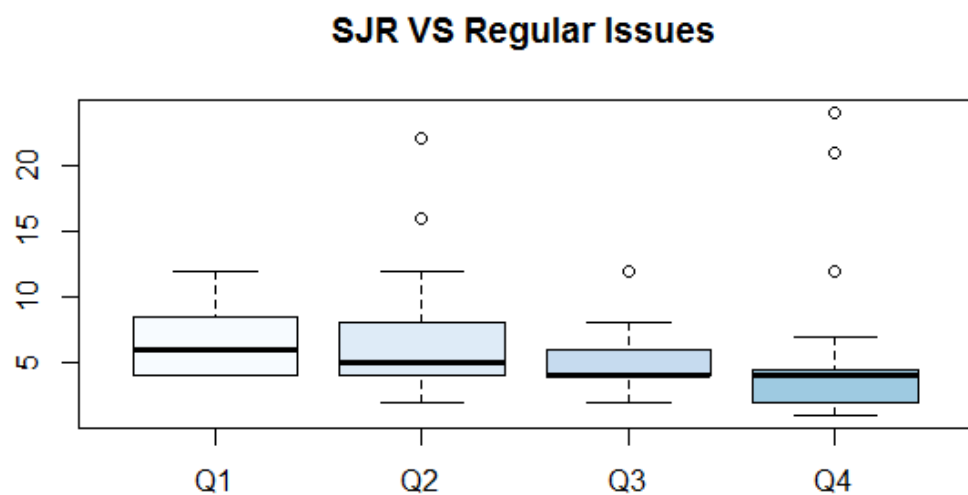


Figure 58

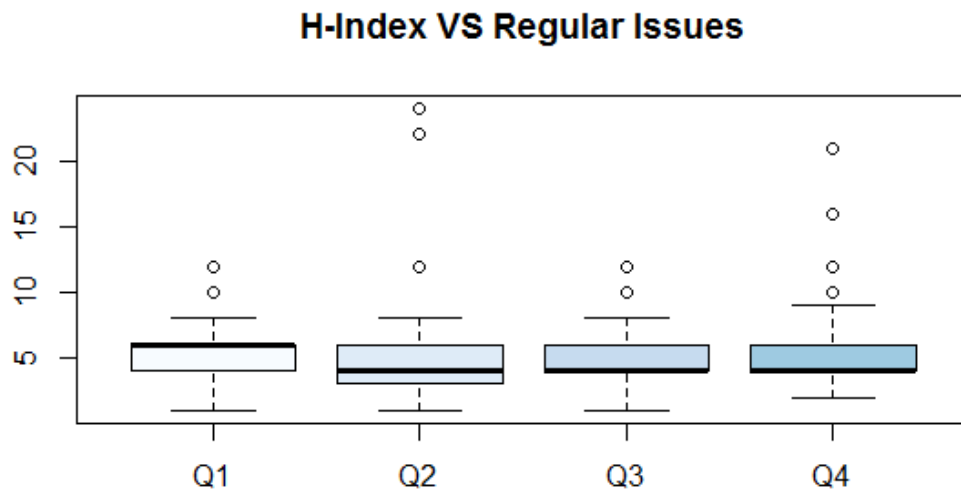


Figure 59

Furthermore, the number of special issues has been analyzed. The majority of our journals if they had special issues they would have had a number of special issues between 0 and 1. There are some outliers as Service Industries Journal which has 10 special issues the year 2015. In general, 59 journals out of 150 had special issues that is 39.33% of the initial list.

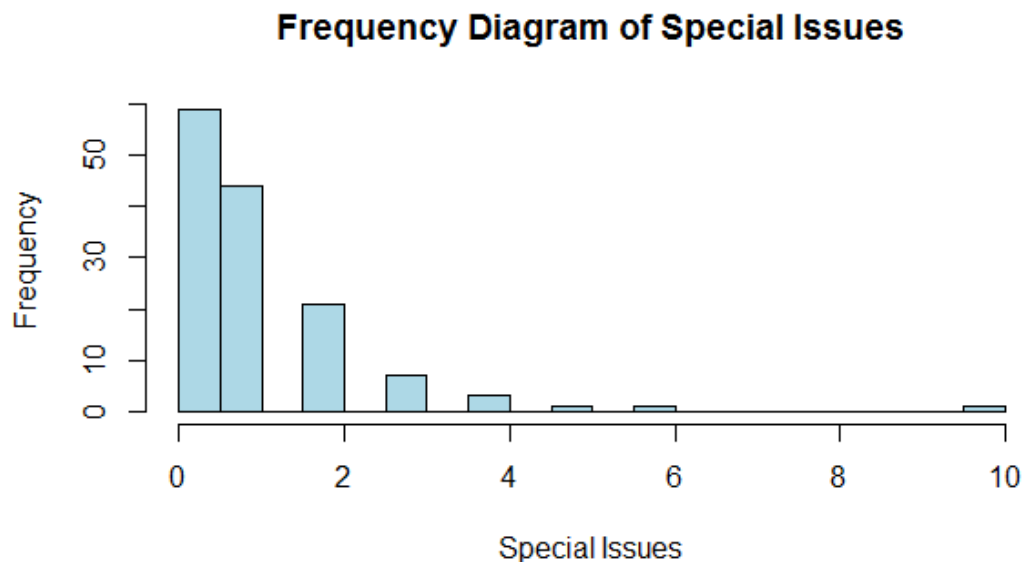


Figure 60

Below, the boxplot where SJR and H-Index are compared with special issues. In the first boxplot, there is great distribution of the data between the quartiles but Q4 is relatively low compared to the other quartiles. That is maybe because in the Q4 exist the most missing data. On the other hand, in the H-Index boxplot Q2 has the biggest number of special issues and all the other quartiles have almost the same number of special issues.

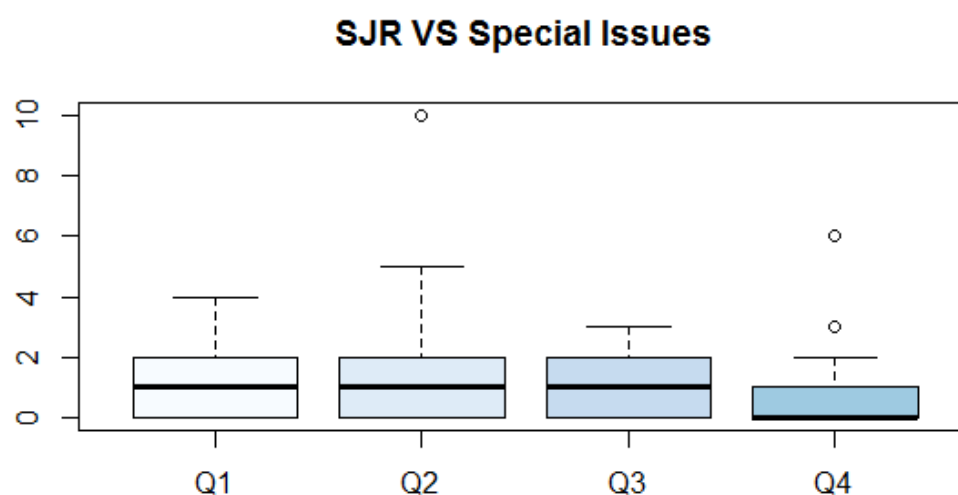


Figure 61

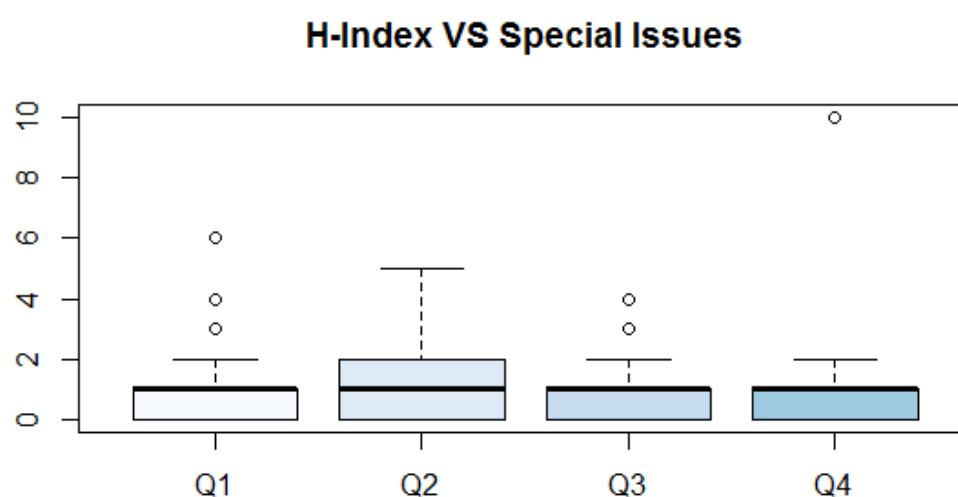


Figure 62

Also, the relationship between regular issues and special issues was examined. From the scatterplot below it is obvious that they do not have a linear relationship. So, a journal may have a lot of regular issues and zero number of special issues. For example, Genetic Engineering and Biotechnology News has 21 number of regular issues the year 2015 and zero number of special issues.

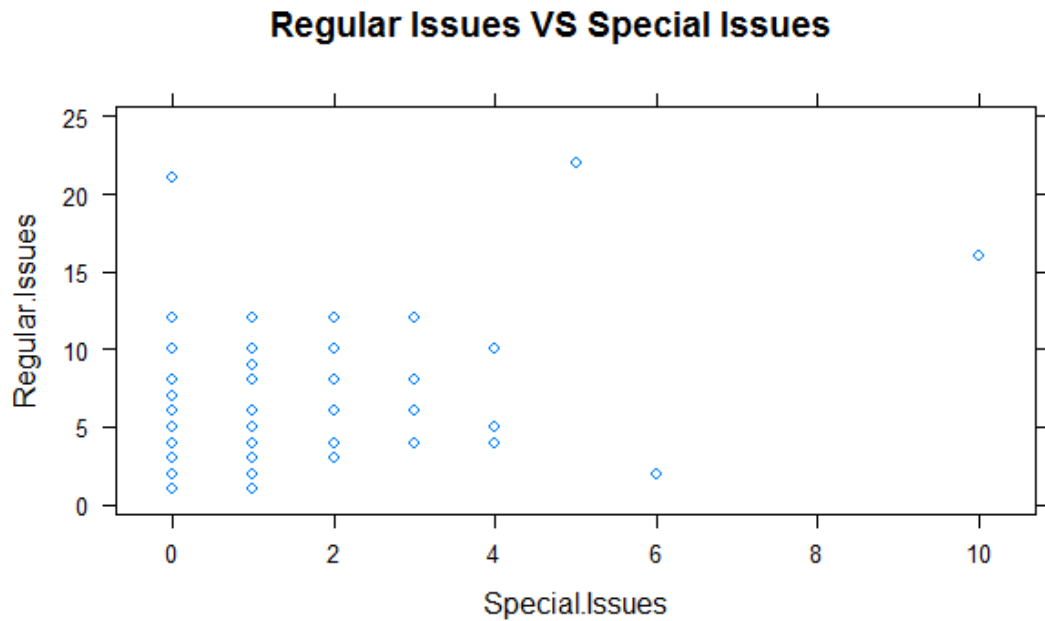


Figure 63

Except from the issues some journals had supplements too. Supplements are separated sections in a regular issue and they are not special issues. From the frequency diagram, we can understand that the majority of our data have 0 and some have 1 supplements. Supplements are rare so in the boxplots below it is obvious that in SJR there some in all the quartiles but in H-Index there are some only in the Q2 and Q4. So, the existence of supplements is in all the categories so it's irrelevant with the ranking and the categorization.

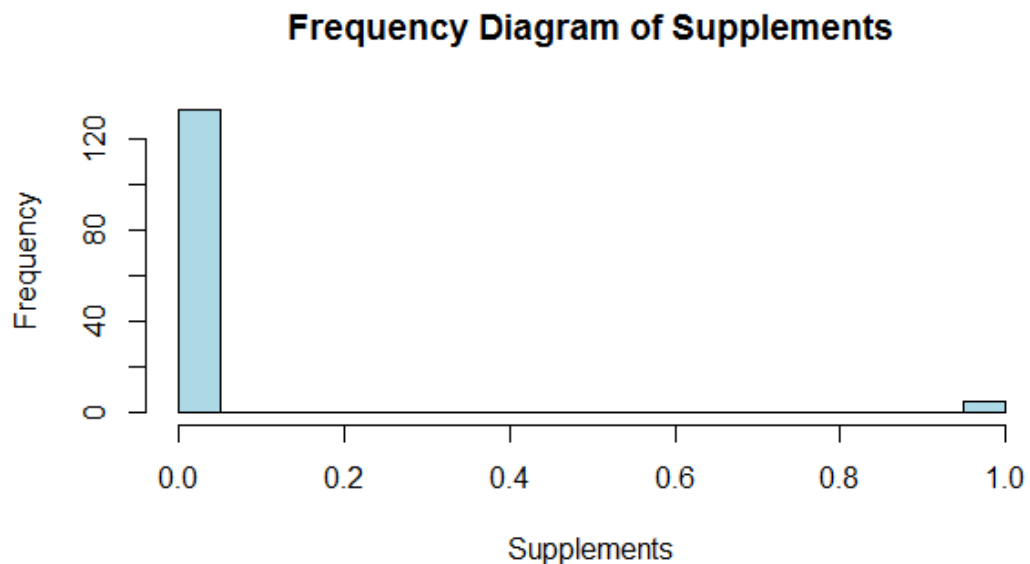


Figure 64

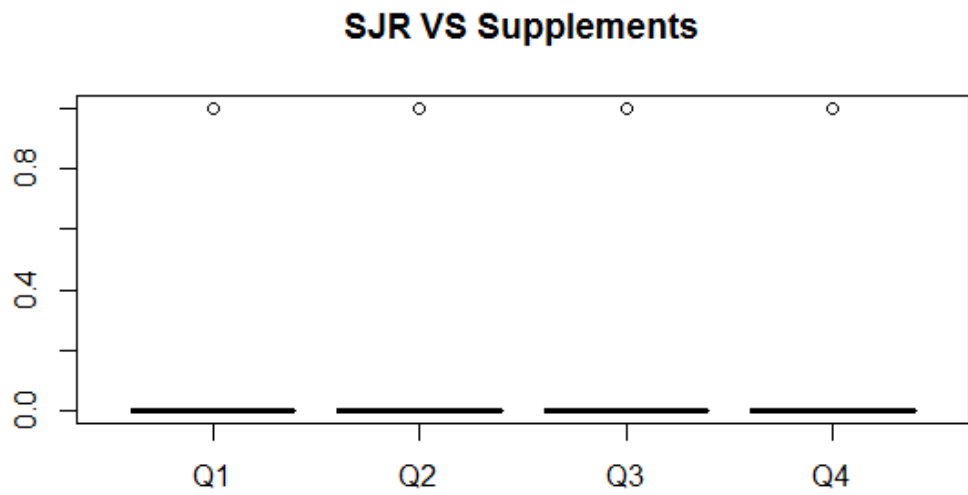


Figure 65

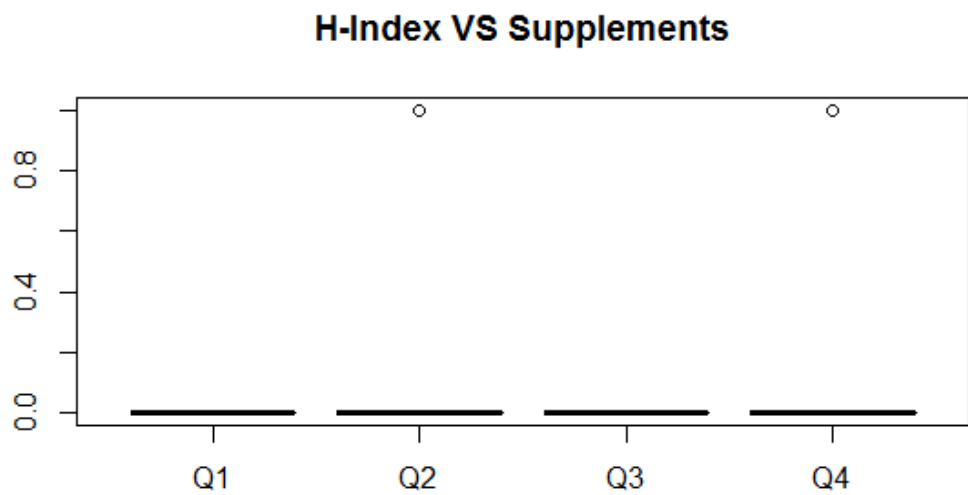


Figure 66

Summing up, below the frequency diagram of the total issues is shown. The total issues are simple the sum of regular issues and supplements of each journal. From the diagram, it is evident that the majority of our journals have each year a total number of issues between 3 and 4. Also, common is the number of issues to be between 5 and 6.

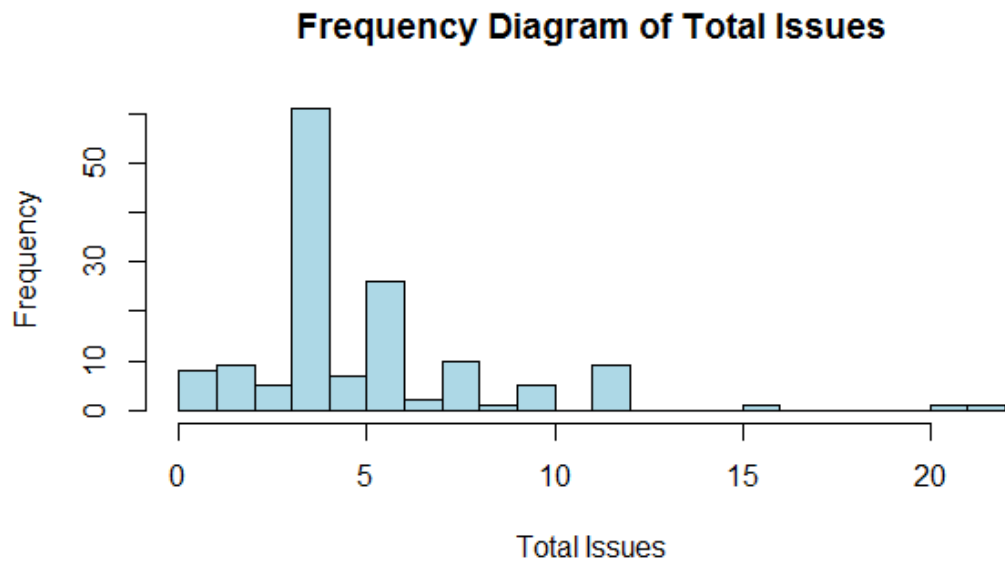


Figure 67

Moreover, the boxplots below show the relationship that total issues have with SJR and H-Index. From that it is obvious that the quartiles and generally the ranking of a journal has a relationship with the number of the issues that a journal has each year. The more issues it has it is more likely to categorized in a higher category. That is because in both boxplots Q1 is higher from the other quartiles.

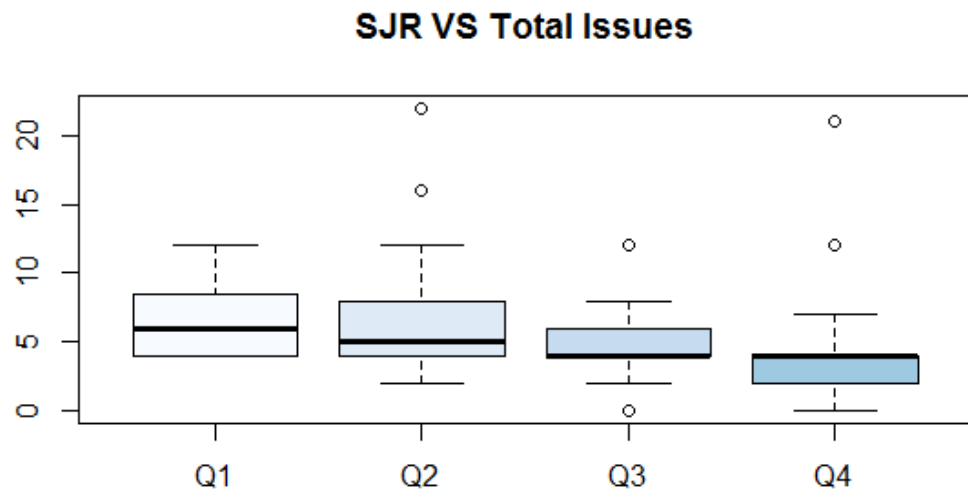


Figure 68

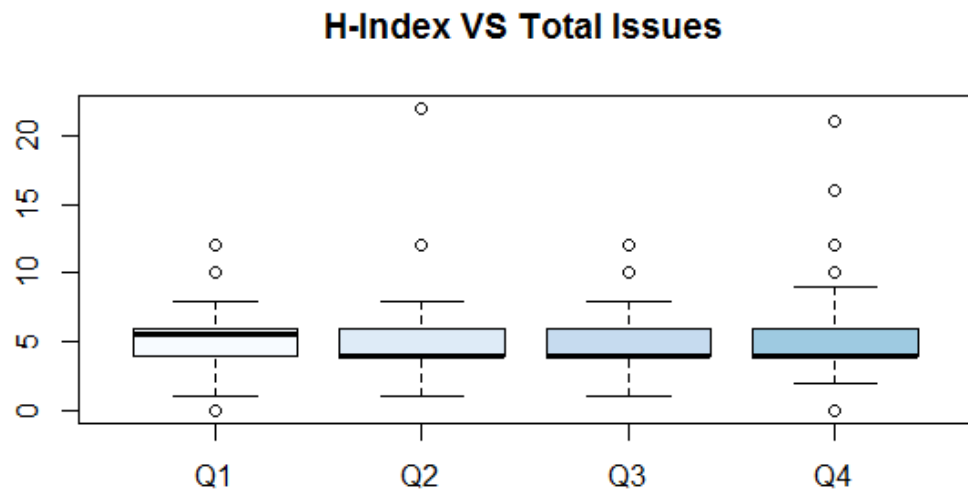


Figure 69

3.6 Regular Papers

Furthermore, we tried to understand if the number of regular papers and the number of regular papers pages have an impact on the ranking of a journal. First of all, the frequency diagram of the regular papers was constricted. From that we can see that no matter the category of our journals the majority have 0 to 50 regular papers published the year 2015. All the other from 56 and upper are outliers.

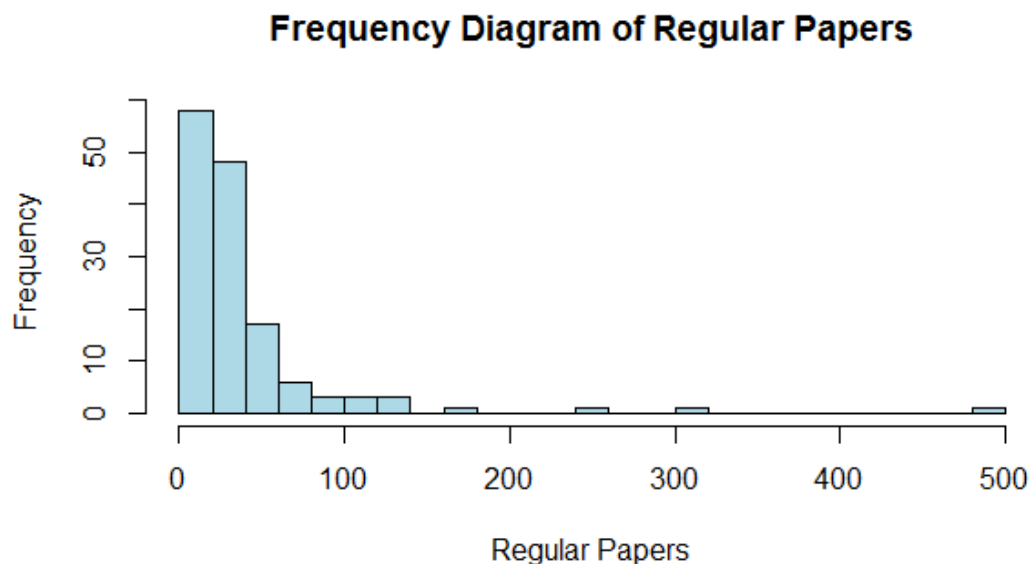


Figure 70

A further investigation was made in order to find the relationship between SJR and H-Index with the regular papers. So, if a journal has more papers published each year is it going to be in the Quartile 1? The boxplots below answer us that question.

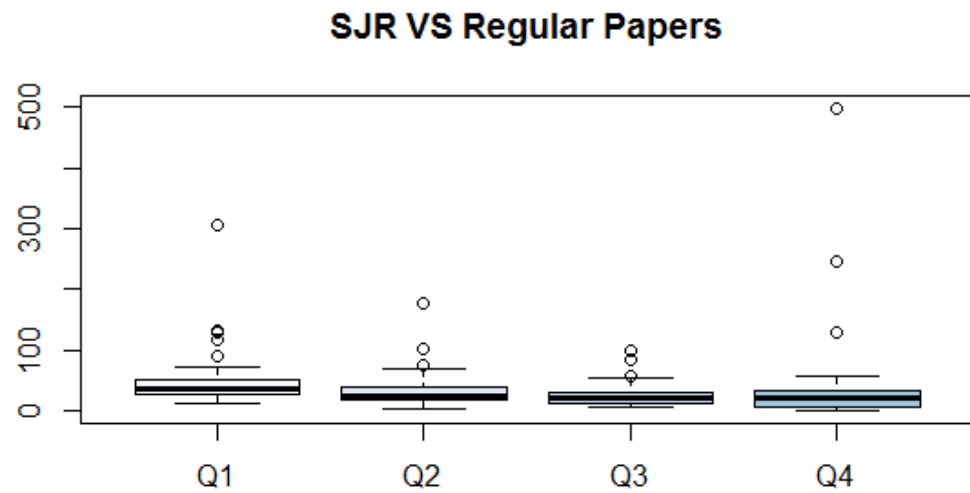


Figure 71

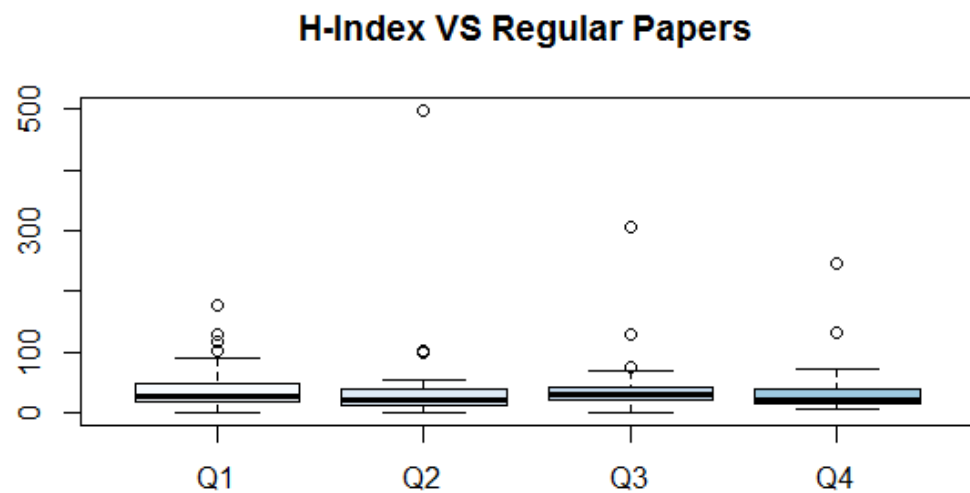


Figure 72

The answer is yes even though our data are distributed really well. In the SJR case, the journals that are in the Q1 have more papers published the year 2015 in comparison with the others categorizes. Q2 and Q3 have almost the same number of papers but the Q2 have more outliers than the Q3. Q4 also have the same number of regular papers but it has some extreme outliers. H-Index also has Q1 slightly bigger than the other quartiles after comes Q3 and Q4 and finally it is Q2. That is strange because Q4 had the biggest number of regular issues published the year 2015. So, Q4 has a lot of issues published but those issues have a few papers inside. That can be seen in the scatterplot below as well.

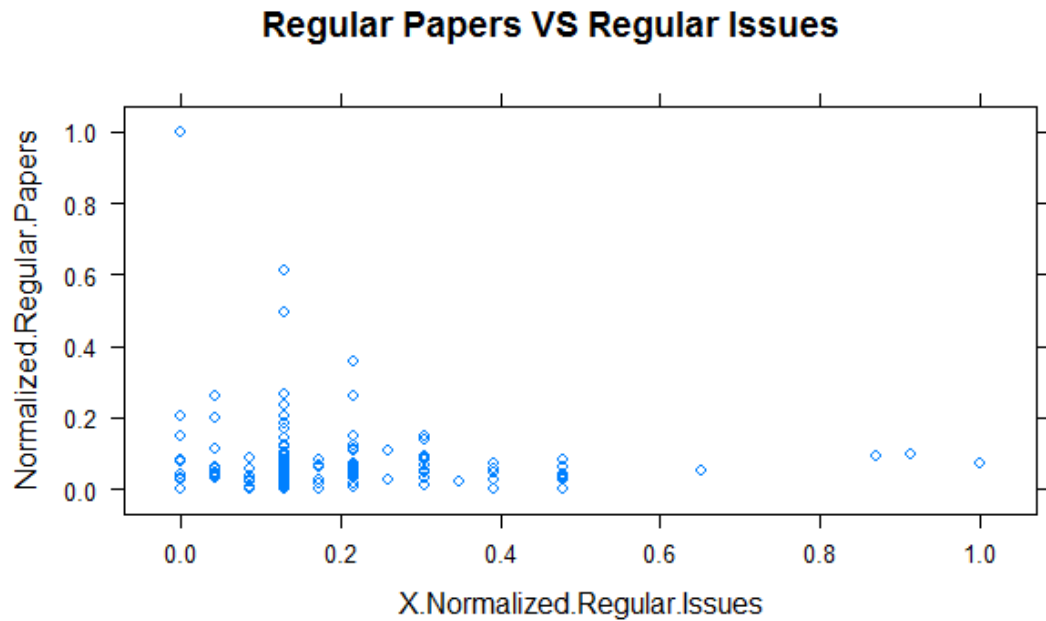


Figure 73

Moreover, we tried to investigate if the number of pages of each regular paper matters. The frequency diagram below shows us that the majority of our journals have number of regular paper pages between 250 and 500.

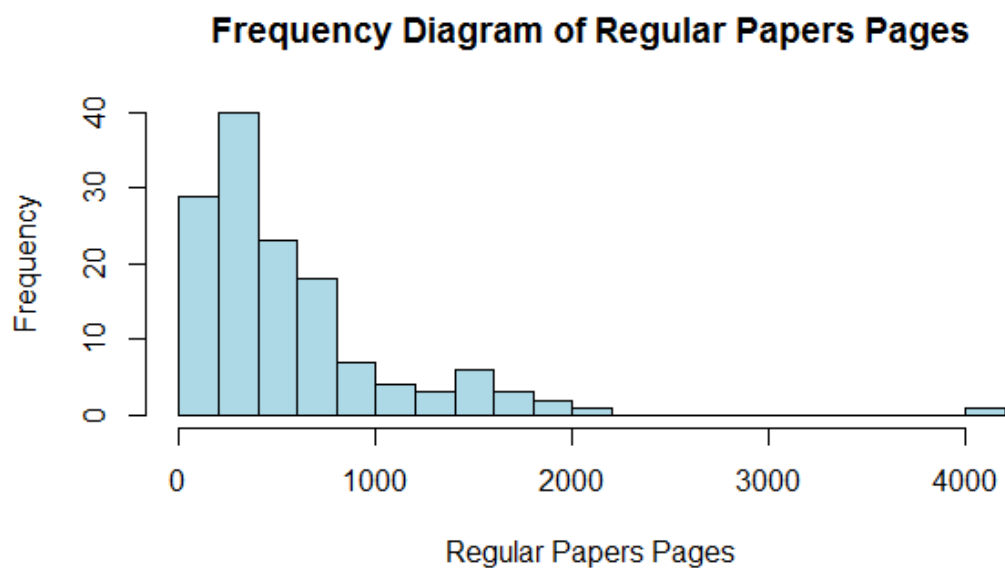


Figure 74

From the comparison between SJR and regular paper pages it is evident that the journals that are in the Q1 have more pages in their regular papers. After comes Q2 following by Q3. And finally, Q4 has the less pages even though it has almost the same number of regular papers published with Q2 and Q3. So, the papers that the journals in the Q4 published are small in comparison with all the other categories.

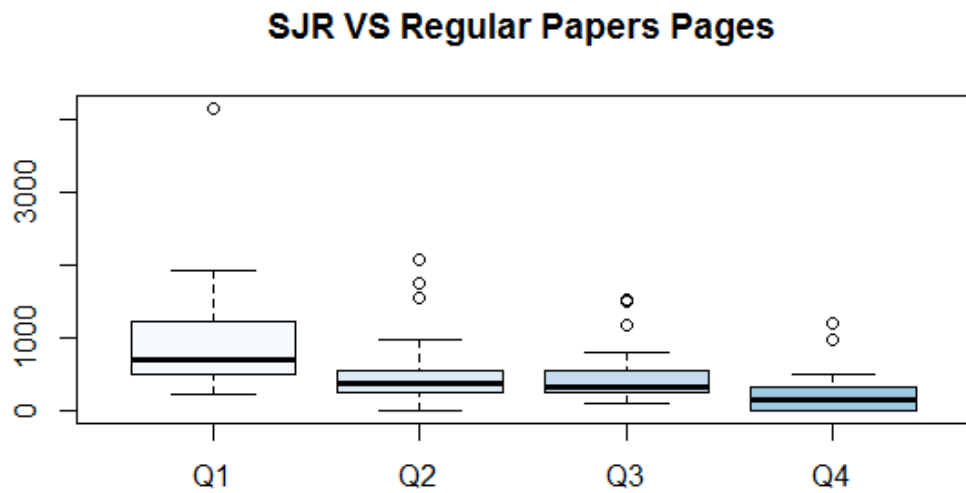


Figure 75

On the other hand, H-index is giving us a different output. Q3 has the journals with the biggest number of regular paper pages after comes Q1 following by Q4 and at the bottom is Q2. So, by H-Index ranking the number of pages that a regular paper has do not make any impact on the categorization.

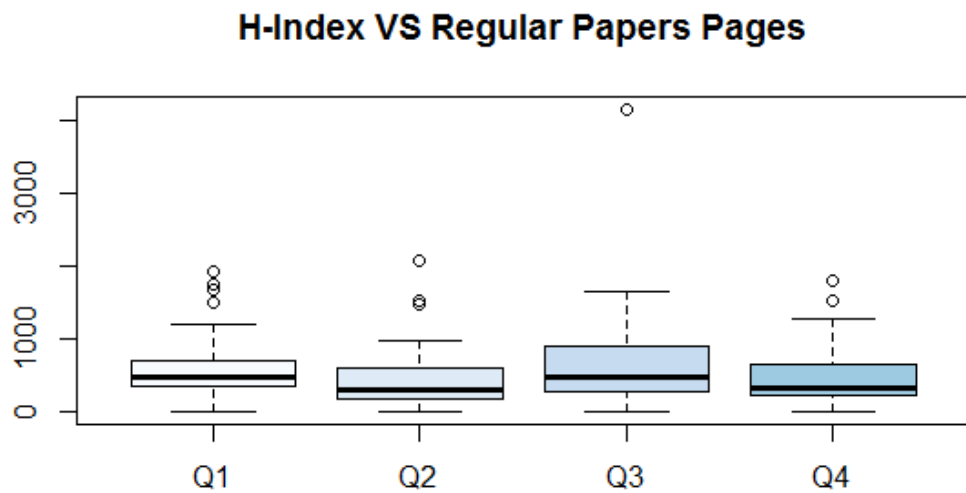


Figure 76

From the boxplot below it is also evident that regular papers pages do not a relationship with regular papers. There is a of journals that have a big number of pages and a low number of papers as Technological Forecasting and Social Change do.

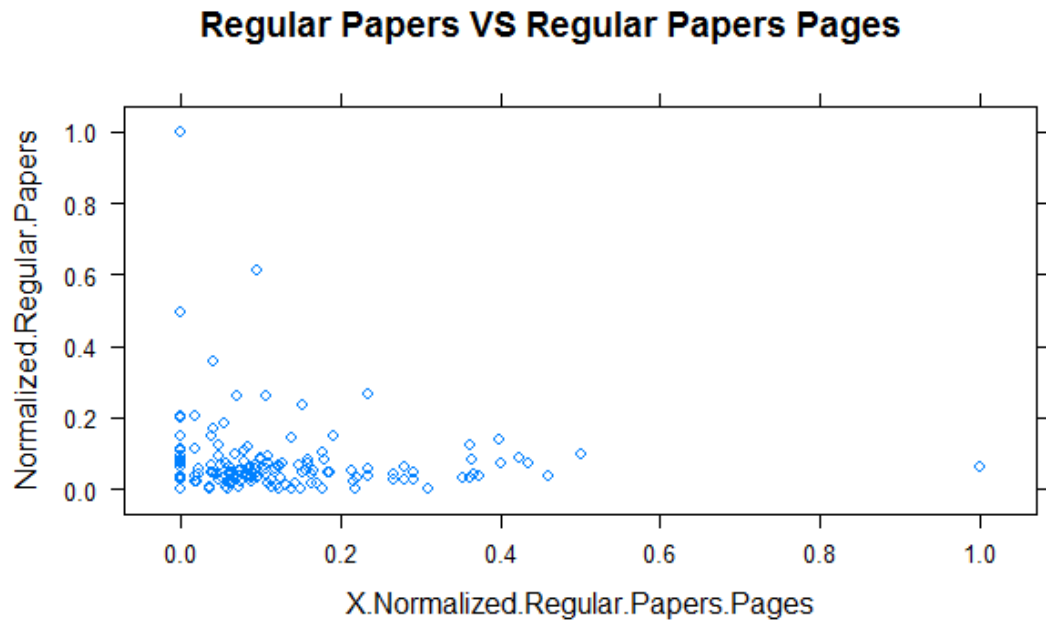


Figure 77

3.7 Other

In that section, we are counting all the other articles that are not papers and belong in the regular issues as well as their pages. Firstly, other was examined and in the frequency diagram below it is obvious that the majority of our journals have 0 to 1 others published the year 2015.

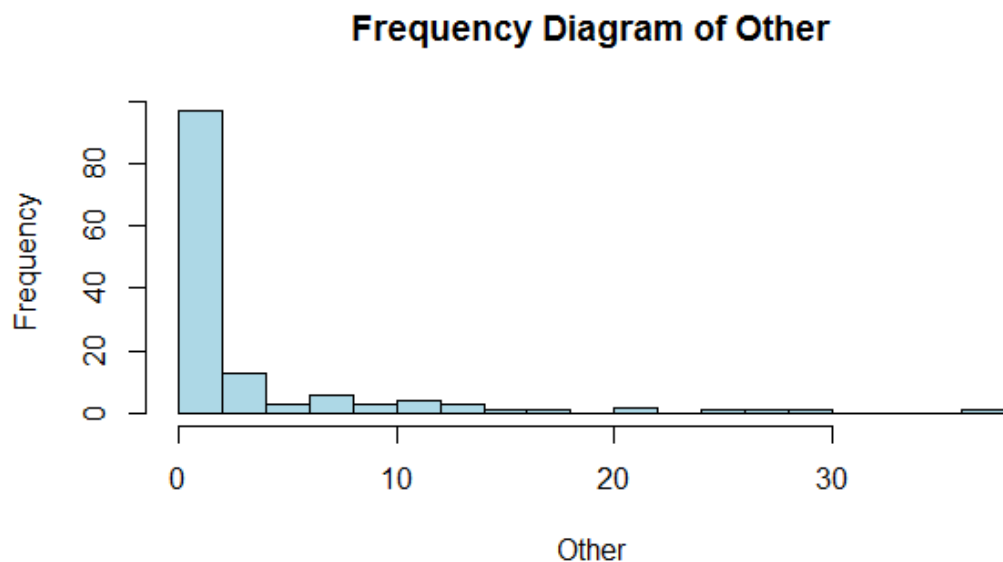


Figure 78

In the boxplots below the relationship between SJR and H-Index with other was examined. Again, for SJR, the journals that are the Q1 have more others than all the other categories have, Q2 is second and Q3 follows. Finally, the journals that belong in the Q4 have almost zero number of other published the year 2015. For H-Index as with regular papers Q1 is first after is Q3 and Q4 and finally last are the journals that are in the Q2.

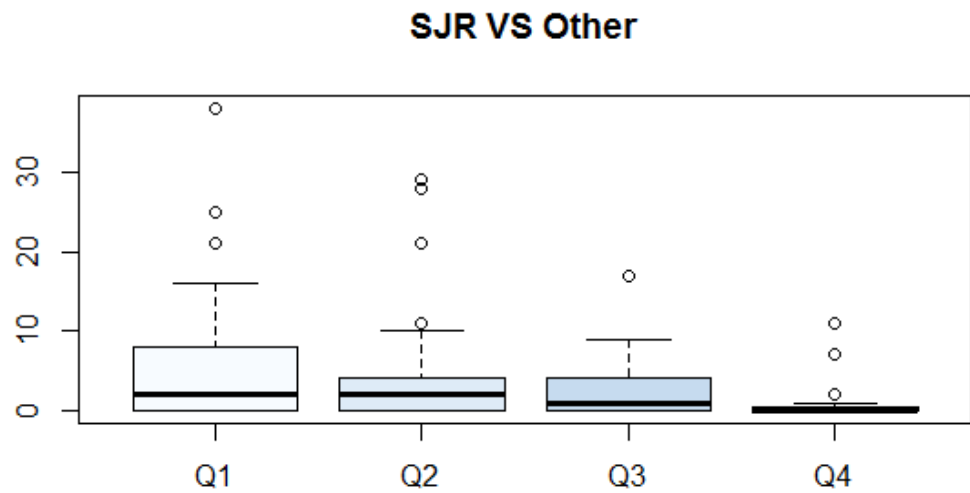


Figure 79

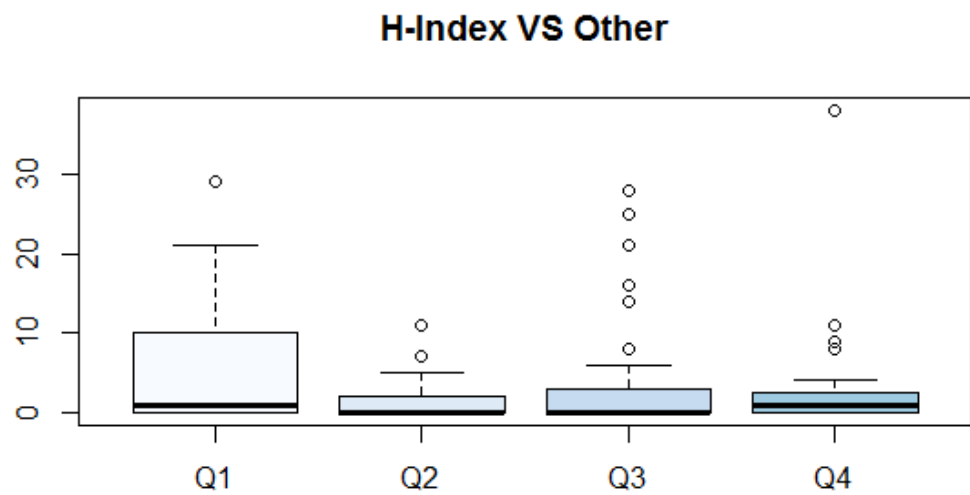


Figure 80

Having examined that how much page's others have? Considering that are not papers the pages are few. That can be seen in the frequency diagram below. From that it is evident that the majority of our journals have 0 to 10 other pages.

Frequency Diagram of Other Pages

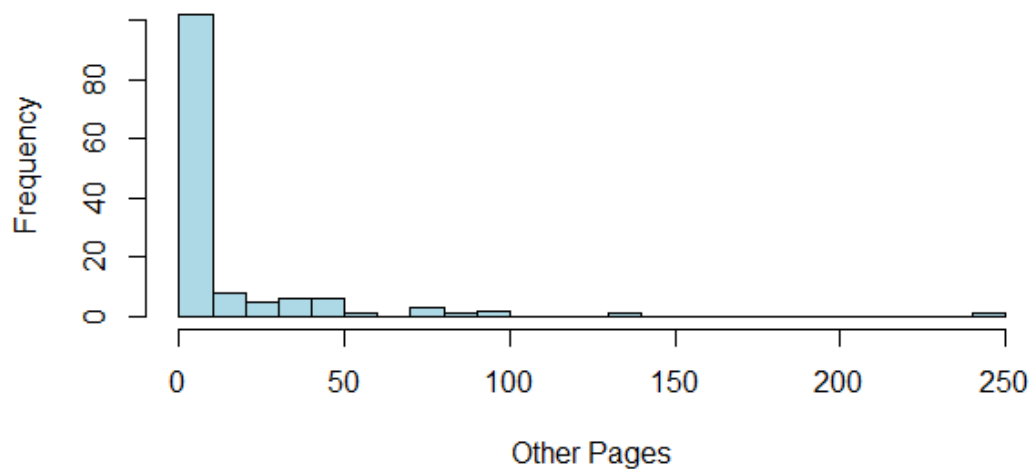


Figure 81

Furthermore, the relationship between SJR and H-Index with other pages was examined. It is evident that in SJR boxplot the journals that are in the Q1 have more pages in their others which was expected. Subsequently, the journals that are in the Q3 have less pages in comparison with the Q2. Finally, the Q4 has the less as it was expected. In the H-Index boxplot the Q1 is first after comes Q2 and Q4 and in the bottom, is Q3. Surprisingly Q2 had the less others but those had a lot of pages so it is second in this boxplot. The exactly opposite is going on with Q3 which Q3 had the journals with second most others but those had a small number of pages so in the boxplot of pages is in the bottom. That can be shown in the scatterplot below.

SJR VS Other Pages

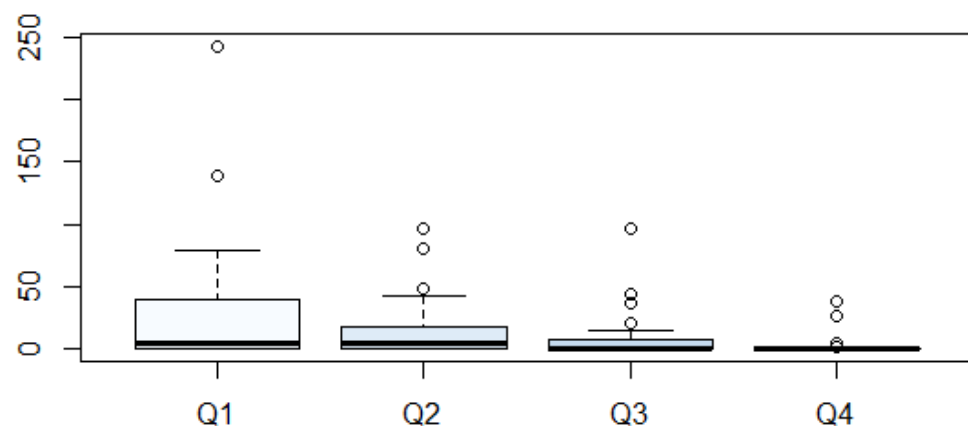


Figure 82



Figure 83

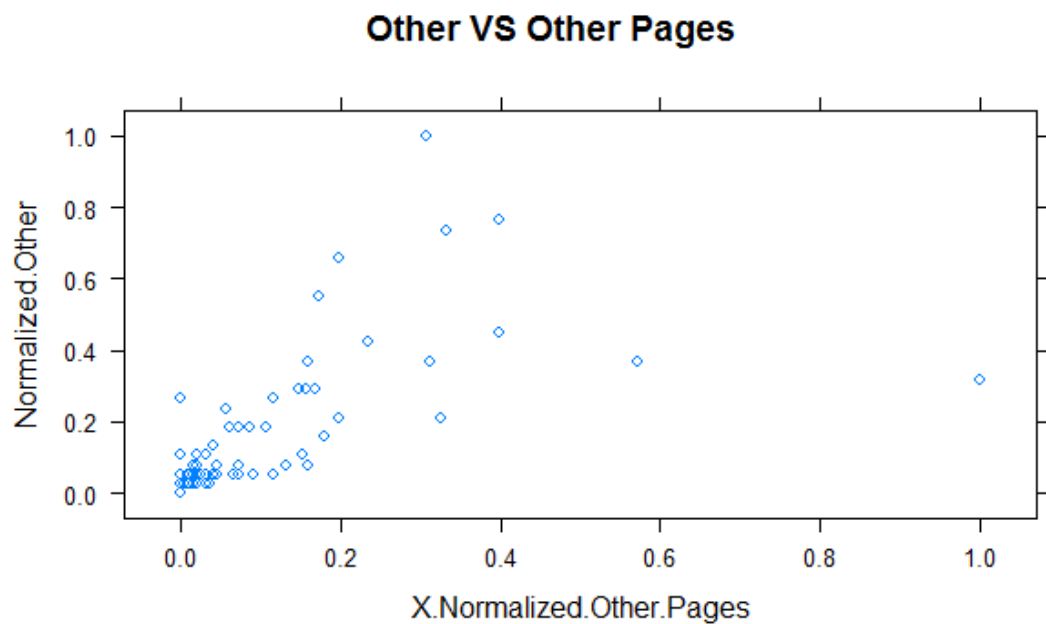


Figure 84

3.8 Special Issue Papers

Additionally, the frequency diagram of the special papers was constructed. More than the half of our journals had published between 0 and 5 special issues that year. Also, all of our journals have published no more than 34 special papers in 2015 except from International Journal of Work Innovation which has published 108 special papers that year. The interesting part is that the same journal had only 4 regular papers published in 2015 and belonged in Q4 in refer to SJR and in Q1 in refer to H-Index.

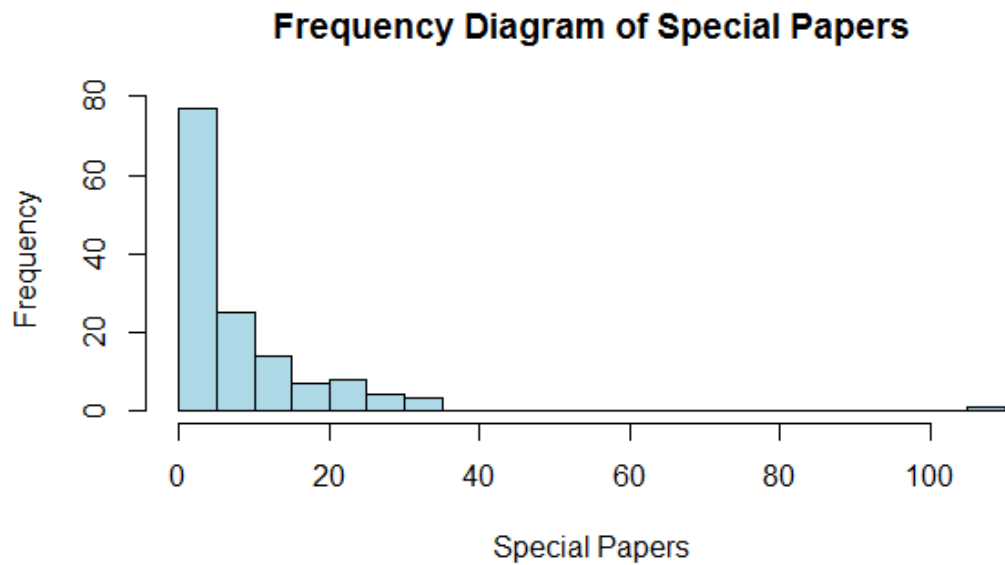


Figure 85

Likewise, in the special issues the number of issues based on their quartiles was examined. In the first boxplot, the relationship between SJR Quartiles and special papers was examined and in the second the relationship between H-Index Quartiles and special papers is shown. In refer to SJR Q2 has the journals with the biggest number of special papers published. That was expected because the journals that are in the Q2 had the most special issues published. The part that was not expected was that the Q3 is second and after comes Q1. That is because, Q1 had the second biggest number of special issues published in 2015 and after came Q3. So, the journals that are in Q3 they may had less special issues published but those special issues had more of papers than all the other categories had, except from Q2.

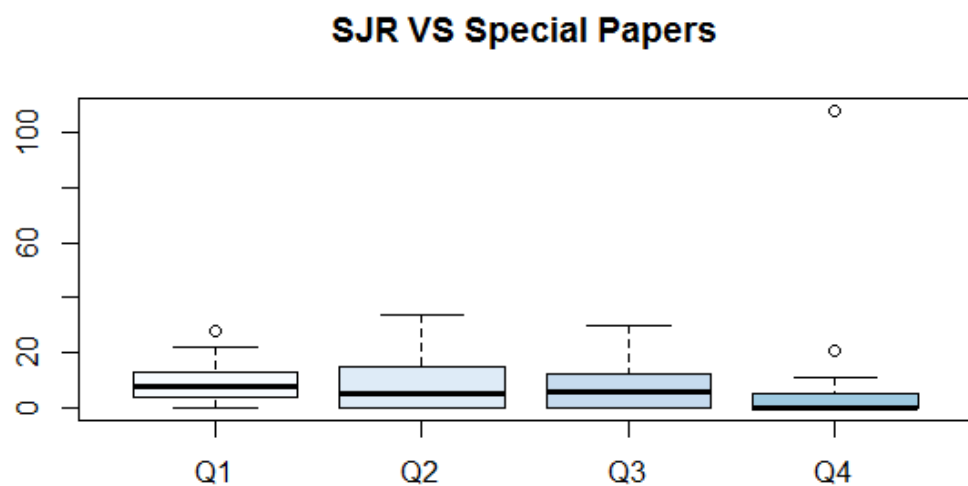


Figure 86

In refer to H-Index, Q1 had the journals with the biggest number of special papers after came Q2 and Q3 and in the bottom, was Q4. That is also strange, because Q2 had the biggest number of special issues published the year 2015 and all the other categories had almost the same number of special issues published. So, Q2 may had a lot of special issues published but those issues had a few papers inside. The exactly opposite is happening with Q1. All this relationship can be seen in the scatterplot below.

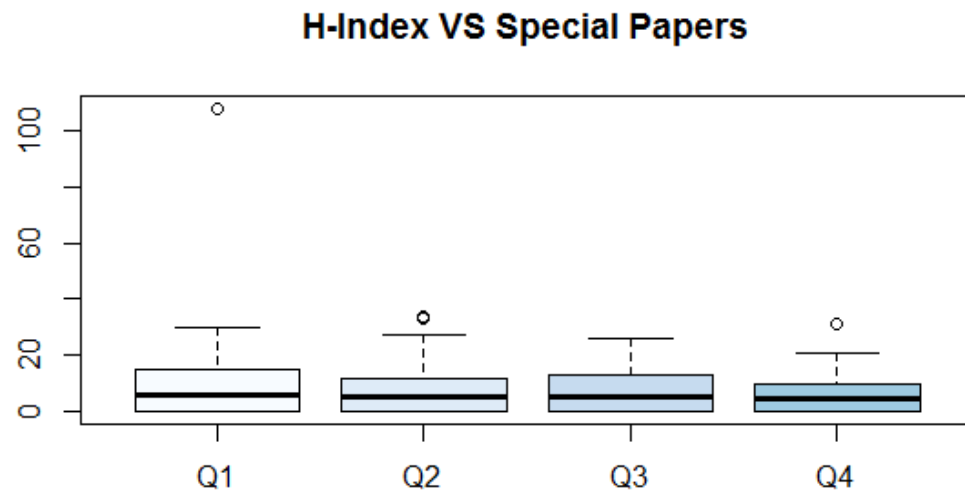


Figure 87

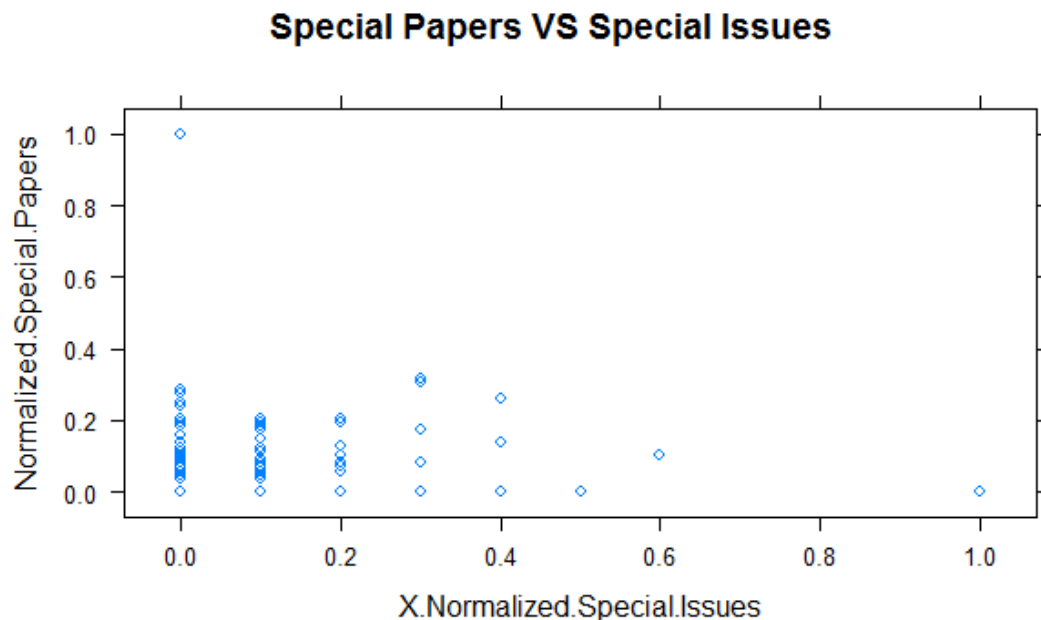


Figure 88

Furthermore below, two scatter plots show the relationship between regular papers and special issue papers. In the second scatter plot the relationship between those two is shown but the color of the dots represents also the way the submitted those papers in the journals. As it was expected the majority of the papers were received via the website of the journal. More, from the two

boxplots we cannot come to the conclusion that the number of special papers had a relationship with the number of the regular papers that our journals published the year 2015.

Special Papers VS Regular Papers

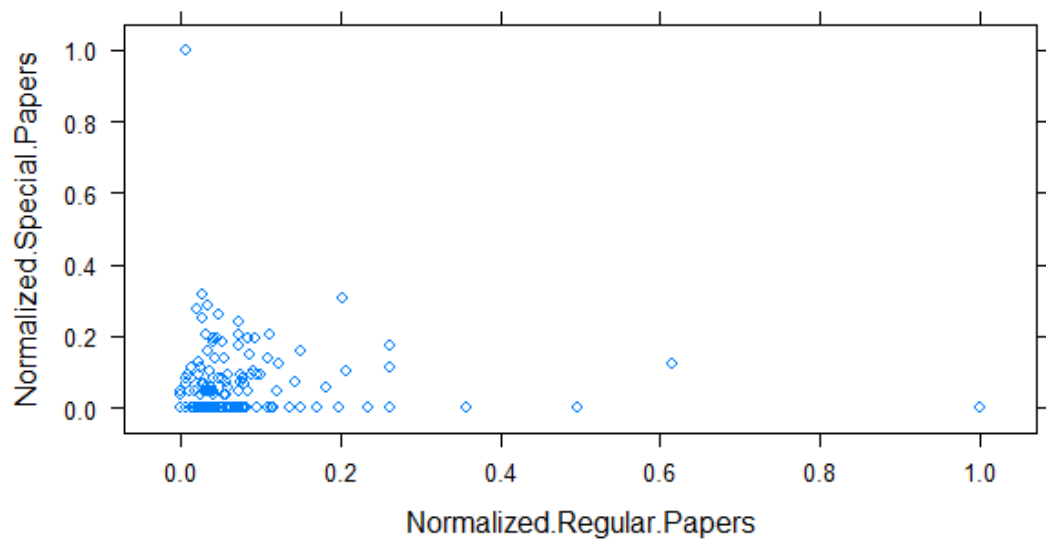


Figure 89

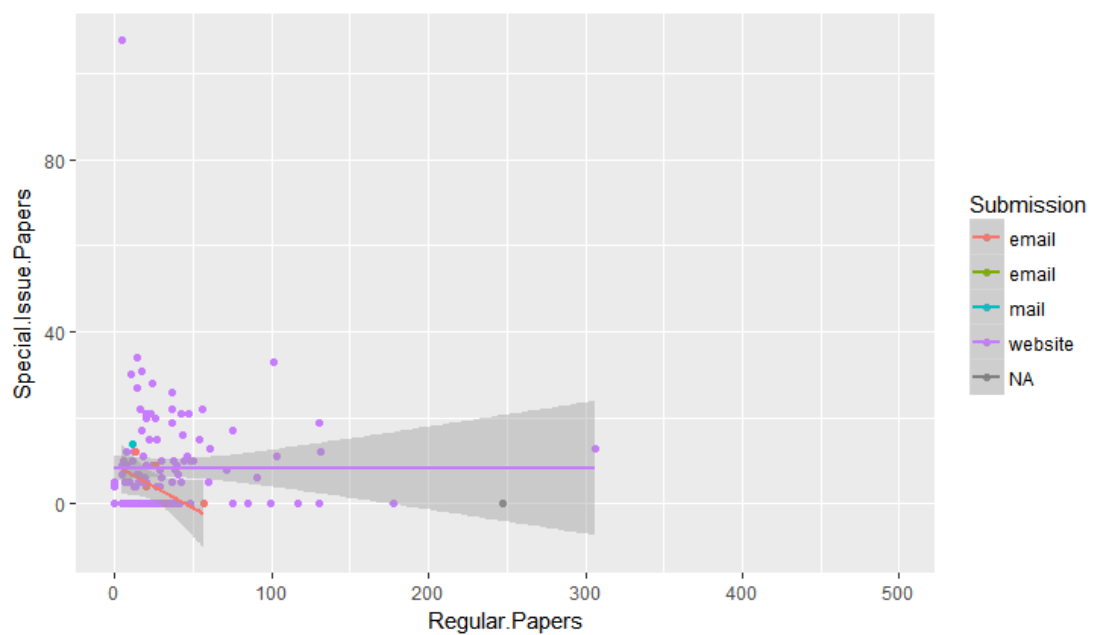


Figure 90

In the same subject, the pages of the special papers were examined. In the frequency diagram, we can see that the lion shares of our journals had publishes papers which had 0 to 50 pages.

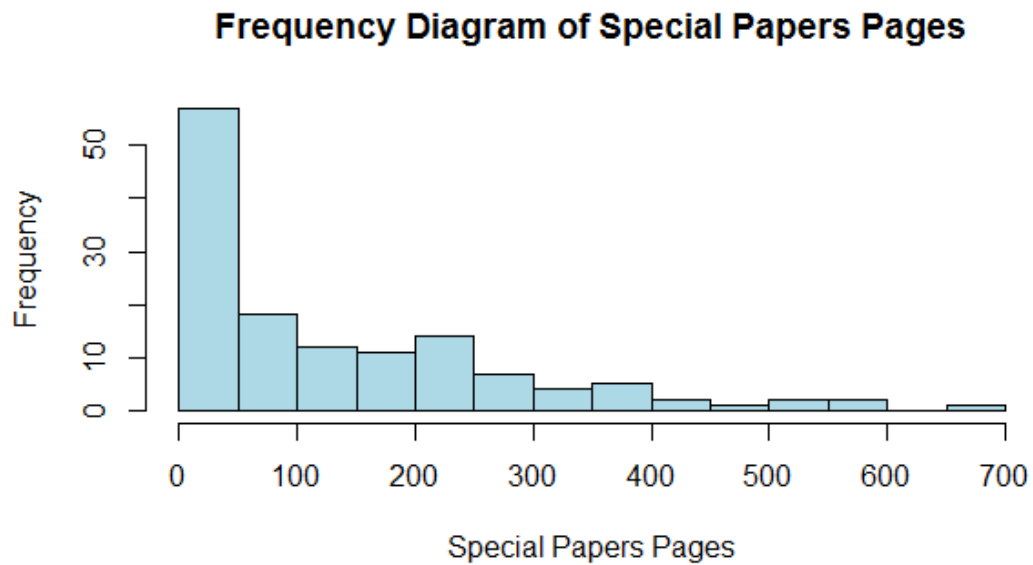


Figure 91

Moreover, an analysis based on the SJR and H-Index quartiles was made. In the first boxplot, Q2 is first after comes Q3 and Q1 and in the bottom, is Q4 as it was expected. In the H-Index boxplot Q1 is first as it was expected but Q3 is second and after comes Q2. So, the journals that belong in the Q3 the may have the same number of special papers published the year 2015 with Q2 but Q3 has more pages. Again, these differences are clearer in scatterplot below.

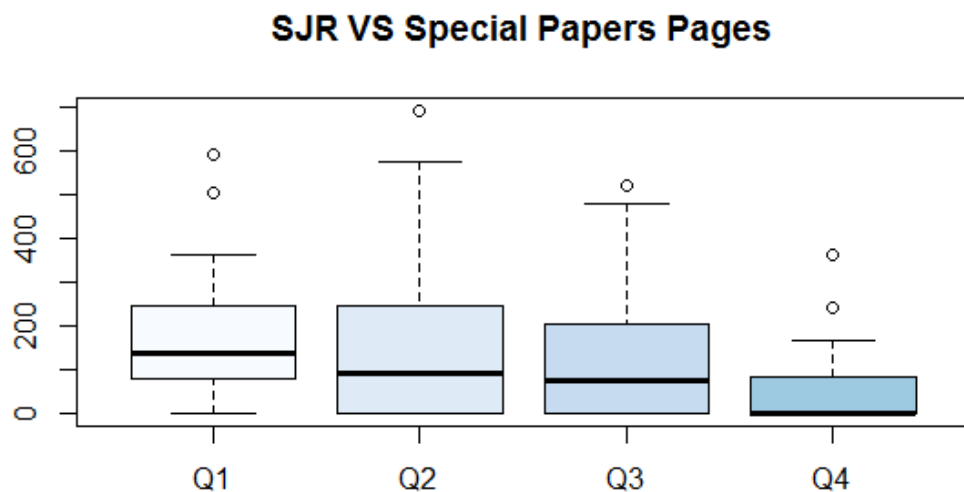


Figure 92

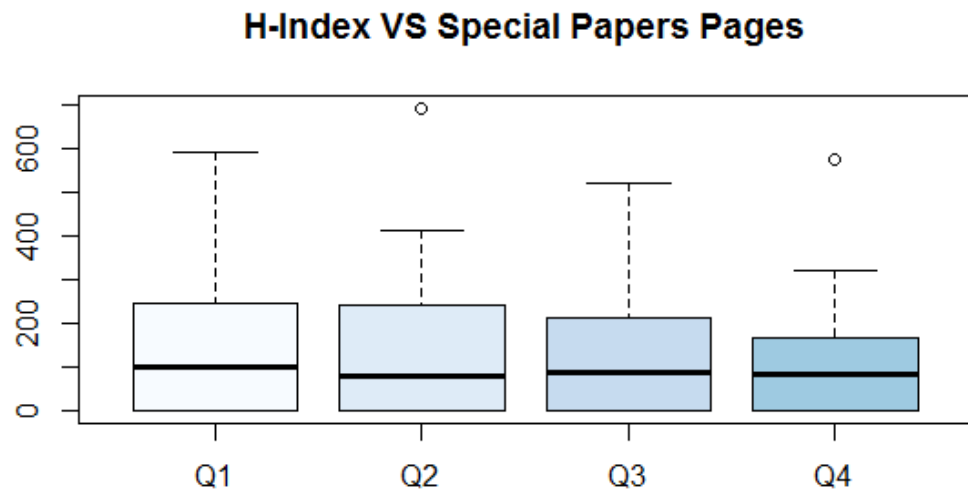


Figure 93

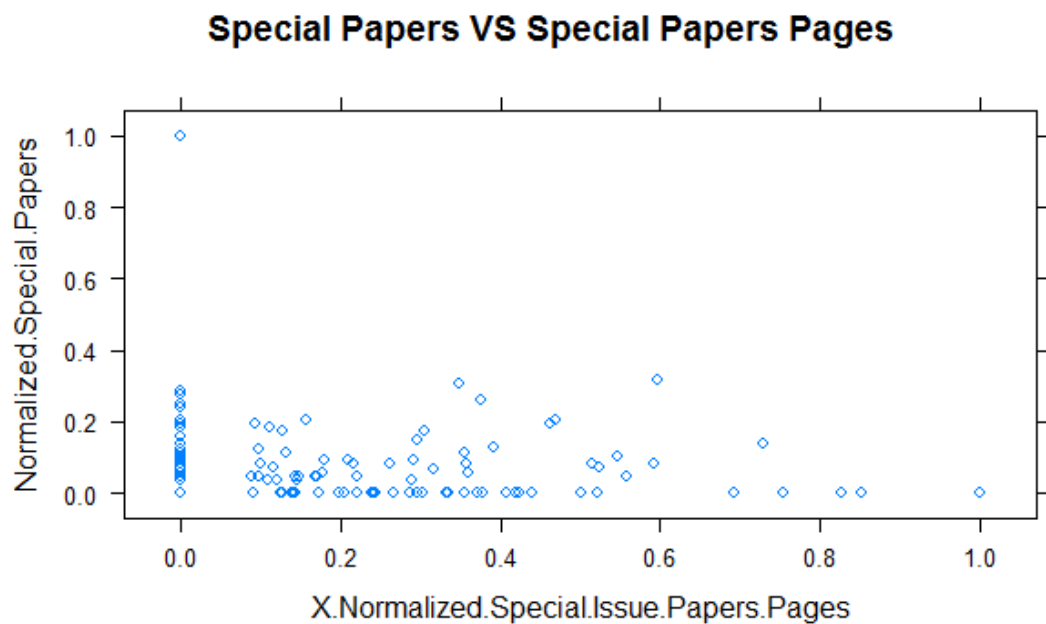


Figure 94

3.9 Other Special

In that section, we are counting all the other articles that are not papers and belong in the special issues as well as their pages as we did in the section with the others. The frequency diagram shows us that the plurality of our data had 0 to 1 other special published the year 2015. Category-wise for SJR the Q1 and Q3 had almost the same number of other special and Q4 had zero except of some outliers. Q2 had the biggest number of other special. In H-Index boxplot, Q2 is also first and after all the other quartiles had almost the same number of other special.

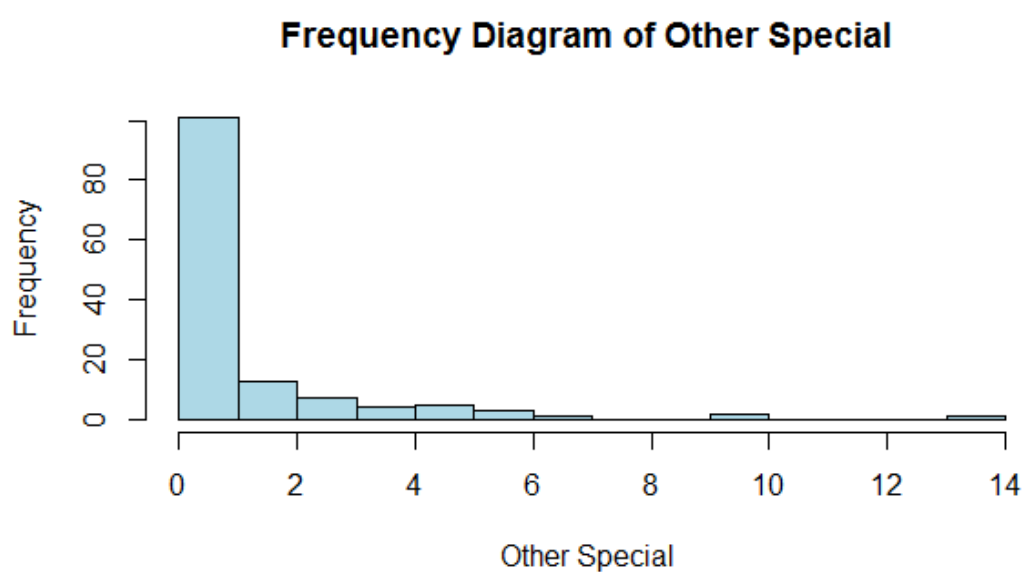


Figure 95

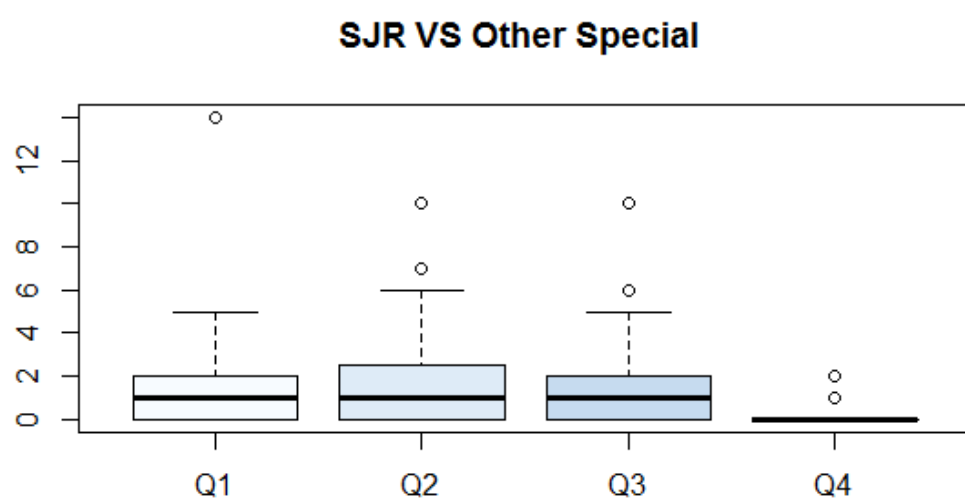


Figure 96

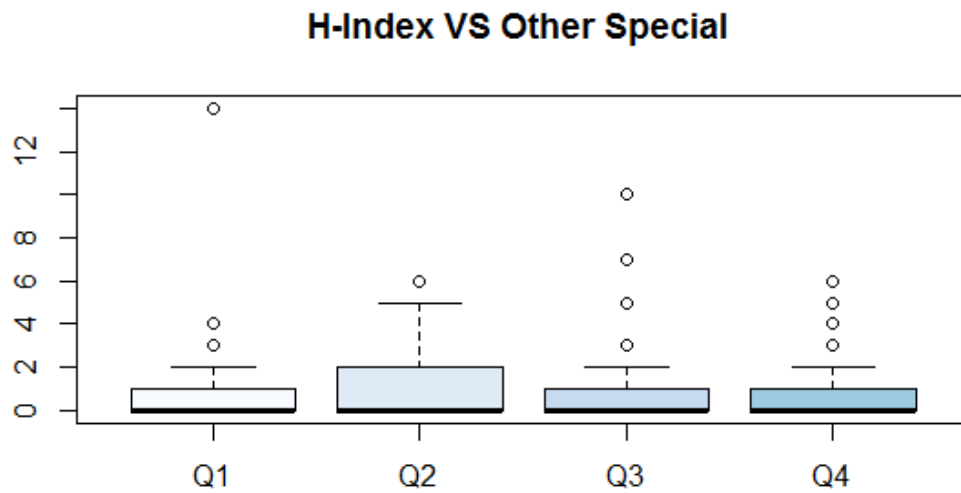


Figure 97

Following the same analyses was made for the pages. From the frequency diagram, we can see that the larger number of our journals had presented 0 to 5 pages for special issue other.

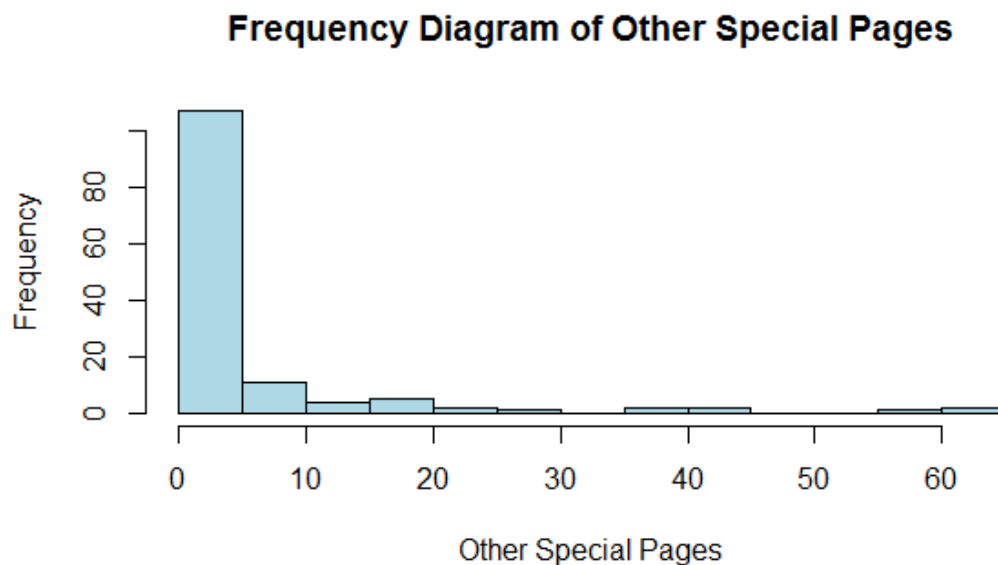


Figure 98

In the boxplot below of SJR, even though that in the Q1 the journals had published less other special than the other three categories they had more pages. For H-Index Q4 even though it had the same number of other with Q1 and Q3 it had more other pages than those and even more pages than Q2 which had the most other special published the year 2015. That can be shown in the scatter plot below.

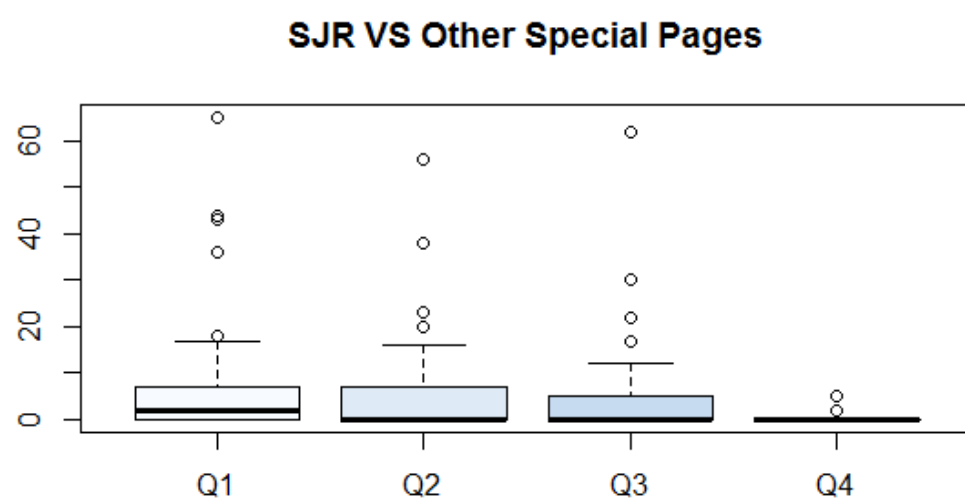


Figure 99

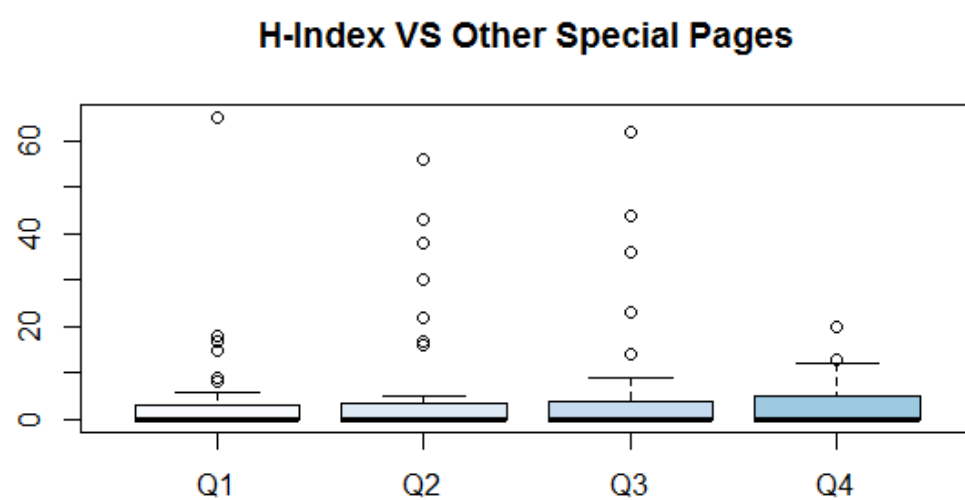


Figure 100

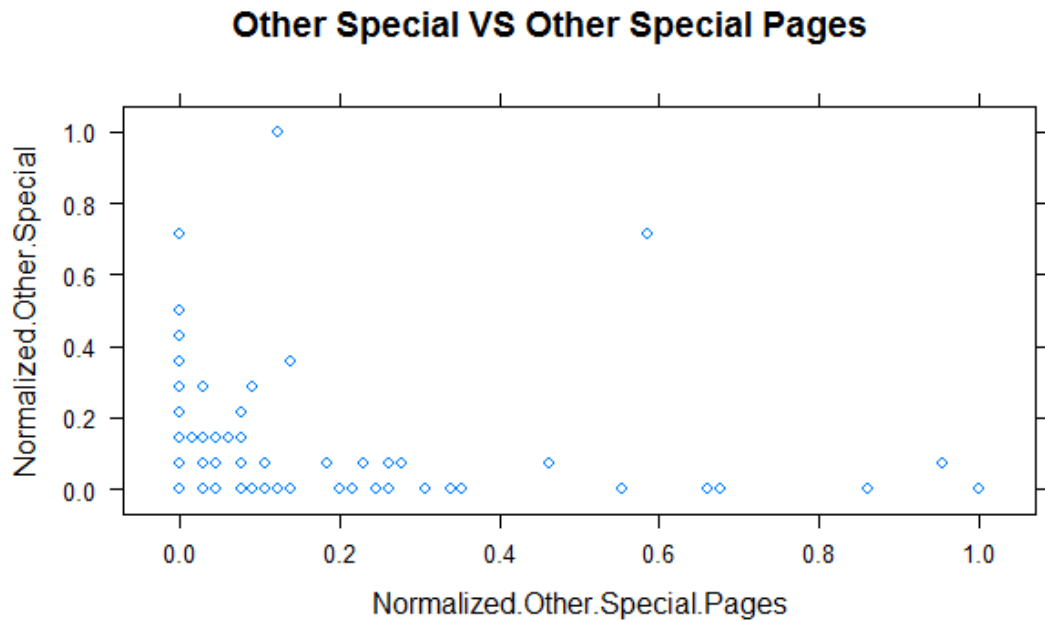


Figure 101

An analysis as in the section with the special papers was made in order to tackle the relationship between other special with other. Unfortunately, as it is evident in the scatter plot below there is not any particular relationship.

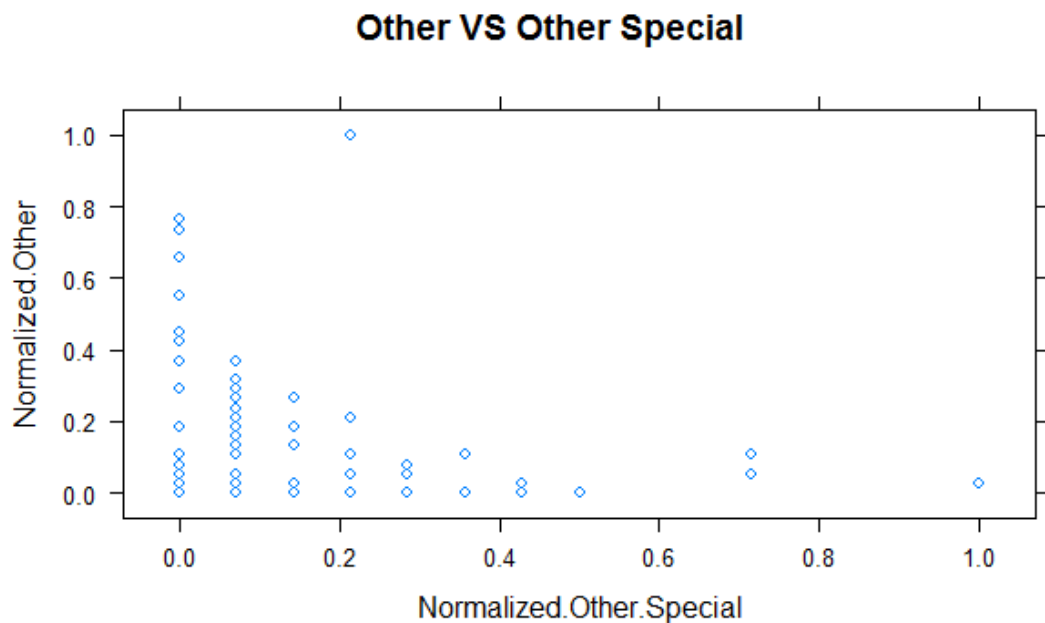


Figure 102

3.10 Corrigenda-Errata

As we discussed above an erratum or corrigendum (plurals: errata, corrigenda) (comes from Latin: errata corrige) is a correction of a published text. An erratum is most commonly issued shortly after its original text is published. Patches to security issues in a computer program are also sometimes called errata. From the frequency diagram below it is evident that the majority of the journals have corrigenda-errata equals to 0.

Frequency Diagram of Corrigenda-Errata

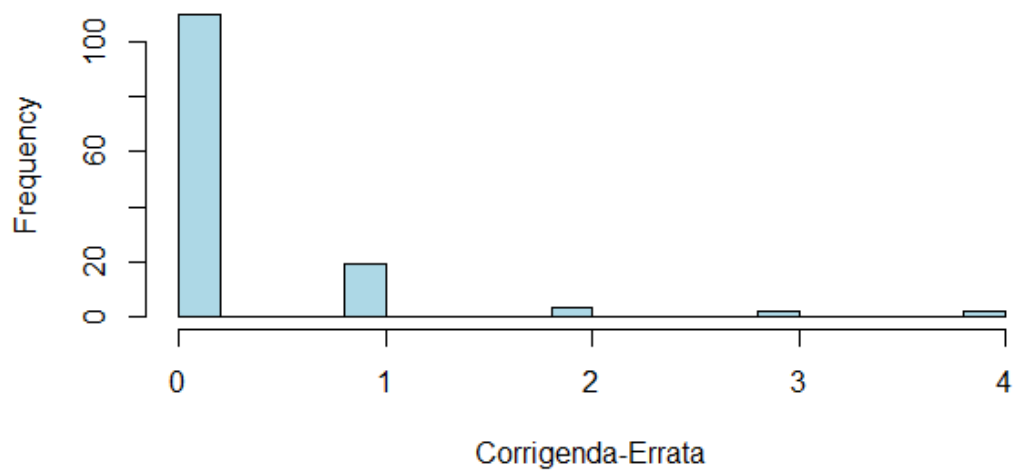


Figure 103

Secondly, some analyses in the categories was made. From the SJR boxplot below, Q1 and Q2 had the most corrigenda-errata. That is because probably the journals that are in the Q1 and Q2 reinvestigated the papers they published after being published. On the other hand, journals that were in the Q3 and Q4 they didn't check after publishing their papers and potentially they didn't have feedback from their readers in order to tackle any mistakes. From the H-Index boxplot all the quartiles were equal to 0.

SJR VS Corrigenda-Errata

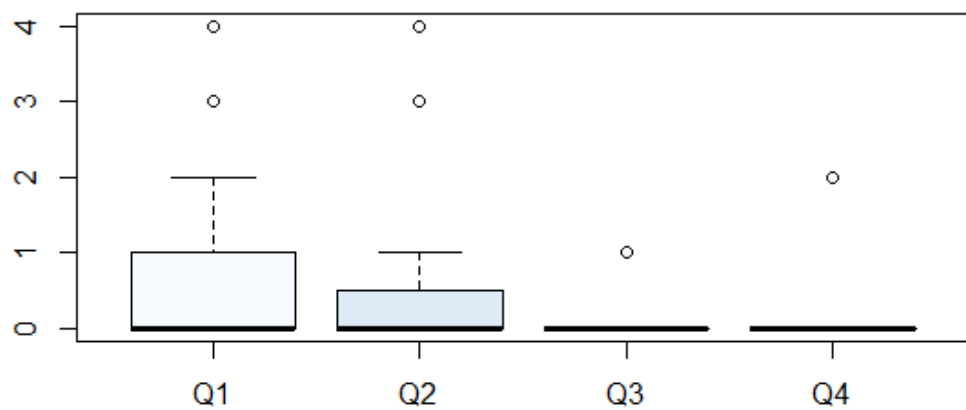


Figure 104

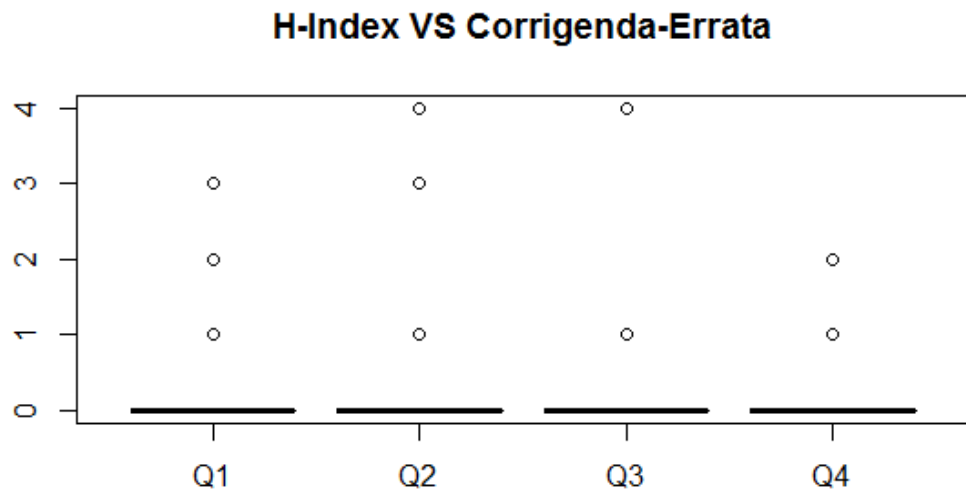


Figure 105

The pages of the corrigenda and errata are between 0 to 1. Category-wise for SJE only the journals that belonged in the Q1 had pages contributed to corrigenda and errata even though there were some outliers in all the categories. For H-Index only Q3 had the journals with the larger number of pages for corrigenda-errata.

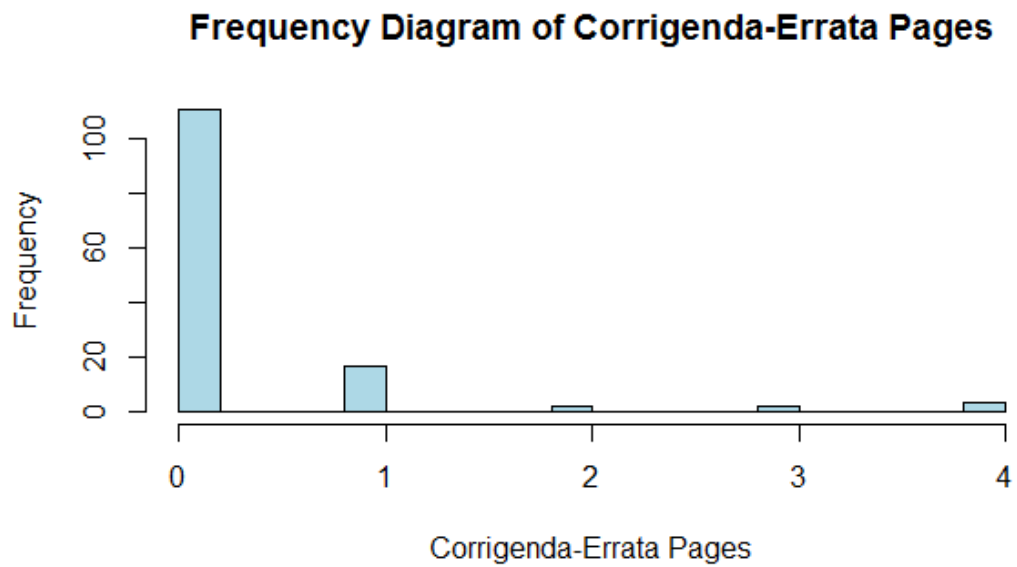


Figure 106

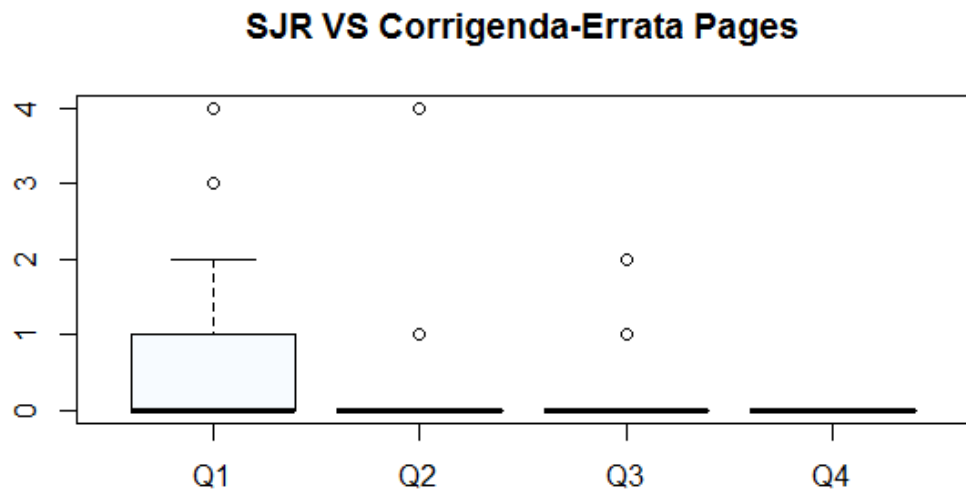


Figure 107

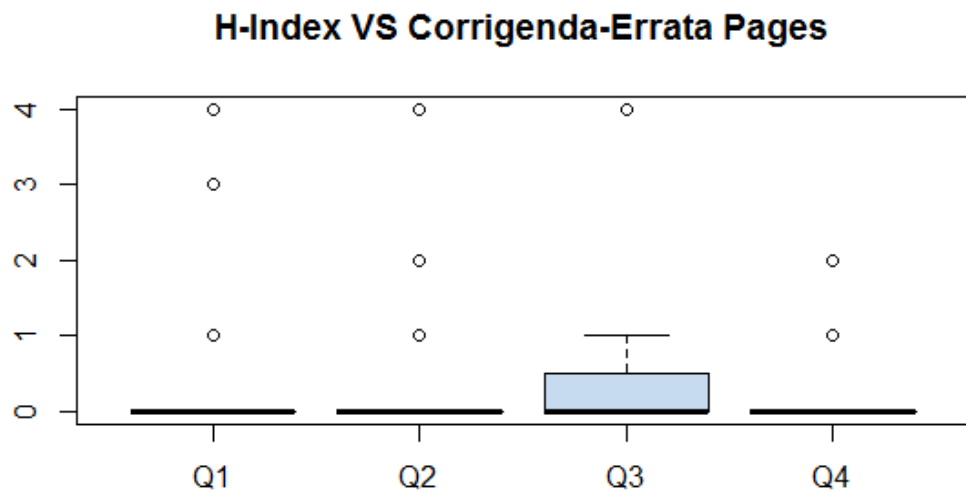


Figure 108

3.11 Retractions

A retraction is a public statement made about an earlier statement that withdraws, cancels, refutes, or reverses the original statement or ceases and desists from publishing the original statement. The frequency diagram shows us that the majority of our journals had retractions equals to 0.

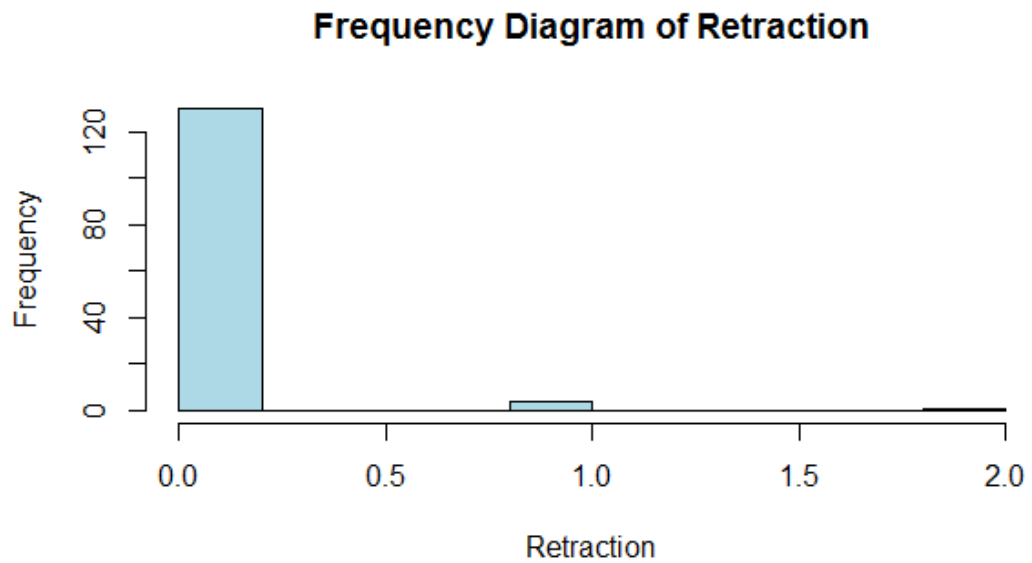


Figure 109

Having that in mind we analyzed the retraction category-wise for SJR and H-Index. Category-wise all of our journals had zero retractions no matter the category they belonged. We had some outliers who had just 1 or 2 retractions published the year 2015 but that didn't have any relationship with the category they belonged.

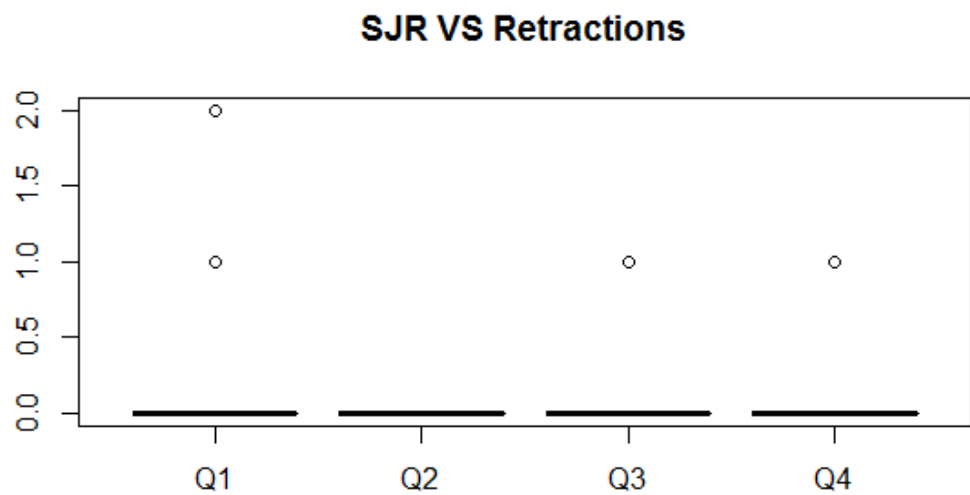


Figure 110

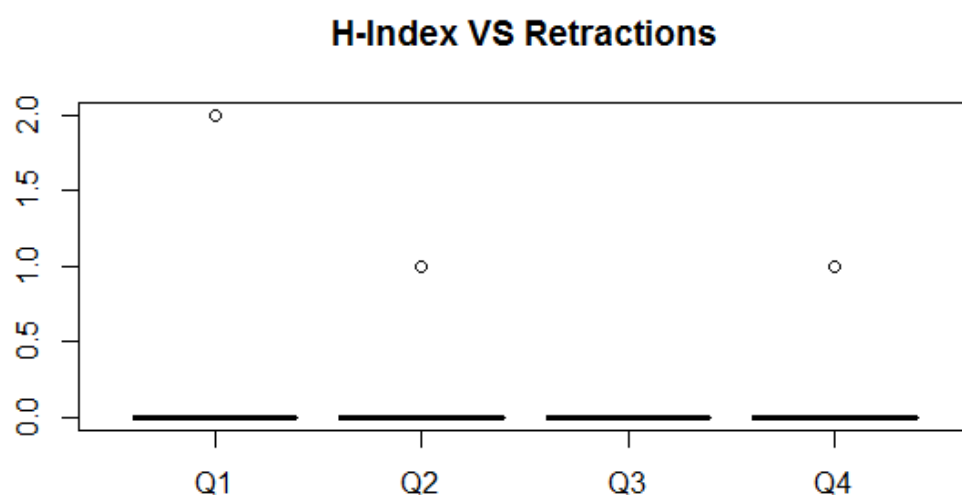


Figure 111

Further, the pages were examined. As with the retractions the retractions pages were 0 to 1 as the diagram below shows us. Category-wise the boxplots have the same output as retractions had.

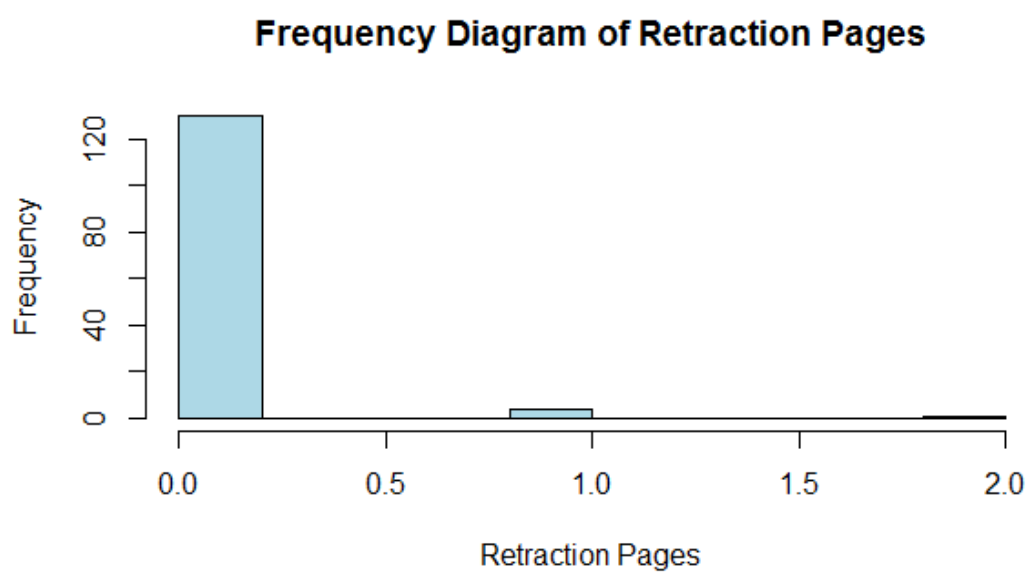


Figure 112

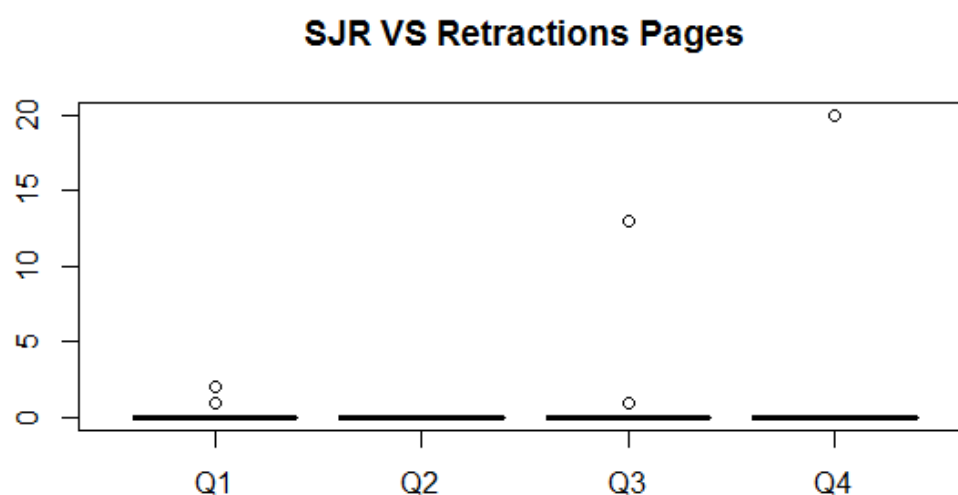


Figure 113

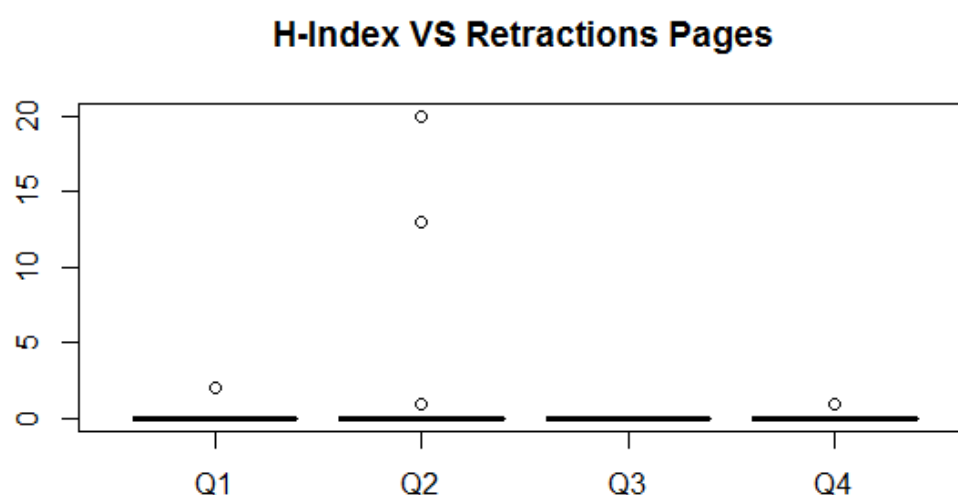


Figure 114

3.12 Total Docs (2015)

Total Docs are the number of documents that each journal published the year 2015. The data from that column was taken from the SCImago website. From the frequency diagram below we can see that the majority of our journals published 20 to 40 journals the year 2015. For SJR the journals that belonged in the Q1 published more papers after comes Q2 and Q3 and finally Q4 with the less papers. For H-Index the journals that are in the Q2 and Q4 had publishes more docs and after comes Q1 and Q3.

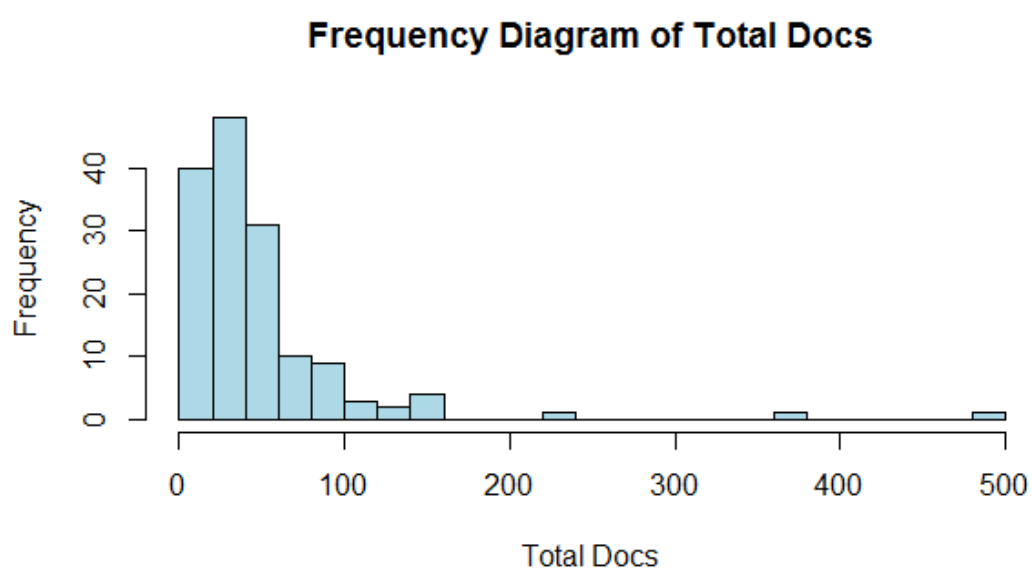


Figure 115

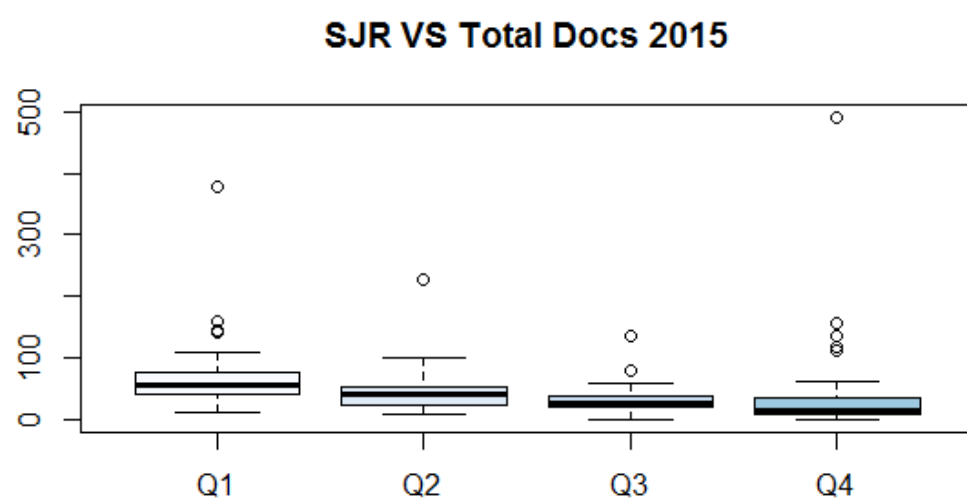


Figure 116

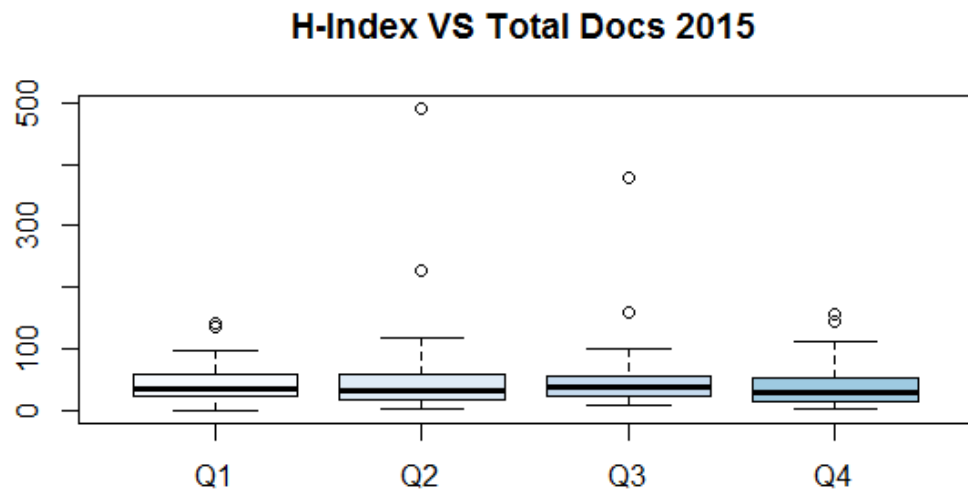


Figure 117

Furthermore, we calculated the column documents. Documents is the sum of the columns regular papers, special issue papers, other, other special and corrigenda and errata. In the boxplot below the comparison between documents and total docs of 2015 is shown. That testifies us that the data that we gathered are correct because the documents and the total docs 2015 are almost identical. So, the same analyses were made in the documents even though we got the same results.

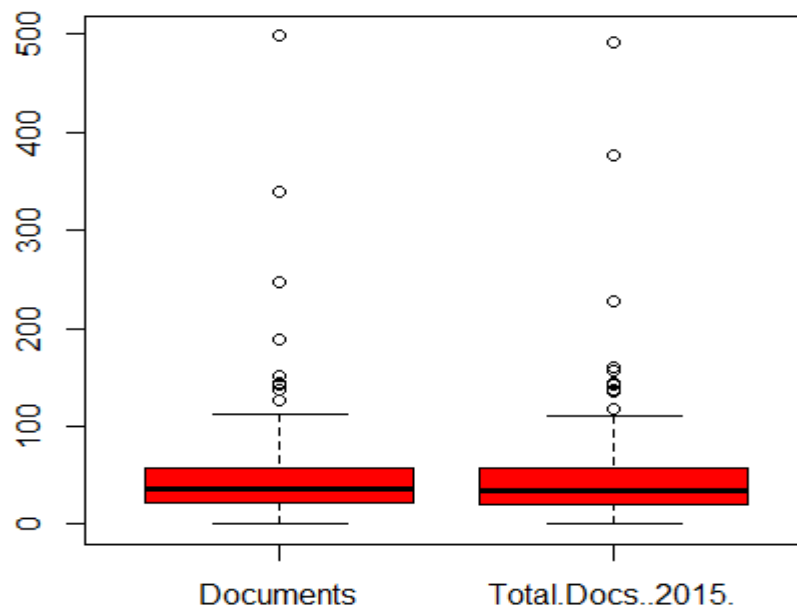


Figure 118

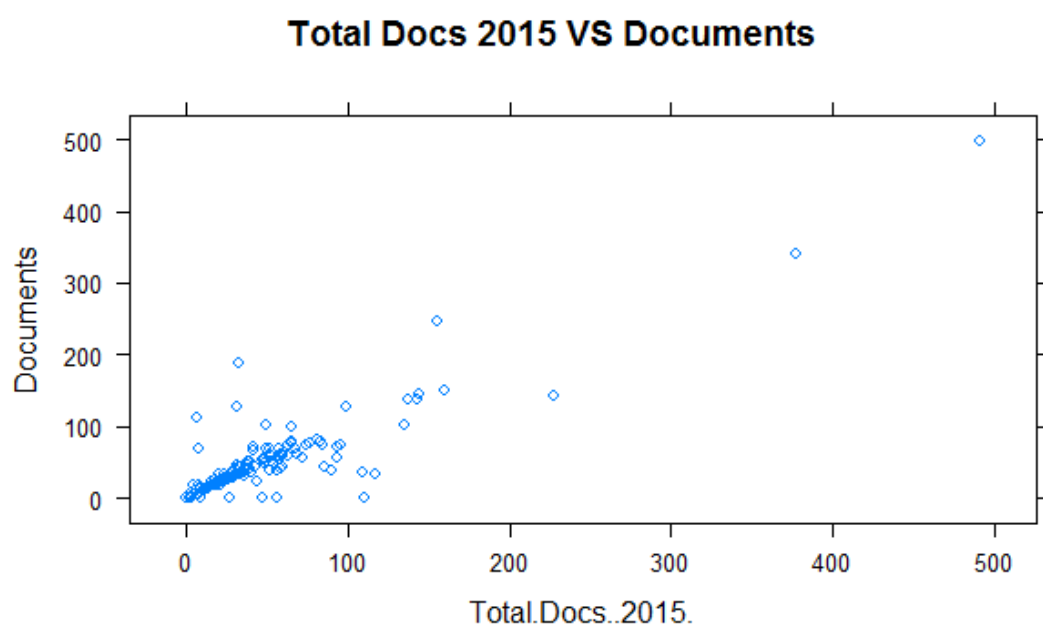


Figure 119

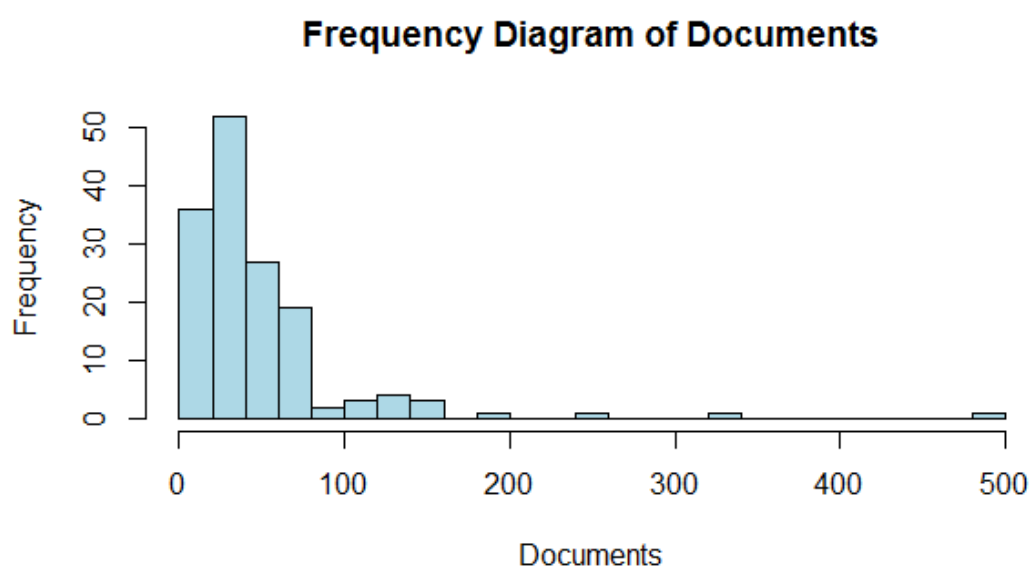


Figure 120

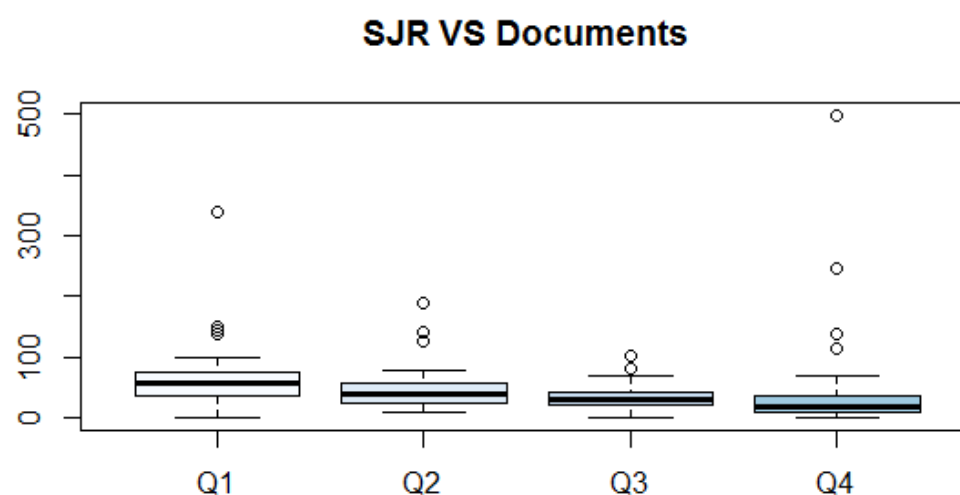


Figure 121

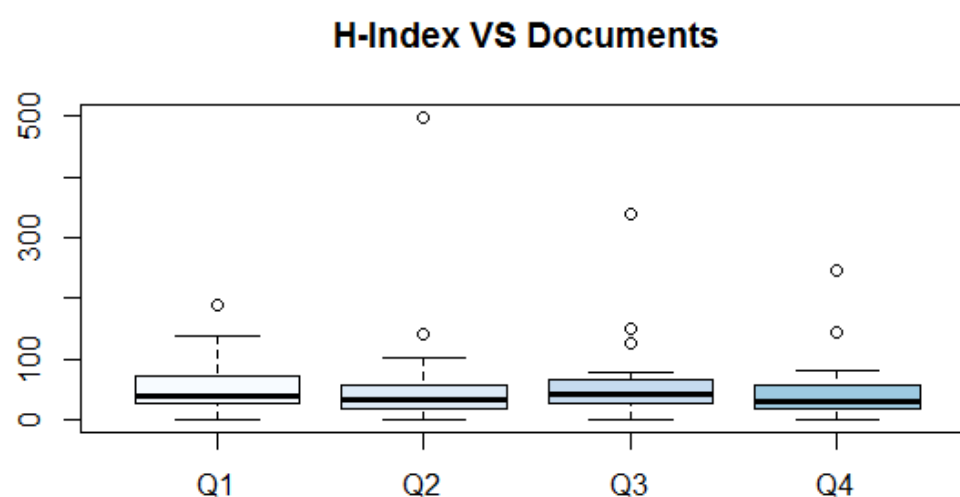


Figure 122

3.13 Total Pages

Total pages are the sum of the columns of regular paper pages, special issues pages, other pages, other special pages and corrigenda and errata pages. Firstly, the frequency diagram was constructed. The majority of our journals had between 0 and 500 pages published the year 2015 no matter the category they belonged.

Frequency Diagram of Total Pages

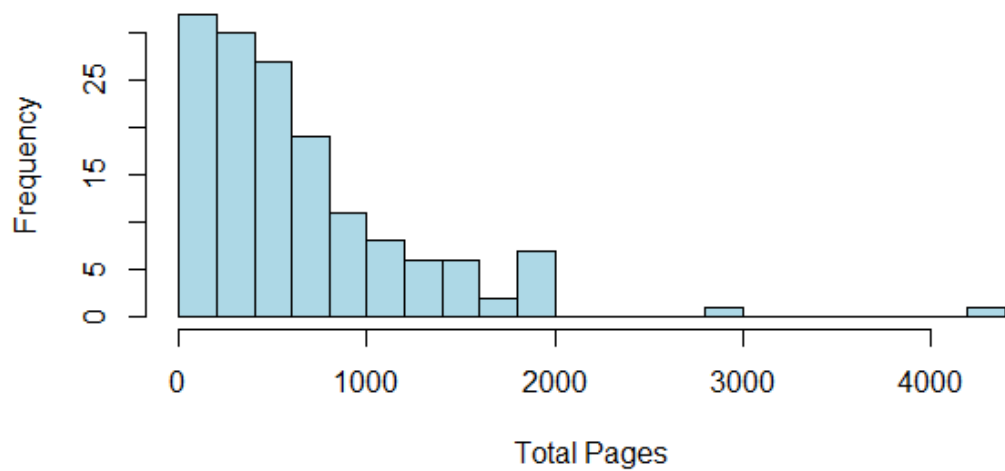


Figure 123

Below, the boxplots category wise is shown. For SJR as it was expected the journals that belonged in the Q1 had the most pages published the year 2015. Afterwards, comes the Q2 and Q3 and finally were the journals from Q4. From that we can come to the conclusion that the journals that were in highest categories had more pages as it happened with the papers. For H-Index, Q1 and Q3 were first and after followed by Q2 and Q4.

SJR VS Total Pages

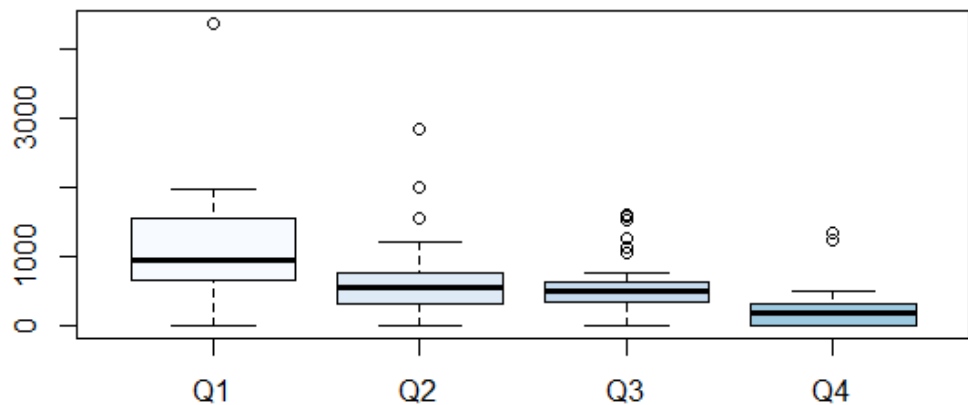


Figure 124

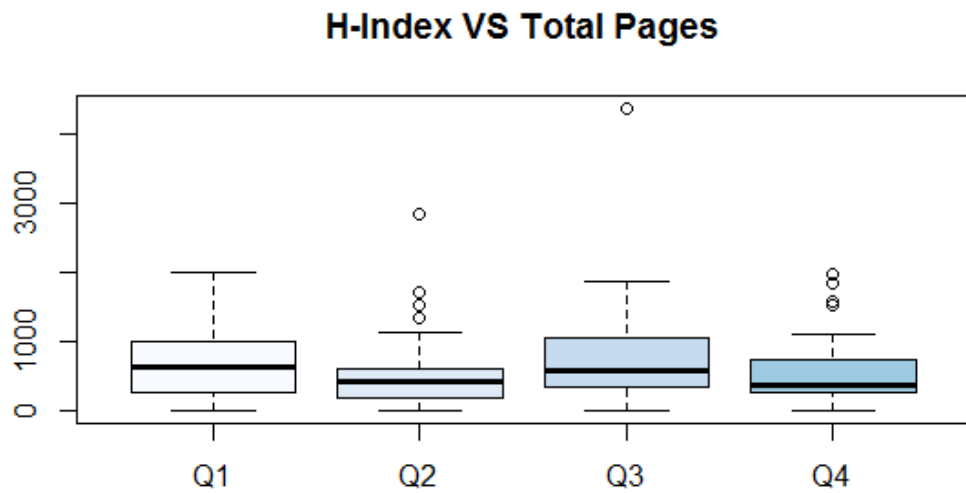


Figure 125

3.14 Conclusion

At this section, the first diagram below shows the percentages of papers published the year 2015. It is obvious that the 76% were regular papers, 15% were special papers and after came others.

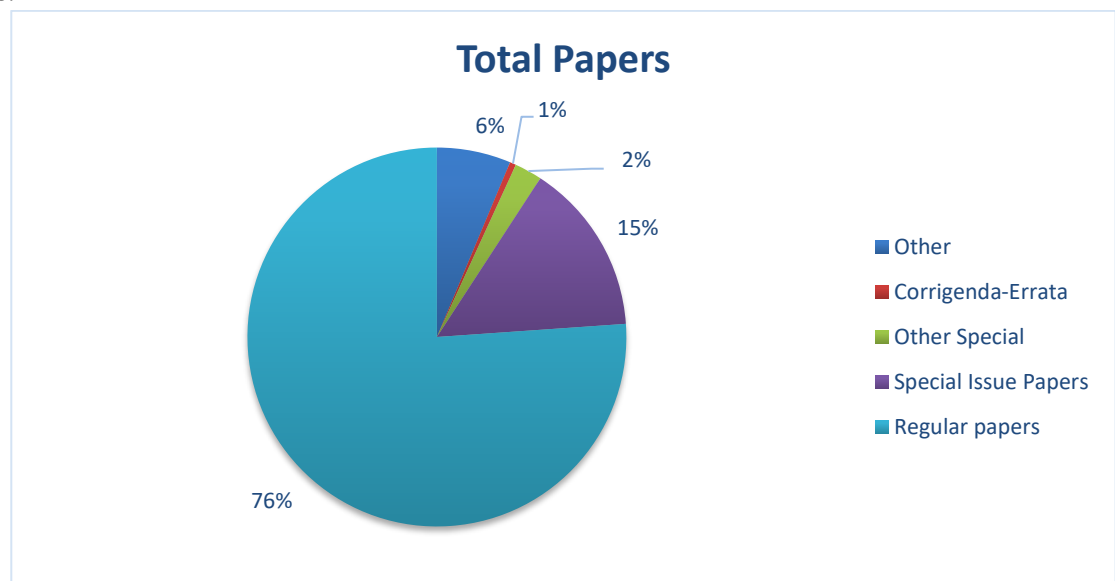


Figure 126

The same procedure was made for the pages also. The 79% of pages were dedicated to regular papers and after 18% were dedicated to special issue papers as it was expected.

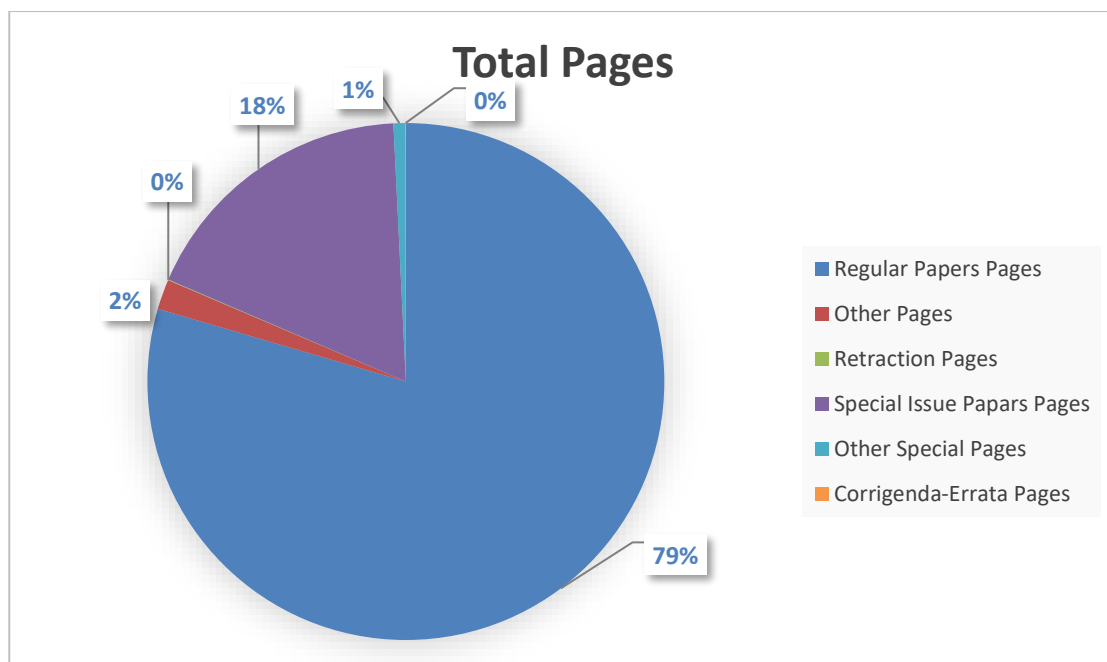


Figure 127

Furthermore, the same diagrams were made for all of our data but with taking into consideration the SJR category they belonged.

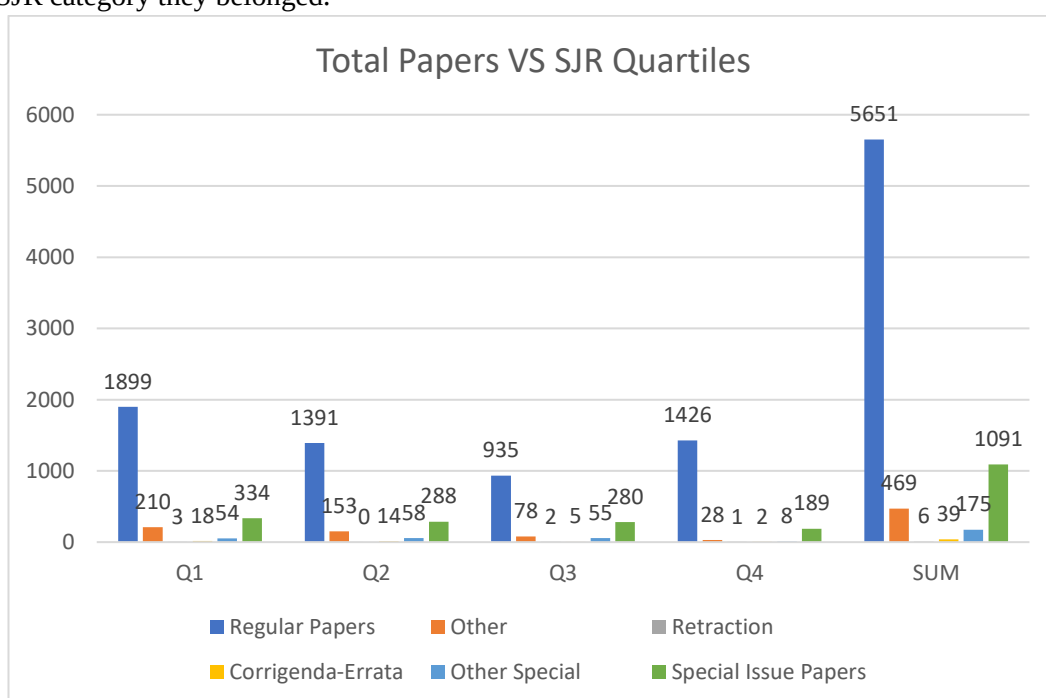


Figure 128

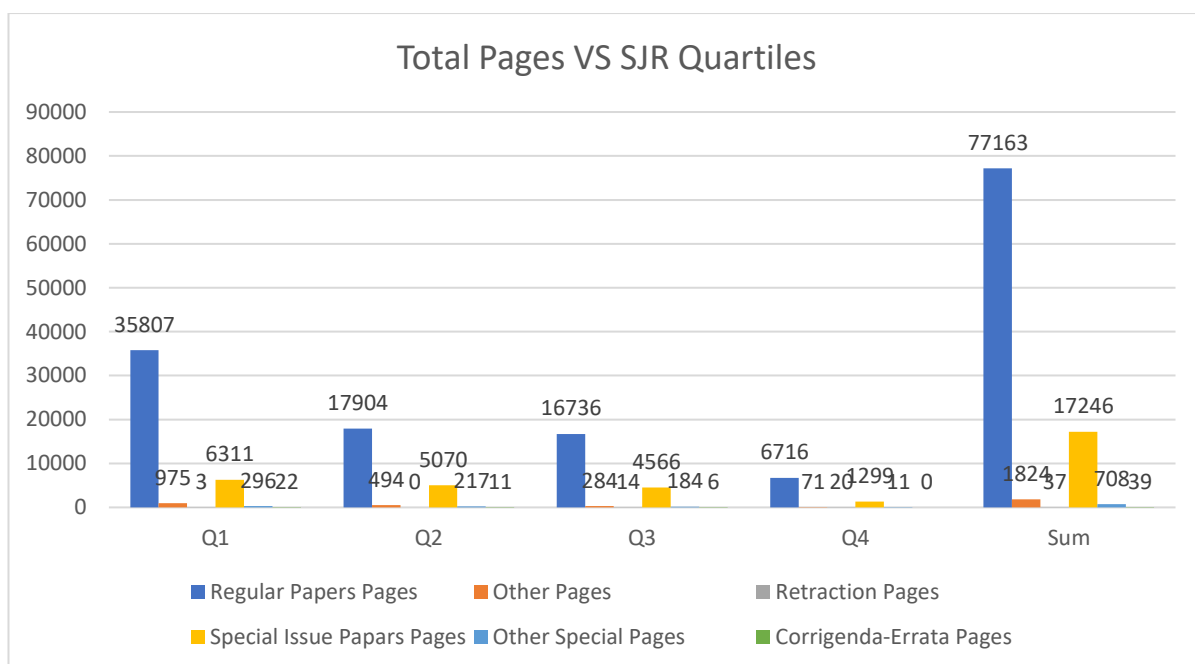


Figure 129

Finally, the same analyses were made for H-Index as well.

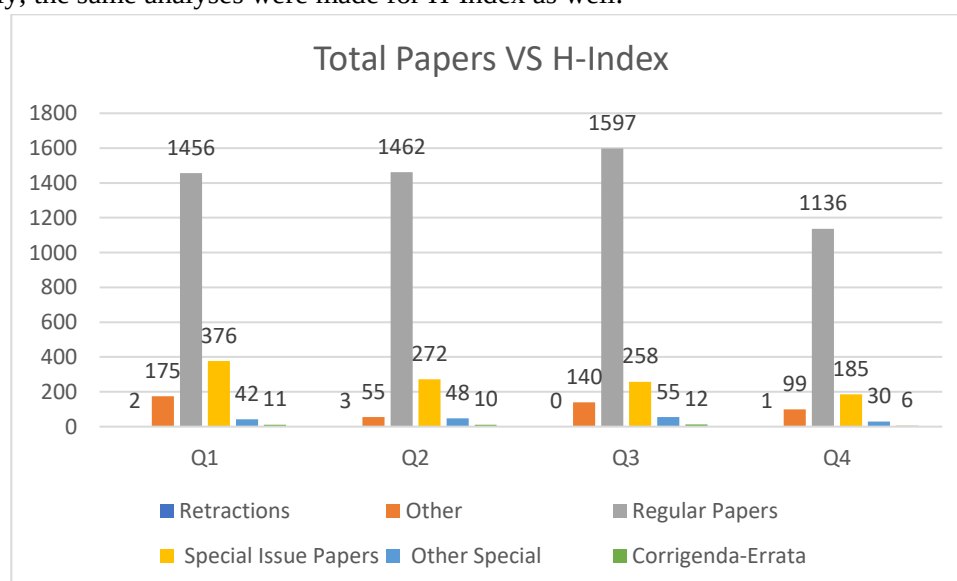


Figure 130

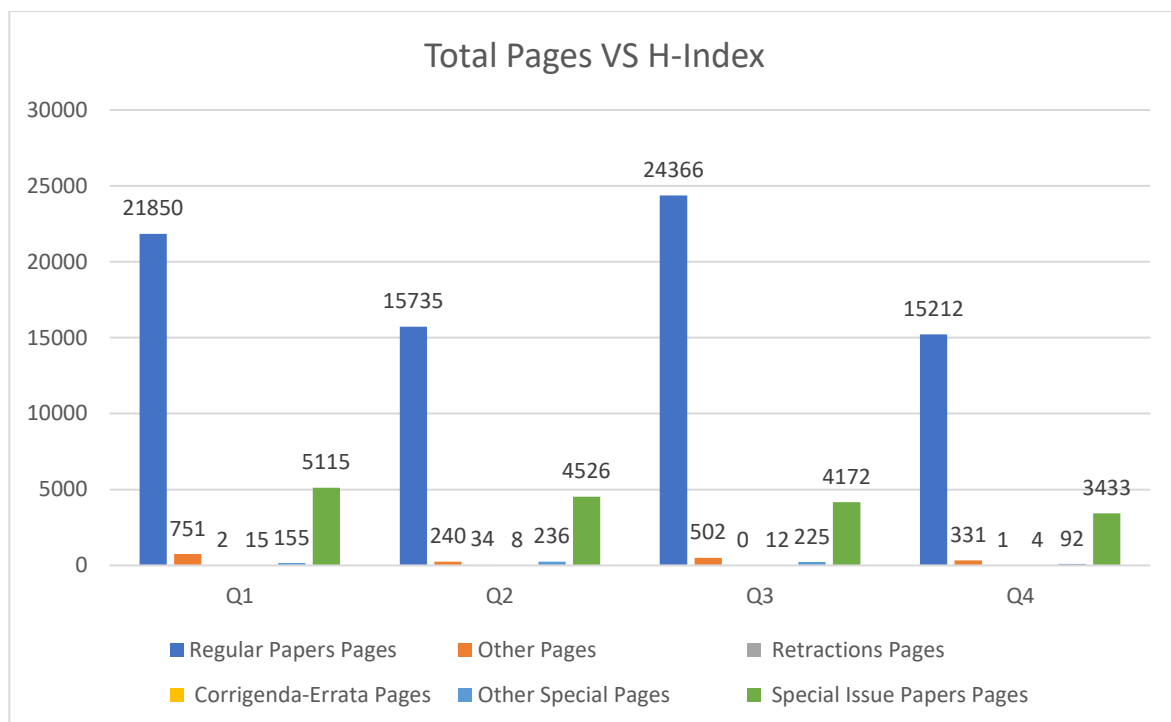


Figure 131

From the above, it is evident that the category is affected by the number of pages and the number of papers a journal published each year.

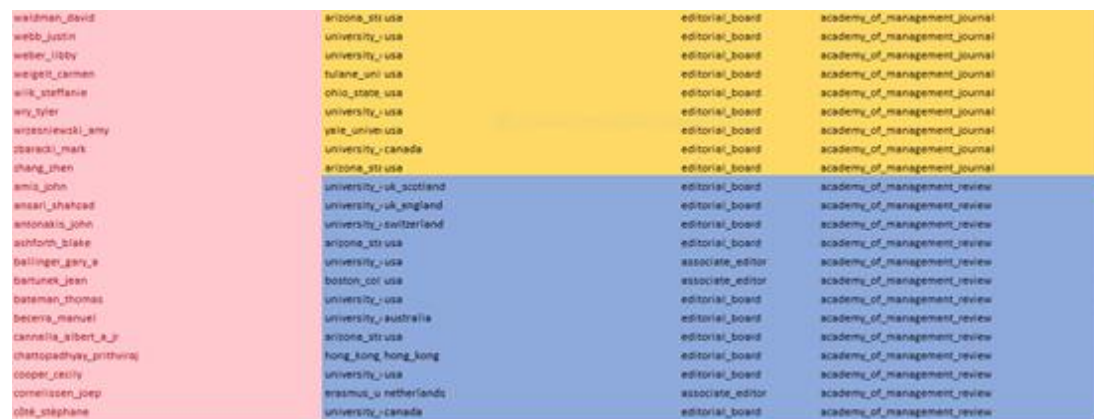
4. Networks

4.1 Introduction

A network is, in its simplest form, a collection of points joined together in pairs by lines. In the jargon of the field the points are referred to as vertices' or nodes and the lines are referred to as edges. [55] At this research social networks analysis was used in order to shape the landscape of management of technology and innovation journals.

Social networks are networks in which the vertices are people in our case journals, and the edges represent some form of social interaction between them, such as friendship. In our case the relations that the edges represent is how many editors were in other journals editorials boards and which are those journals. By answering to that question, we can come to the assumption that the journal with the most edges is probably the most influential journal in the field. That's because that journal is sharing the majority of his editorial board with other journals in this field worldwide.

The process followed in the interest of answering that question is the following. Firstly, all the data referring to the editorial boards members from each individual excel was gathered in one excel. That excel had as columns the name and the surname of the editorial boards members their affiliation, their country, their position and if there was a second or a third affiliation or country. On the last column, there was the name of their journal. From there, the editorial boards members that participated in more than one journal was gathered in a different excel sheet as well as their references. The data on that excel sheet was sorted by the journal name. Below a screenshot of that excel sheet is shown:



waldman_david	arizona_sti usa	editorial_board	academy_of_management_journal
webb_justin	university_usa	editorial_board	academy_of_management_journal
weller_lizzy	university_usa	editorial_board	academy_of_management_journal
welgeit_carmen	tulane_uni usa	editorial_board	academy_of_management_journal
wilk_steffanie	ohio_state usa	editorial_board	academy_of_management_journal
wily_tyler	university_usa	editorial_board	academy_of_management_journal
wisniewski_amy	yale_univ usa	editorial_board	academy_of_management_journal
zbaracki_mark	university_canada	editorial_board	academy_of_management_journal
zhang_theren	arizona_sti usa	editorial_board	academy_of_management_journal
amia_john	university_uk scotland	editorial_board	academy_of_management_review
ansari_shahad	university_uk england	editorial_board	academy_of_management_review
antonakis_john	university_switzerland	editorial_board	academy_of_management_review
aschforth_bake	arizona_sti usa	editorial_board	academy_of_management_review
bettinger_gary_s	university_usa	associate_editor	academy_of_management_review
bartunek_jean	boston_col usa	associate_editor	academy_of_management_review
bateman_thomas	university_usa	editorial_board	academy_of_management_review
becerra_manuel	university_australia	editorial_board	academy_of_management_review
cannella_albert_r_jr	arizona_sti usa	editorial_board	academy_of_management_review
chatopadhyay_prithwiraj	hong_kong hong_kong	editorial_board	academy_of_management_review
cooper_dorothy	university_usa	editorial_board	academy_of_management_review
cornelissen_jeep	erasmus_u netherlands	associate_editor	academy_of_management_review
cote_stephane	university_canada	editorial_board	academy_of_management_review

Image 13

Afterwards, from that data the incident matrix was constructed. The rows of the incident matrix were the editorial boards member that were in more than one journal and the columns were the journals titles. The incident matrix was a 663x150 matrix. The elements of the matrix were filled with 1 if the editorial board member is member of the journal column or with 0 if it's not. A screenshot of the incident matrix is shown below:

Surname Name	Academy of Management Journal	Academy of Management Review	Asian Journal of Shipping and Logistics	Asian Journal of Technology Innovation
acker_joan	0			
acur_muran	0			
adler_paul	0			
aguilera_ruth	0			
ainsworth_susan	0			
al_ariss_akram	0			
alcacer_juan	0			
alderton_wendy	0			
alegre_joaquin	0			
alexey_oliver	1			
altay_nezih	0			
altinay_levent	0			
alvesson_mats	0			
ambrosini_veronique	0			
anand_gopesh				
amis_john	0	1		
anderson_marc	0			
anderson_neil	0			
anderson_r_alistair	0			
andriopoulos_costas	0			
anwar_ahmed	0			

Image 14

The 1 in the incident matrix was filled manually because there wasn't any other way but the 0 was filled in R. In R the code that we wrote is the following:

```
library(xlsx)

editorial_boards_networks<-
as.matrix(read.xlsx("editorial_board_networks.xlsx",sheetIndex=1))

editorial_boards_networks[is.na(editorial_boards_networks)]<-0
```

R code 1

That process is followed because our goal is to construct an adjacency matrix A of a simple graph. An adjacency matrix A is the matrix with elements

A_{ij} such that:

$A_{i,j} = \{ 1 \text{ if there is an edge between vertices } i \text{ and } j,$

0 otherwise.

Above we constructed an unweighted network. A Weighted or value network on the other side can be represented by giving the elements of the adjacency matrix values equal to the weights of the corresponding connections. Below, we construct the weighted network and its clearer what it is and what are the differences between unweighted network and weighted network.

Then, in order to construct the incident matrix of the weighted network and because we want to construct the networks of journals and not the networks of editorial boards members we calculate the transpose matrix (150x663) of the incident matrix in R.

```
transpose<-t(editorial_boards_networks)

incident_matrix_weighted<- transpose%*% editorial_boards_networks
```

R code 2

The incident matrix is a 150x150 matrix and it's almost the matrix that we want for our network analysis. But, just to be sure again in R we subtracted the incident matrix from his transpose in order to give us a check matrix which had only 0.

```
check<- adjacency_matrix_weighted- t(adjacency_matrix_weighted)
```

R code 3

But the right incident matrix has in his diagonal 0 something that our matrix didn't had. So, in R again we made our diagonal equals to 0.

```
incident_matrix_weighted<-  
as.matrix(0,ncol=ncol(incident_matrix_weighted),nrow=nrow(incident_matrix_weighted))  
  
incident_matrix_weighted<-diag(incident_matrix_weighted,x=0)
```

R code 4

That's the matrix for the weighted network but except for the weighted network we want to construct also the unweighted network. For that, we made again in R all the elements that weren't 0 equal to 1. Finally, in R the adjacency matrix in excel format was exported.

```
write.xlsx(adjacency_matrix_weighted,"C:/Users/Admin/Desktop/adjacency  
matrix_weighted.xlsx")  
  
write.xlsx(adjacency_matrix_unweighted,"C:/Users/Admin/Desktop/adjacency  
matrix_unweighted.xlsx")
```

R code 5

4.2 Undirected- Unweighted Network

At that point where our matrixes are ready we decide to visualize them via Gephi software. Gephi is the leading visualization and exploration software for all kinds of graphs and networks. It is open-source and free. Firstly, the unweighted matrix is inserted in Gephi. However, Gephi only imports csv files so our unweighted matrix was convert into csv format. Undirected network option was selected. Afterwards, in order to draw into conclusions statistical analysis in Gephi was made. But before we did that we observed that our network consists of 434 edges and 150 nodes. That his size which can be determined by the number of nodes of the network or alternatively, as the number of edges in the network.

4.2.1 Connected Components

Firstly, the connected components of the network were calculated. A component is a subset of the vertices of a network such that there exists at least one path from each member of that subset to each other member, and such that no other vertex in the network can be added to the subset while preserving this property. In an undirected network, we typically find that there is a large component that fills most of the network-usually more than half and not infrequently over 90%-while the rest of the network is divided into a large number of small components disconnected

from the rest. [55] The Gephi algorithm for connected components detect only weakly connected components on undirected networks. In the following image, we can see the components of our networks. First, we can see the graph which contains 32 components.

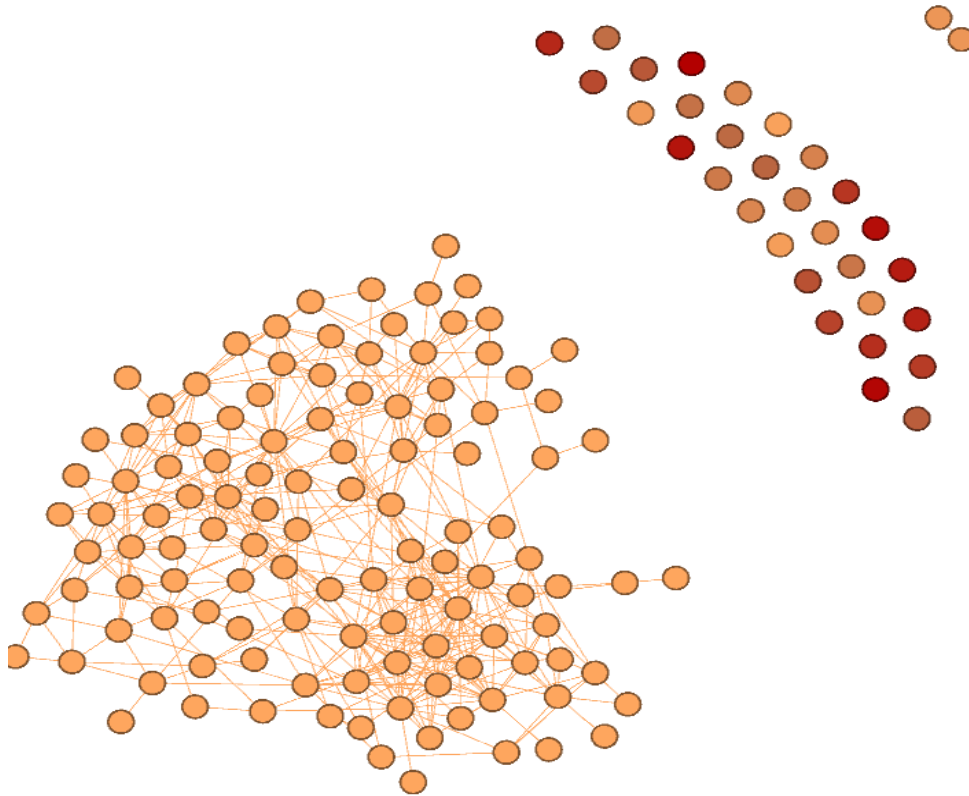


Image 15 (Connected Components)

These components can be split into three groups as it is shown in the image. The first group contains all the journals that form the central component which is shown in the table 1. The second group are the journals the Eurasian Mining and the International Journal of Mining Reclamation and Environment which connect to each other. Finally, the last group contains all the other journals that do not connect with anyone.

Academy of Management Journal	International Journal of Information System Modeling and Design
Academy of Management Review	International Journal of Innovation and Learning
Asian Journal of Shipping and Logistics	International Journal of Innovation and Sustainable Development
Asian Journal of Technology Innovation	International Journal of Innovation and Technology Management
Baltic Journal of Management	International Journal of Innovation Management
British Journal of Industrial Relations	International Journal of Intelligent Enterprise
British Journal of Management	International Journal of Knowledge Management
Canadian Journal of Administrative Sciences	International Journal of Knowledge Management Studies
Corporate Governance	International Journal of Knowledge-Based Development
Creative Industries Journal	International Journal of Management Reviews
Creativity and Innovation Management	International Journal of Manpower
Decision Sciences	International Journal of Operations and Production Management
Economic and Industrial Democracy	International Journal of Operations and Quantitative Management
Economics of Innovation and New Technology	International Journal of Physical Distribution and Logistics Management
Electricity Journal	International Journal of Product Development
Electronic Commerce Research and Applications	International Journal of Project Management
Electronic Markets	International Journal of Selection and Assessment
European Journal of Industrial Relations	International Journal of Services and Operations Management
European Journal of Innovation Management	International Journal of Services and Standards
Group Decision and Negotiation	International Journal of Shipping and Transport Logistics
Human Relations	International Journal of Technological Learning, Innovation and Development
Human Resource Management	International Journal of Technology Intelligence and Planning
Industrial and Labor Relations Review	International Journal of Technology Management and Sustainable Development
Industrial Relations	International Journal of Work Innovation
Industry and Innovation	International Labour Review
Innovation: Management, Policy and Practice	International Transactions in Operational Research
Intangible Capital	Journal of Business Venturing
Interfaces	Journal of Business Venturing Insights
International Entrepreneurship and Management Journal	Journal of Direct, Data and Digital Marketing Practice
International Journal of Accounting and Information Management	Journal of Economics and Management Strategy
International Journal of Biotechnology	Journal of High Technology Management Research
International Journal of Business Information Systems	Journal of Human Resources
International Journal of Business Innovation and Research	Journal of Information Systems
International Journal of Conflict Management	Journal of International Business Studies
International Journal of Electronic Finance	Journal of Knowledge Management
International Journal of Enterprise Network Management	Journal of Labor Research
International Journal of Entrepreneurial Venturing	Journal of Management Control
International Journal of Entrepreneurship and Innovation	Journal of Management Inquiry
International Journal of Entrepreneurship and Innovation Management	Journal of Management Studies
International Journal of Foresight and Innovation Policy	Journal of Organizational Change Management
International Journal of Human Capital and Information Technology Practice	Journal of Personal Selling and Sales Management
International Journal of Human Resource Management	Journal of Product and Brand Management
International Journal of Information and Decision Sciences	Journal of Product Innovation Management

Journal of Science and Technology Policy Management	Organizational Research Methods
Journal of Small Business Management	Production and Operations Management
Journal of Technology Management and Innovation	Project Management Journal
Journal of Textile and Apparel, Technology and Management	Public Management Review
Knowledge and Process Management	Public Personnel Management
Knowledge Management	Quality Technology and Quantitative Management
Knowledge Management and E-Learning	R and D Management
Knowledge Management Research and Practice	Research Policy
Management Learning	Research Technology Management
Managerial and Decision Economics	Review of Industrial Organization
New Technology, Work and Employment	Service Industries Journal
Operational Research	Supply Chain Forum
Operations Management Research	System Dynamics Review
Organization	Team Performance Management
Organization Science	Technological Forecasting and Social Change
Organization Studies	Technovation

Table 1

Those journals represent the 78,67% of the SCImajor list. Also, the median of the journals that are in the central component is 0,554 which is higher than the median of all the journals that are in the SCImajor list. The same happens with the average, the average of the central component is 1,115067797 and the average of the SCImajor list is 0,402. That shows us that the journals that are in the central component have higher SJR. That can be seen in the boxplots below. In the first boxplot, the SJR ranking are separated in Quartiles. As it was expected the journals which belong in the Q1 have the higher SJR rank and after comes the other Quartiles. In the second boxplot, the SJR of the journals that were in the central component was consider. Again, the Q1 is higher but it is also higher from the Q1 in the first boxplot. The differences of the boxplots are that the medians in the second boxplot are higher in all the Quartiles and Q4 has less journals in the second boxplot that in the first.

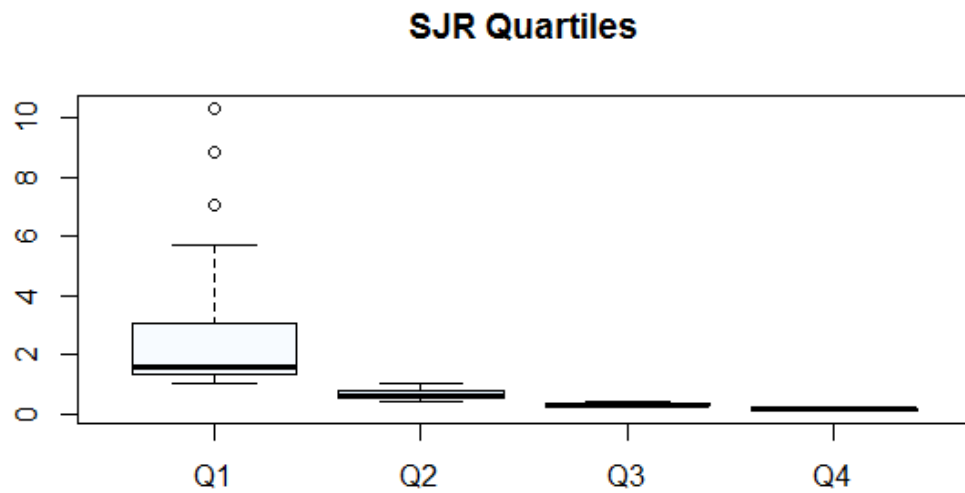


Figure 132

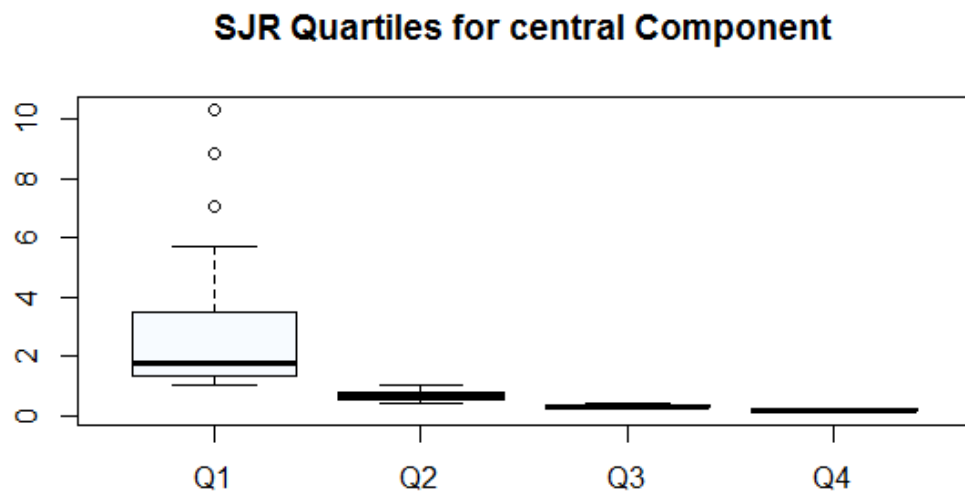


Figure 133

Moreover, the diagram below shows that the journals that belonged in the Q1 with respect to SJR ,92,31% are in the central component. The same is happening with all the other Quartiles. That was also shown in the boxplots above. The central component consists more journals from the Q1 and Q2 and less journals from Q3 and Q4.

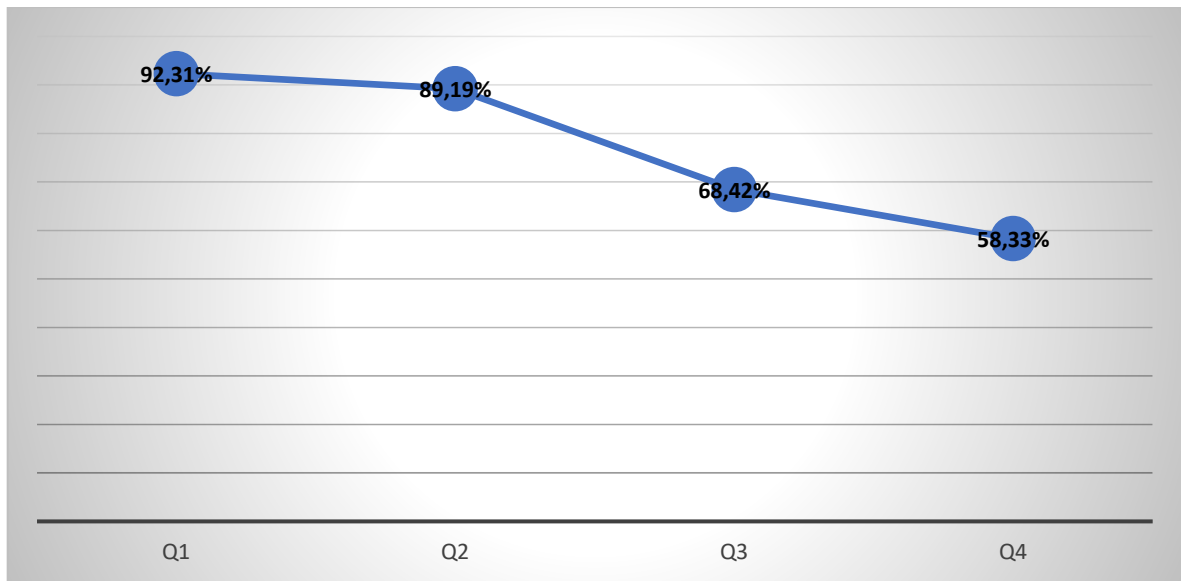


Figure 134

Furthermore, the same procedure was made for H-index. In the first boxplot, as before with SJR the Q1 is higher and all the other Quartiles are below. In the second boxplot which contains only the journals that are in the central component again the Q1 is higher and it also has higher median. The other three Quartiles seem to be the same or less that in the first boxplot. That can also be seen in the diagram 2 where it is shown that 92.31% from the journals that were in the Q1 in the SCImajor list are in the high component. In the case of H-Index, in diagram 2 also it is shown that a lot of journals that were in the Q3 are in the high component.

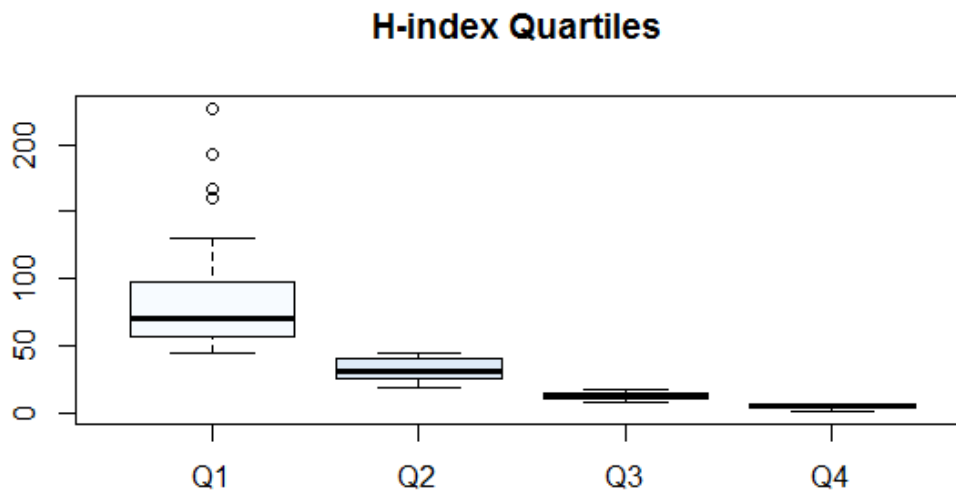


Figure 135

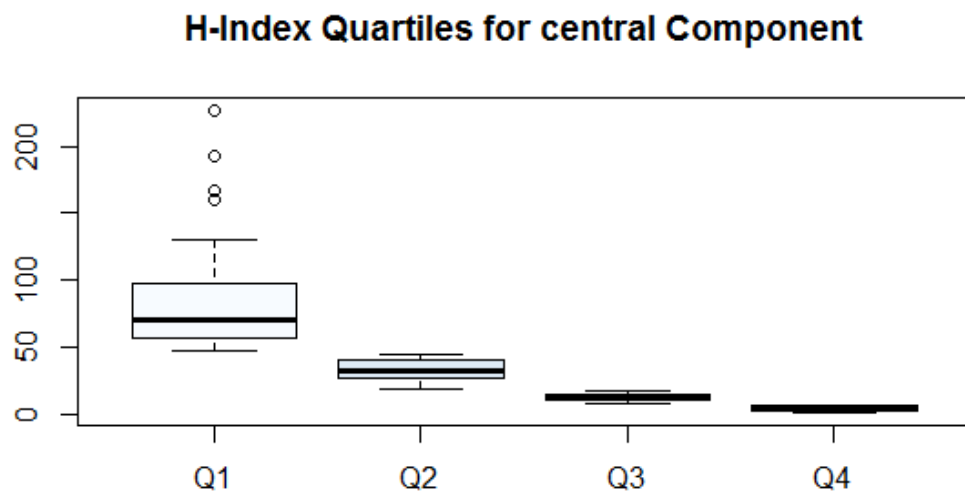


Figure 136

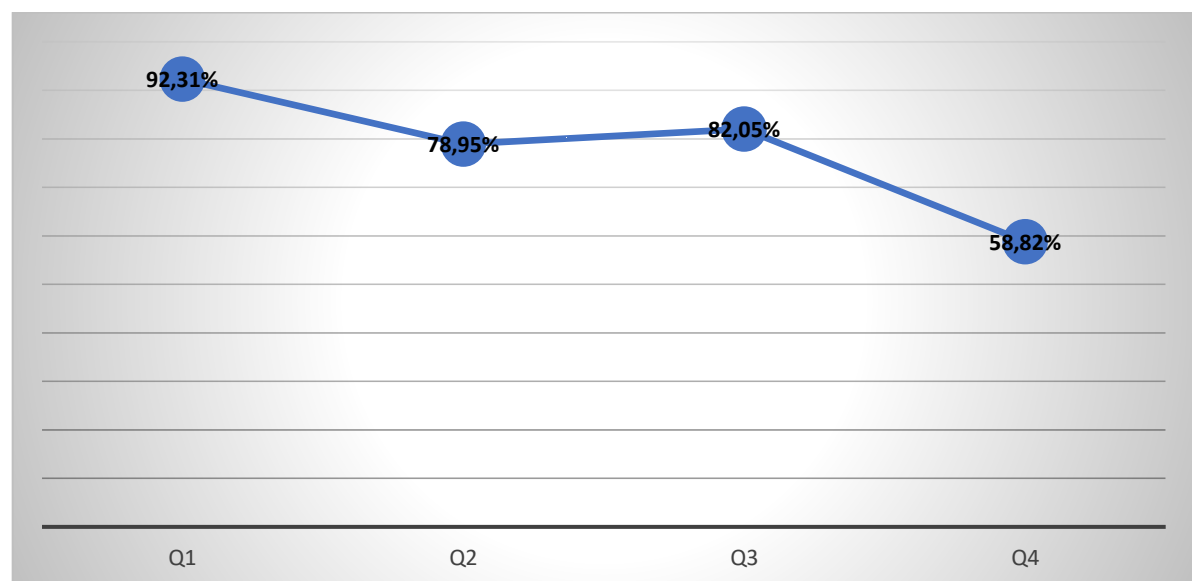


Figure 137

Afterwards, we have two journals that connect to each other, the Eurasian Mining and the International Journal of Mining Reclamation and Environment. Both of them belong in Q3 with respect to SJR and H-Index.

Finally, we have all the other journals that do not connect with anyone. All those journals are isolated and represents the 20% of the journals that are in the SCImajor list.

AutoTechnology	Journal of Internet Commerce
Cartography and Geographic Information Science	Journal of Organizational Behavior Management
Espacios	Journal of Social Marketing
Genetic Engineering and Biotechnology News	Memoirs of the Faculty of Engineering, Kyushu University
Harvard Business Review	MIT Sloan Management Review
Information and Organization	Monthly Labor Review
Innovation	NanoEthics
International Journal of Construction Management	Negotiation Journal
International Journal of Innovation Science	Printed Circuit Design and Fab
International Journal of IT Standards and Standardization Research	Publishing Research Quarterly
International Journal of Precision Engineering and Manufacturing - Gr	Quality Innovation Prosperity
International Journal of Sustainable Manufacturing	Research Journal of Business Management
International Journal of Technology	Science and Engineering Ethics
Journal of Commercial Biotechnology	Systemic Practice and Action Research

Table 2

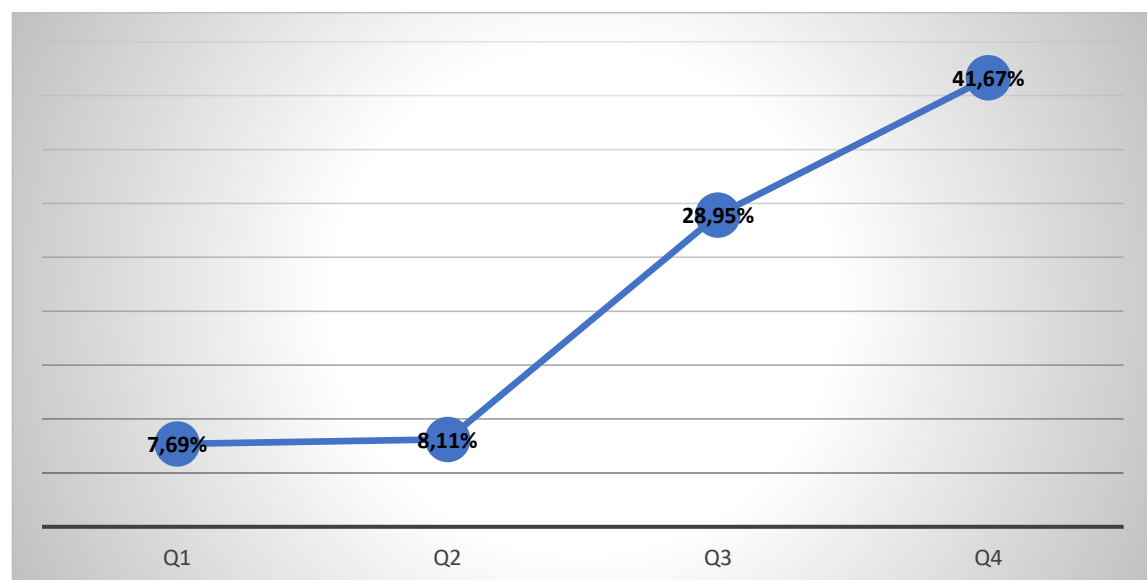


Figure 138

From the diagram above we can see that only 7,69% of all the journals that belong in the Q1 are in this component but 41,67% of the Q4 are in this component. By that we can come to the conclusion that the journals that belong in this component have low Quartiles. The same procedure was made for H-index as it is shown below. Again, the Q1 and Q4 are almost the same as SJR was but the Q3 is higher than Q2 with respect to H-Index. Never the less, the output is the same that the journals that are in this component have lower quartiles.

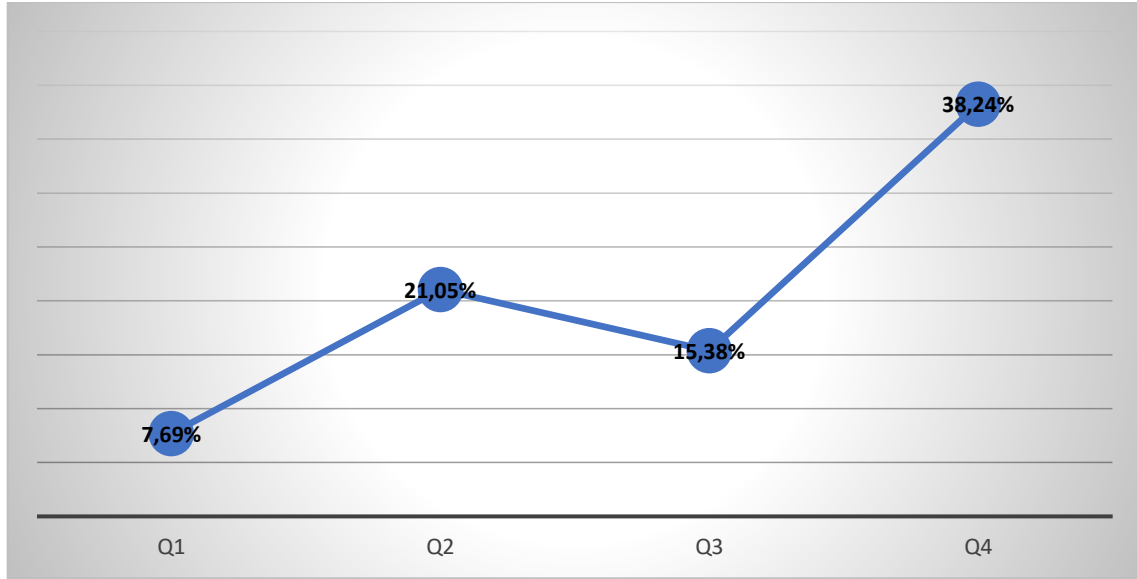


Figure 139

4.2.2 Degree

A main concern in network analysis is to distinguish between the center and the periphery of the network. In our case, the problem is to distinguish between the journals which have a central position in the network and those in the periphery. The simplest measures to represent that is degree. Degree indeed, the more ties a journal has to other journals, the more central its position in the network. In detail, degree of a vertex in a graph is the number of edges connected to it. We will denote the degree of vertex i by k_i . For an undirected graph of n vertices, the degree can be written in terms of the adjacency matrix as:

$$k_i = \sum_{j=1}^n A_{ij} \quad (1)$$

Every edge in an undirected graph has two ends and if there are m edges in total then there are $2m$ ends of edges. But the number of ends of edges is also equal to the sum of the degrees of all the vertices, so:

$$2m = \sum_{i=1}^n k_i \quad (2)$$

Or,

$$m = \frac{1}{2} \sum_{i=1}^n k_i = \frac{1}{2} \sum_{ij} A_{ij}. \quad (3)$$

The mean degree c of a vertex in an undirected graph is

$$c = \frac{1}{n} \sum_{i=1}^n k_i, \quad (4)$$

and combining this with Eq. 2 we get

$$c = \frac{2m}{n} \quad (5). \quad [55]$$

In an undirected network, the degree of a node is the number of links that such a node has. Below the top 10 journals sorted by the degree is listed with the addition of the rank the map with of the degrees are attached in the end of the chapter.

label	degree	normalized degree	Rank
Journal.of.Management.Studies	23	1	1
Academy.of.Management.Journal	19	0,826086957	2
International.Journal.of.Management.Reviews	19	0,826086957	2
International.Journal.of.Business.Innovation.and.Research	19	0,826086957	2
Organization.Studies	19	0,826086957	2
Journal.of.International.Business.Studies	19	0,826086957	2
International.Journal.of.Human.Resource.Management	18	0,782608696	7
British.Journal.of.Management	18	0,782608696	7
Human.Relations	18	0,782608696	7
Academy.of.Management.Review	17	0,739130435	10

Table 3

The average degree of our network is 5,787. Then the frequency diagram was constructed. Thus, we cannot tell the complete structure of a network from its degrees frequency alone. The degree sequence certainly gives us very important information about a network, but it doesn't give us complete information. It's obvious that the majority of our data have degree between 0 and 1. The degree number equals to zero means that they do not connect with any other journals and they do not belong in the central component. So, those journals are isolated. If the journals that do not connect to each other and have degree equals to zero was excluded, then the frequency would be almost normal. That tell us that the majority of our journals have almost equal number of connection with other journals.

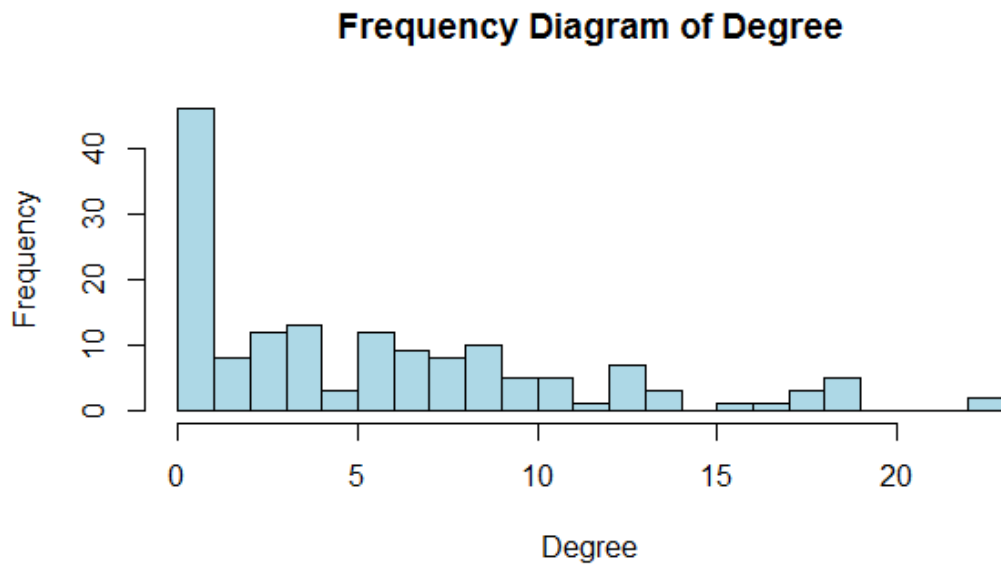


Figure 140

Furthermore, the boxplot with the degree is shown below. The median of the degree is 5, the average of the degree is 5,786666667 and the outlier of the boxplot below is 23 and belongs to the journal with the title Journal of Management Studies which has the highest degree of all.

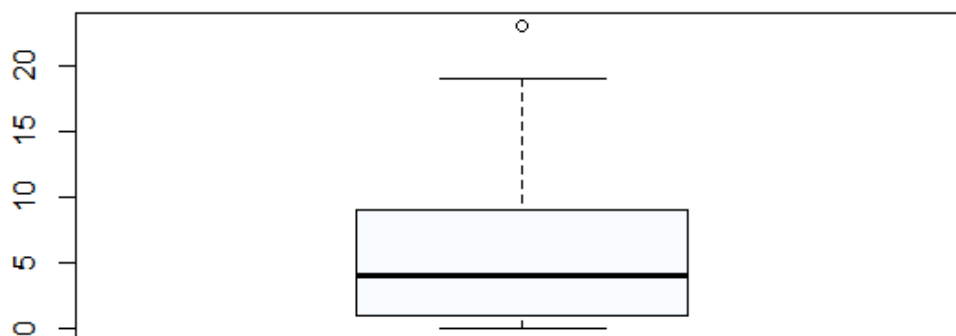


Figure 141

Moreover, an analysis was conducted in order to investigate the relationship between SJR and H-Index with degree. For all the diagrams, the normalized degree was used in order to have a clearer view. The diagram below shows us that degree and SJR don't have a linear relationship. If a journal for example has a high SJR do not mean that is going to have lot of each members

at other journals too. For example, International Journal of Technology has SJR equals to 7,037 which is high and degree 0. On the other side, Journal of International Business Studies has degree equals to 19 which is the second highest degree and SJR just 0,105.

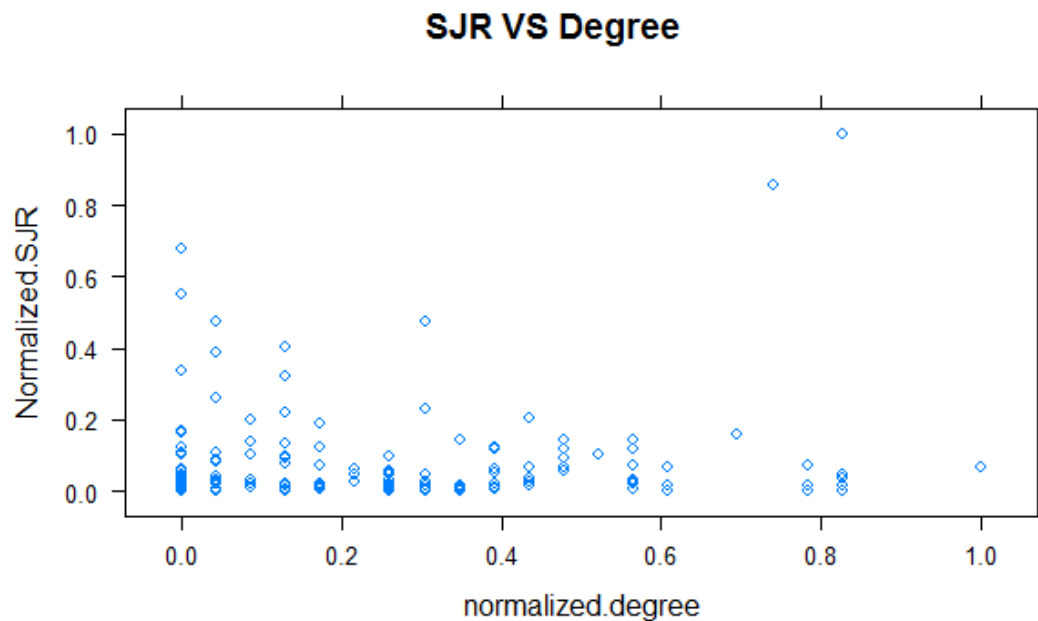


Figure 142

In addition, H-Index does not have a linear relationship with degree, but it is slightly better than with SJR. The interesting part though is that the same journals that were referred to above have the same problems with H-Index. The International Journal of Technology has H-Index equals to 167 which is high and degree 0. The Journal of International Business Studies has degree equals to 19 which is the second highest degree and H-Index just 2.

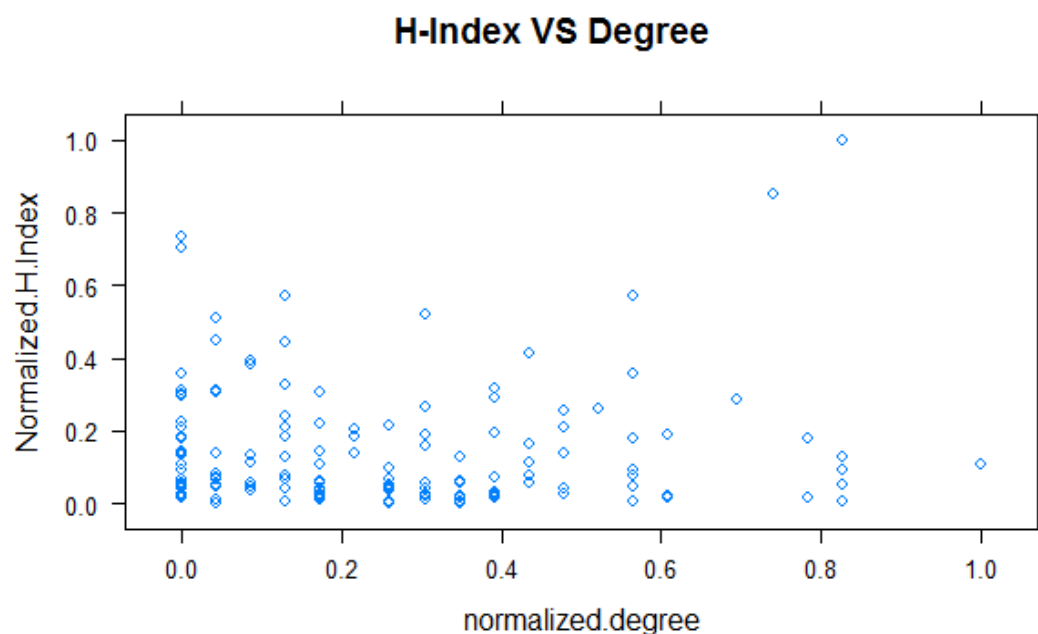


Figure 143

Moreover, the boxplot of the degree and the SJR Quartiles was constructed. At that boxplot, the degrees were separated into the categories of SJR. As it is shown the journals that belong in the Q2 have the highest degree. Afterwards comes the journals that are the Q1 but those journals have lower median. The same procedure was made for H-Index were the journals that were in the Q2 had again the highest degree but the second highest degree belongs in the journals that are in Q4. That is bizarre because it was expected the journals that were in the Q1 to have higher degree in respect to SJR but also to H-Index. That is because the journals that are in the Q1 have larger editorial board size and bigger influence in the field so more connections inside the journals and higher degree. That is not happening because maybe they are connected only with journals that belong in their category and not with others as the journals that are in the Q2 may do.

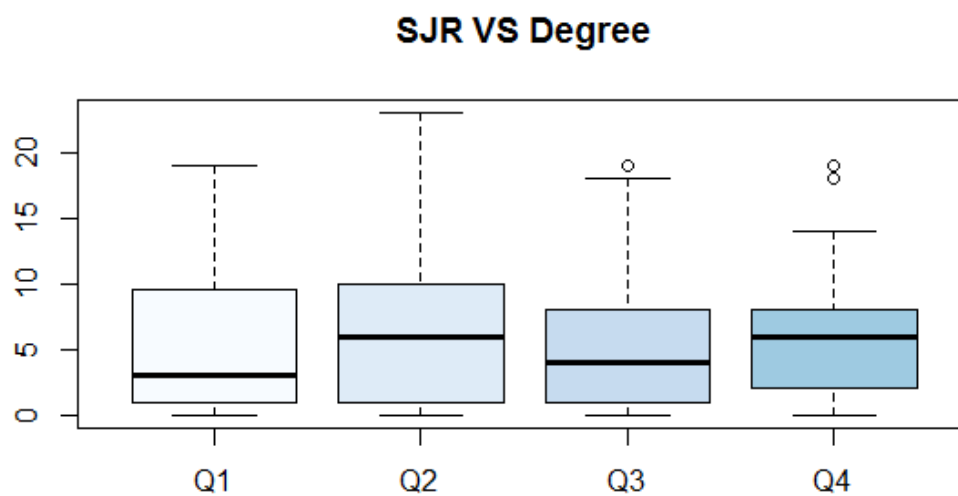


Figure 144

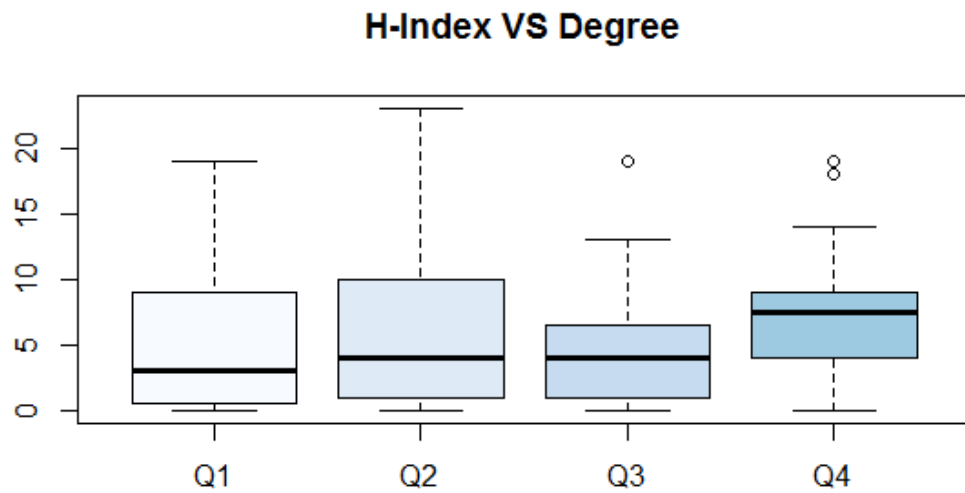


Figure 145

Furthermore, the same procedures were made for the journals that were in the central component. The normalized degree of those journals is now changed so the same diagrams were made in order to compare them. As it shown in the frequency diagram now the majority of our journals have degree between 0 and 4. That is happening because the journals that were not connected to each other and had degree equals to 0 were excluded. Also, our boxplot has higher median that before and higher minimum than before because of the same reason.

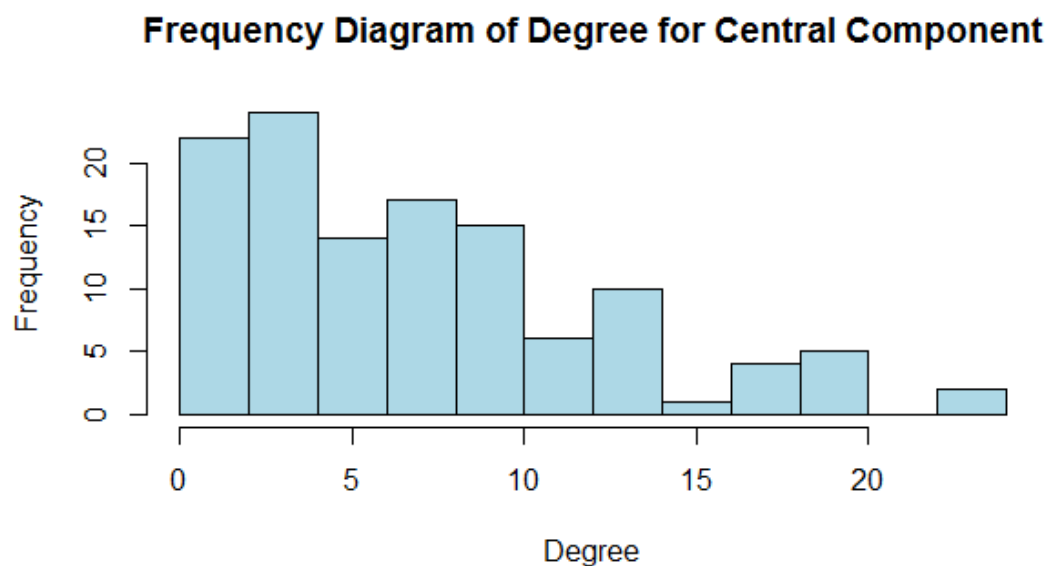


Figure 146

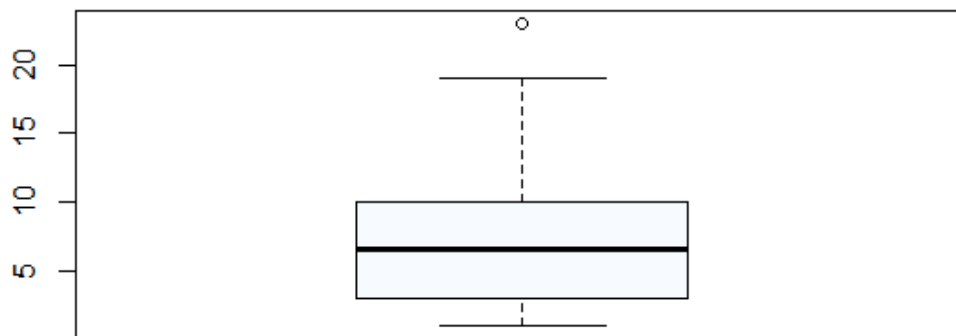


Figure 147

On the other hand, the relationship between SJR and H-Index with the degree did not change for the journals that are in the central component. For example, again we have the case where the Journal of Management Studies has degree equals to 23 which is the highest degree of all and SJR equals to 0,799 which is low as well as H-Index equals to 25. On the other side, International Journal of Work Innovation has SJR equals to 4,047 and H-Index equals to 102 which are high and degree equals to 1.

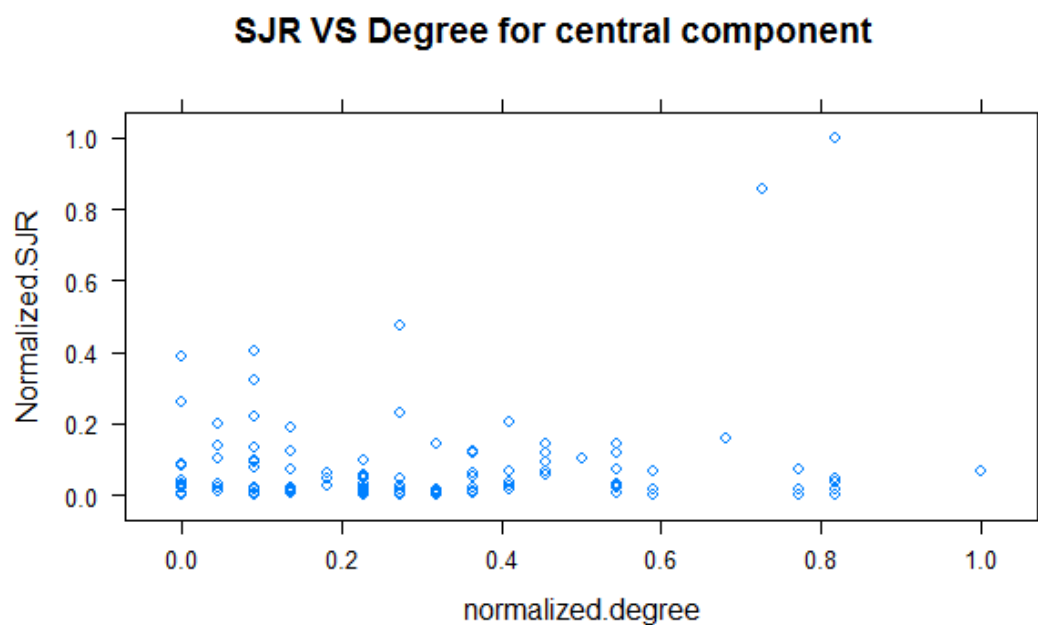


Figure 148

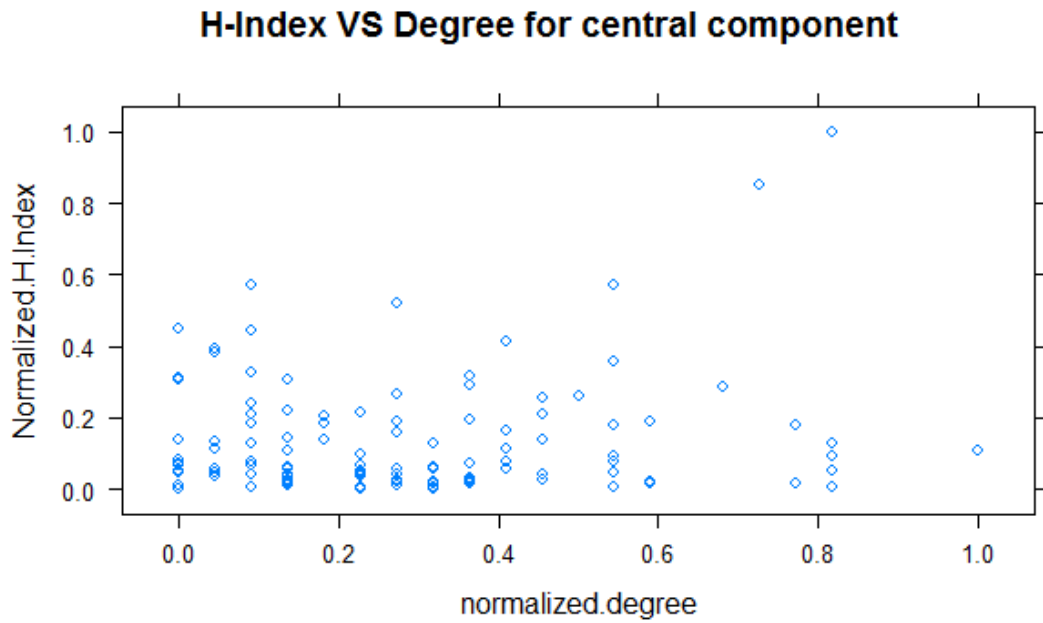


Figure 149

Still, the boxplots that shows degree and SJR Quartiles and H-Index Quartiles are different. They all have higher median compared to the previous boxplots and there are not any zeros. Also, H-Index now has again Q2 as his highest category but the second category is Q1 as it is in SJR Quartiles.

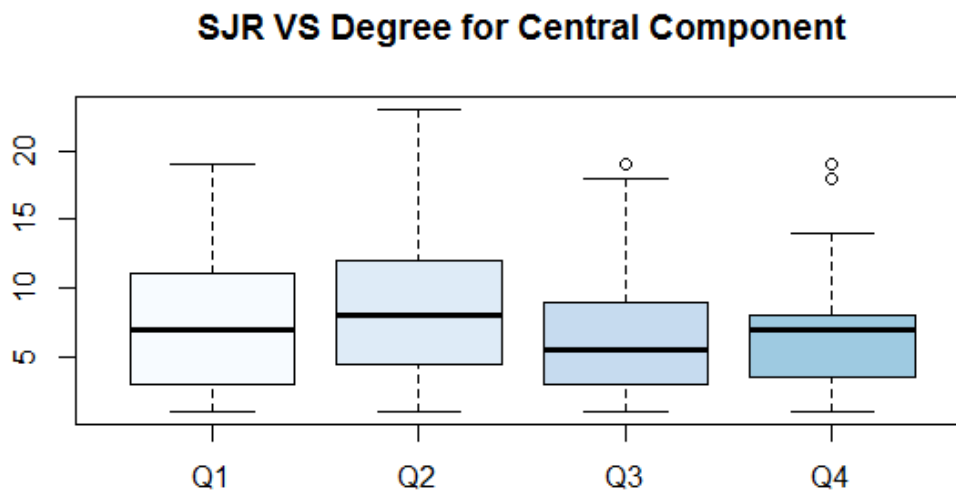


Figure 150

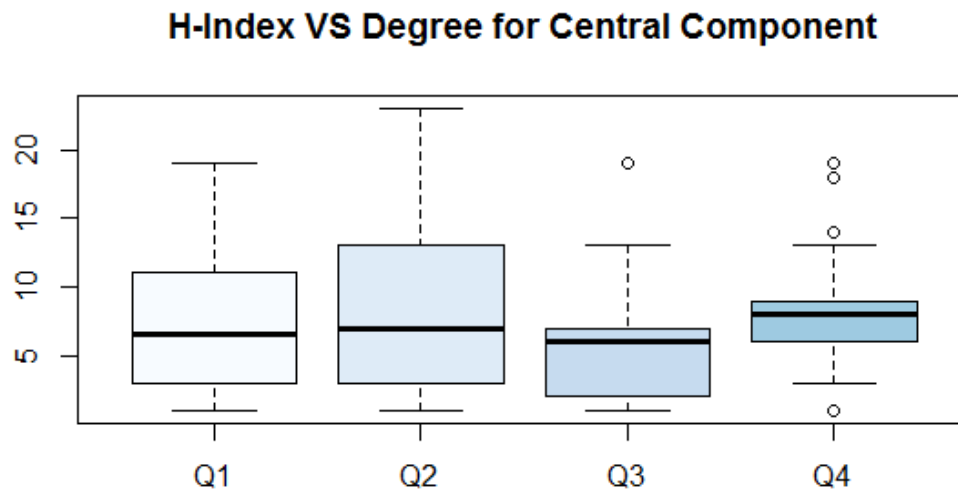


Figure 151

4.2.3 Modularity

Afterwards, in Gephi we tried to calculate the modularity. Modularity measures how well a network decomposes into modular communities. A high modularity score indicates sophisticated internal structure. This structure, often called a community structure, describes how the network is compartmentalized into sub-networks. These sub-networks (or communities) have been shown to have significant real-world meaning. For a given division of the network's vertices into some modules, modularity reflects the concentration of edges within modules compared with random distribution of links between all nodes regardless of modules. Networks with high modularity have dense connections between the nodes within modules but sparse connections between nodes in different modules. In our case randomize, use of weights and resolution equals to 1 were selected. The graph of Gephi is the following. As it is shown the different colors the graph uses represent the different groups that the journals create.



Image 16 (Modularity)

The modularity of our diagram is 0,498 and the number of communities are 37, but from those only 7 form groups. One group as it was expected the two journals that connect to each other. In our graph those two are the two nodes that connect with each other and no one else. The other 6 groups are listed below. The journals that do not connect with anyone were excluded.

Group 1	Group 2
Academy of Management Journal	Economics of Innovation and New Technology
Academy of Management Review	International Journal of Business Information Systems
Industry and Innovation	International Journal of Innovation and Sustainable Development
International Journal of Work Innovation	International Journal of Knowledge-Based Development
Journal of Economics and Management Strategy	International Journal of Shipping and Transport Logistics
Journal of Human Resources	Knowledge Management and E-Learning
Journal of Labor Research	Baltic Journal of Management
Journal of Management Inquiry	International Journal of Electronic Finance
Organization Science	International Journal of Innovation and Learning
Management Learning	International Journal of Intelligent Enterprise
Organization	Knowledge Management
Human Resource Management	International Journal of Business Innovation and Research
International Journal of Human Resource Management	International Journal of Enterprise Network Management
International Journal of Management Reviews	Journal of Knowledge Management
Journal of Management Studies	Journal of Textile and Apparel, Technology and Management
Journal of Organizational Change Management	International Journal of Knowledge Management Studies
Managerial and Decision Economics	International Journal of Services and Operations Management
International Journal of Conflict Management	Corporate Governance
International Journal of Selection and Assessment	International Journal of Accounting and Information Management
Organization Studies	Knowledge Management Research and Practice
Review of Industrial Organization	Intangible Capital
Industrial and Labor Relations Review	International Journal of Knowledge Management
Team Performance Management	International Journal of Services and Standards
Economic and Industrial Democracy	Knowledge and Process Management
International Labour Review	Group 3
British Journal of Management	Innovation: Management, Policy and Practice
Canadian Journal of Administrative Sciences	International Journal of Biotechnology
Industrial Relations	International Journal of Foresight and Innovation Policy
British Journal of Industrial Relations	Journal of Product Innovation Management
Creative Industries Journal	International Journal of Entrepreneurship and Innovation Management
European Journal of Industrial Relations	Journal of High Technology Management Research
Human Relations	Asian Journal of Technology Innovation
Journal of International Business Studies	International Journal of Technological Learning, Innovation and Development
New Technology, Work and Employment	Journal of Technology Management and Innovation
Organizational Research Methods	R and D Management
Service Industries Journal	Electricity Journal

Technovation	Group 5
International Journal of Technology Intelligence and Planning	Journal of Business Venturing
International Journal of Technology Management and Sustainable Development	Journal of Business Venturing Insights
Project Management Journal	International Entrepreneurship and Management Journal
Technological Forecasting and Social Change	International Journal of Entrepreneurial Venturing
International Journal of Innovation Management	Public Personnel Management
International Journal of Project Management	Journal of Small Business Management
Quality Technology and Quantitative Management	Public Management Review
Research Technology Management	Group 6
Creativity and Innovation Management	Journal of Information Systems
International Journal of Entrepreneurship and Innovation	Journal of Product and Brand Management
International Journal of Innovation and Technology Management	International Journal of Information System Modeling and Design
International Journal of Product Development	Journal of Direct, Data and Digital Marketing Practice
Research Policy	
Group 4	
Asian Journal of Shipping and Logistics	
International Journal of Physical Distribution and Logistics Management	
International Transactions in Operational Research	
Production and Operations Management	
International Journal of Information and Decision Sciences	
International Journal of Operations and Production Management	
International Journal of Operations and Quantitative Management	
Journal of Management Control	
Operational Research	
Electronic Commerce Research and Applications	
Decision Sciences	
Group Decision and Negotiation	
International Journal of Manpower	
Journal of Personal Selling and Sales Management	
Electronic Markets	
International Journal of Human Capital and Information Technology Professionals	
Supply Chain Forum	
European Journal of Innovation Management	
Journal of Science and Technology Policy Management	
Interfaces	
Operations Management Research	
System Dynamics Review	

Table 4

Those journals represent the 78,67% of the SCImajor list. More specifically, group 1 represents 30,25% of the central component, group 2 represents 20,17% of the central component, group 3 21,01%, group 4 18,49%, group 5 5,88% and finally group 6 just 3,36% of the central component. The diagrams below show the relationship that they have with SJR by group. The boxplot shows that the highest SJR is in the group 6 and that is because group 6 is the only group which has higher Q1 than all the other categories as the diagrams below show. Those diagrams show us what percent of the SCImajor list are in each module and in what Quartile they are.

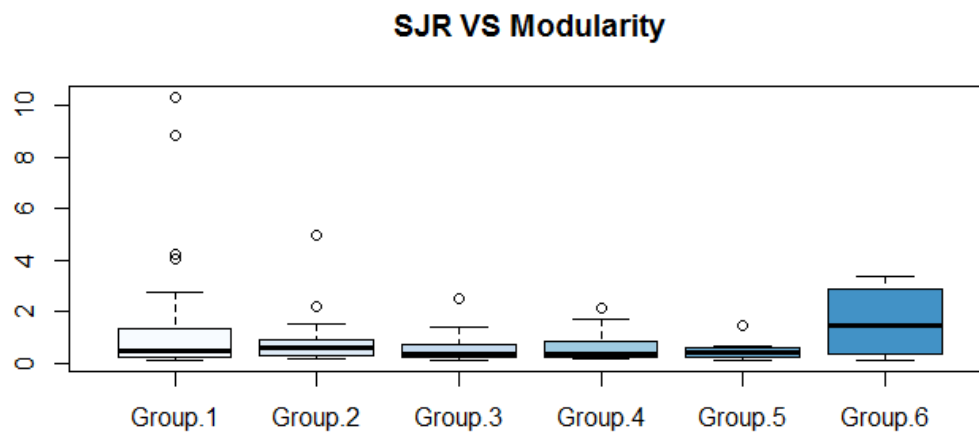


Figure 152

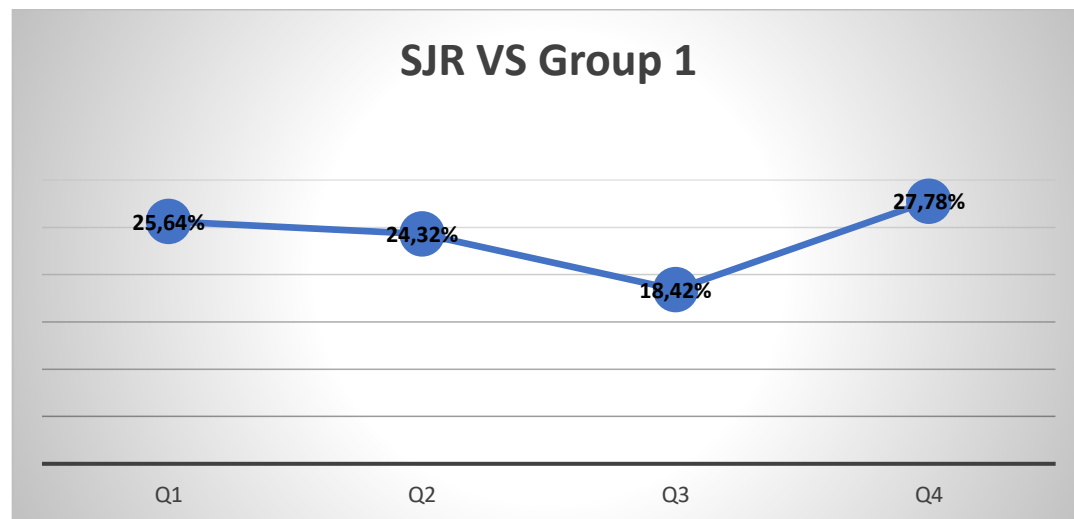


Figure 153

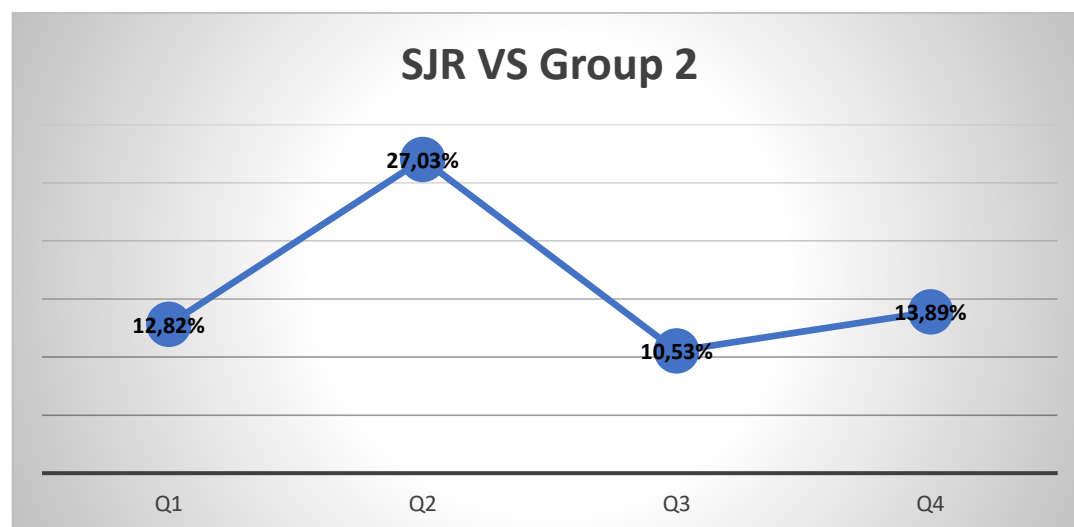


Figure 154

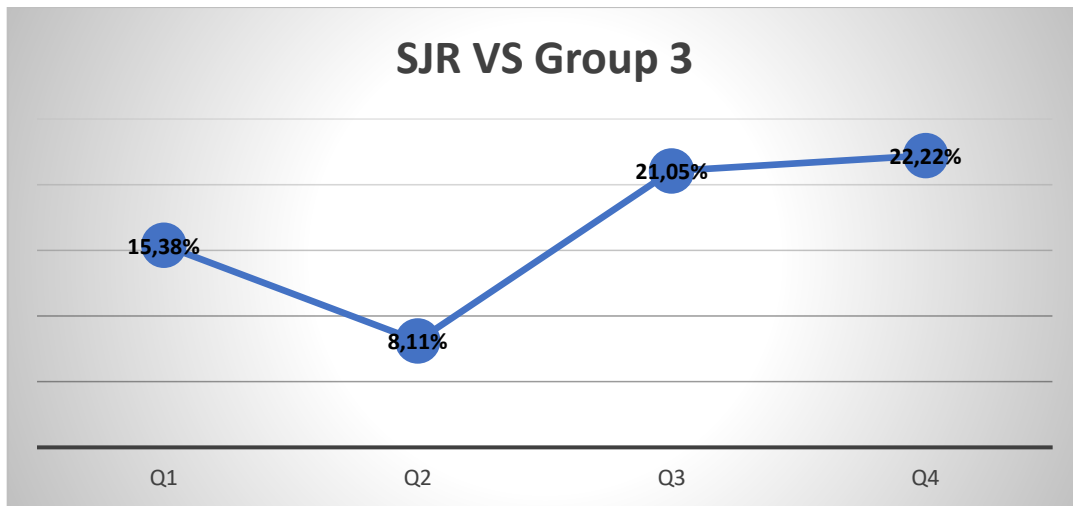


Figure 155

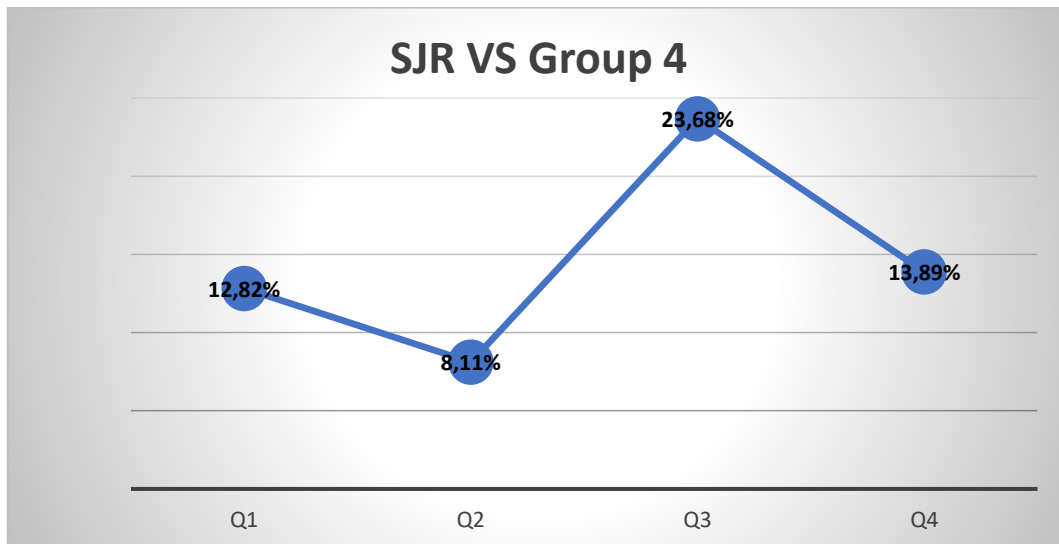


Figure 156

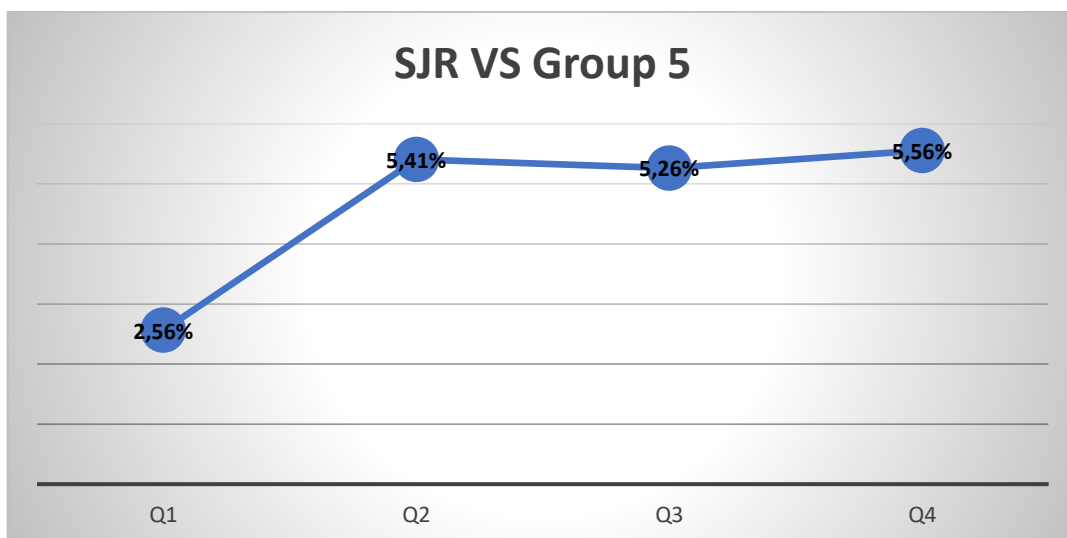


Figure 157

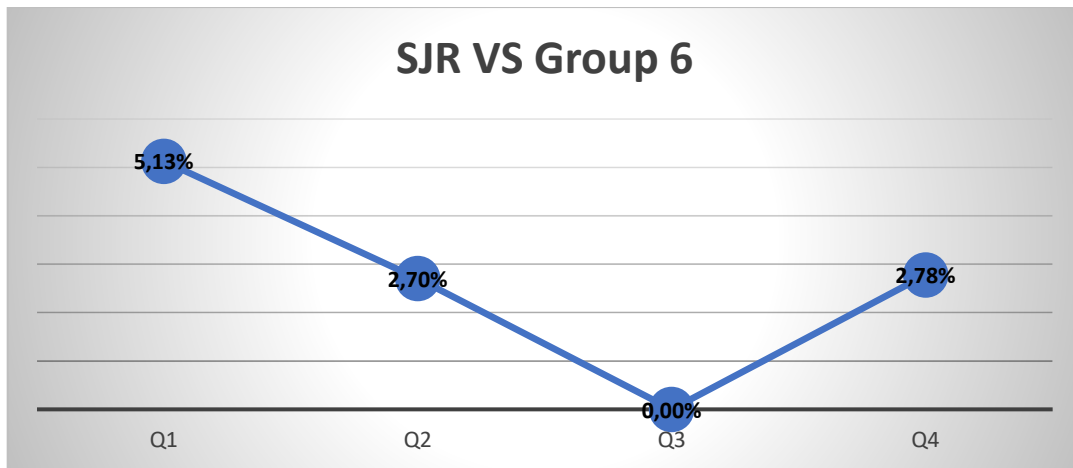


Figure 158

Furthermore, the same procedure was made for H-Index. Again, group 6 has the highest H-Index for the same reason.

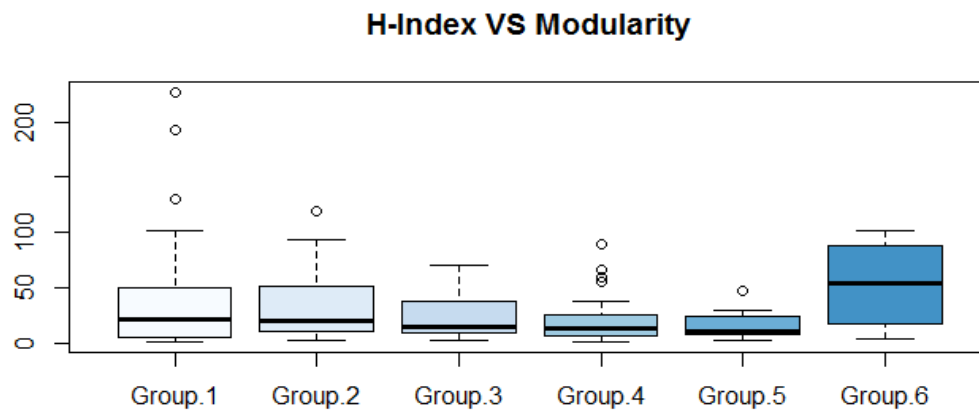


Figure 159

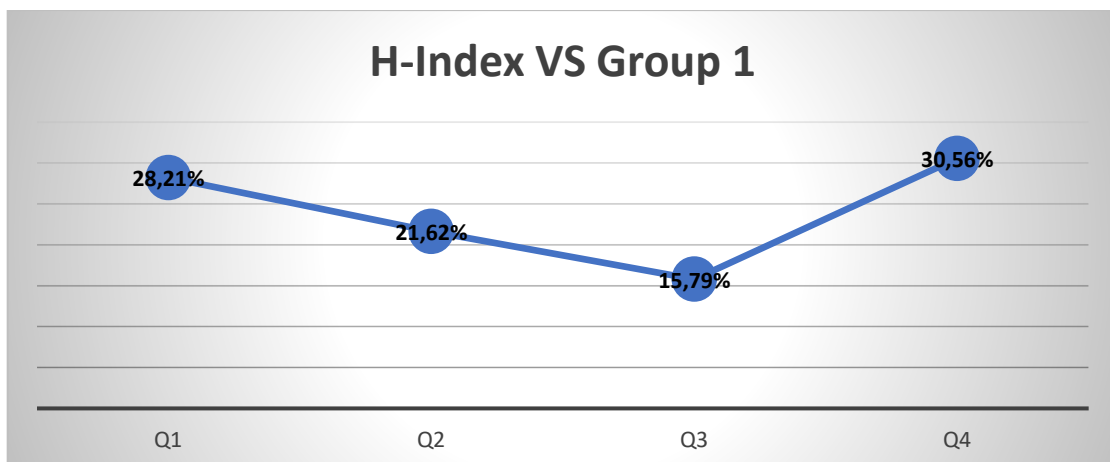


Figure 160

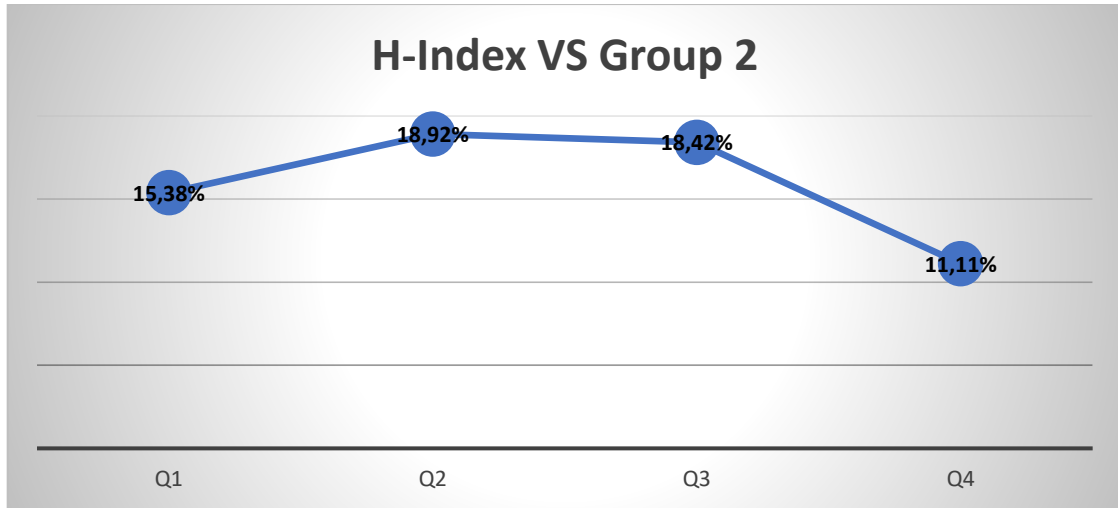


Figure 161

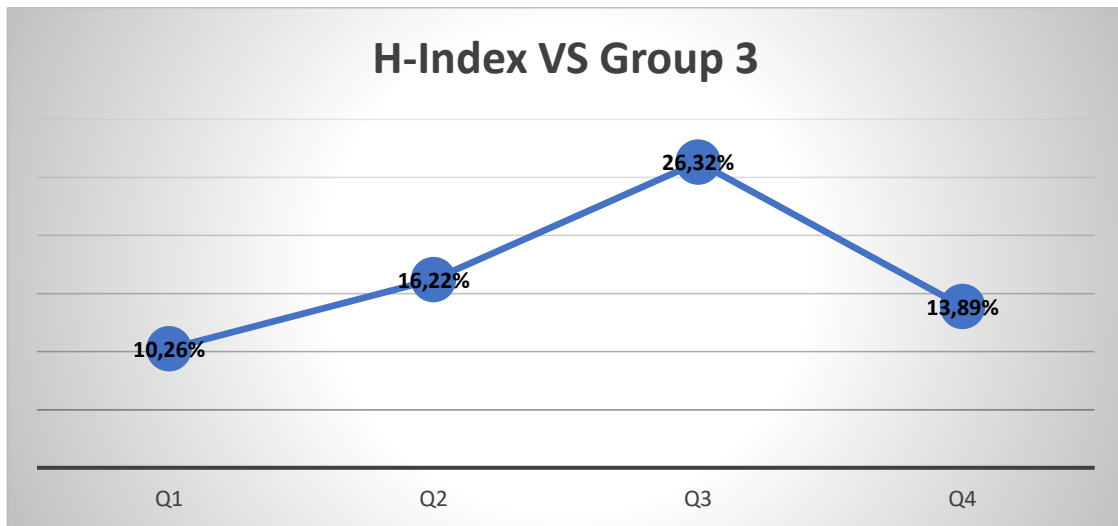


Figure 162

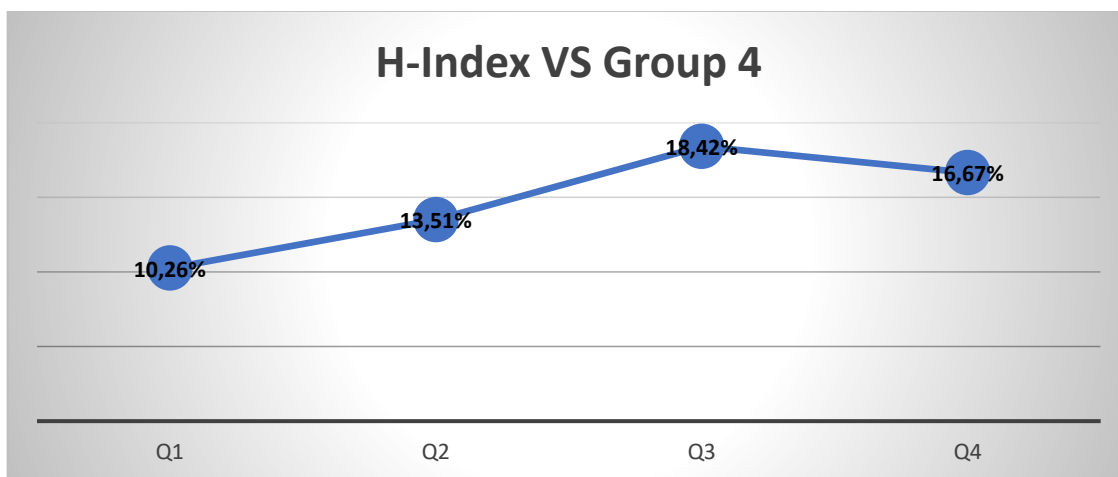


Figure 163

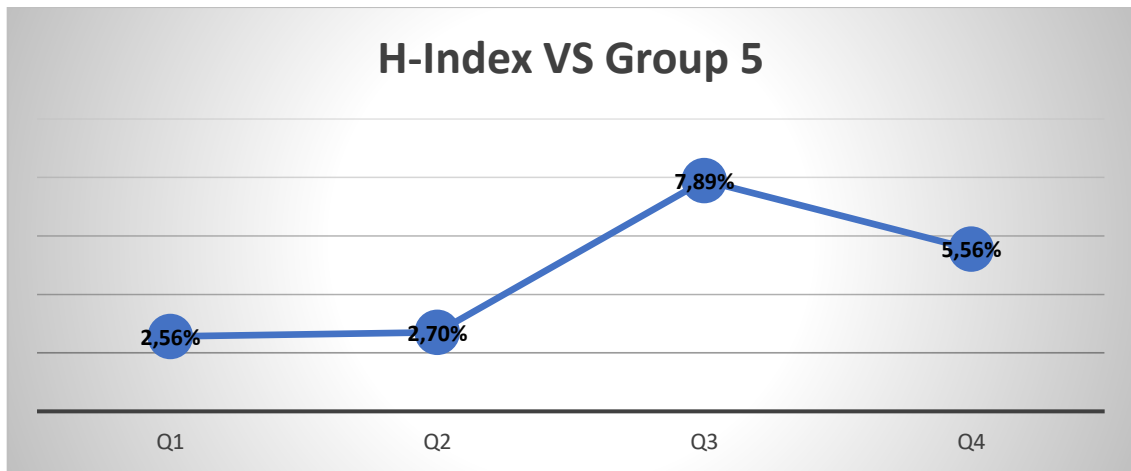


Figure 164

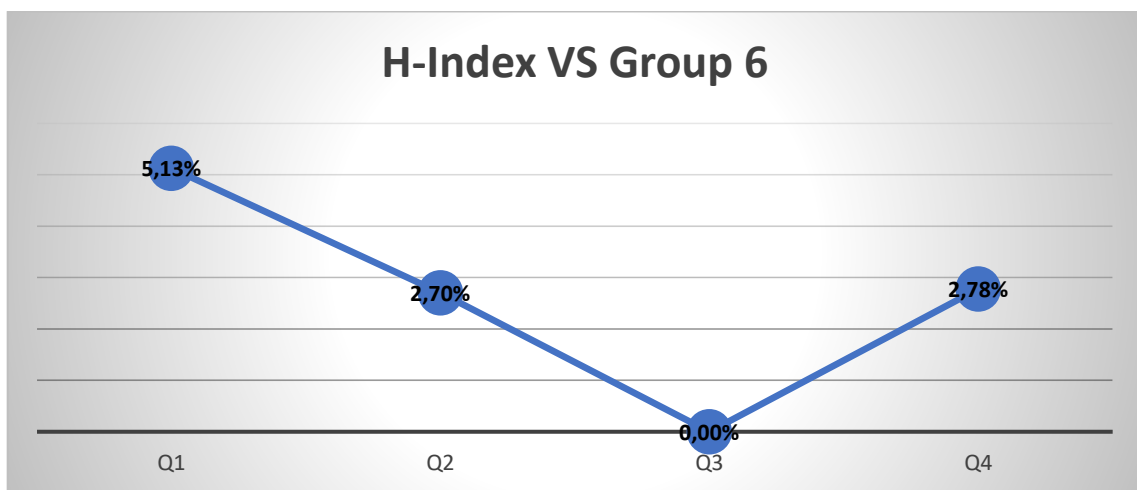


Figure 165

Moreover, we examine by scatter plots the relationship between modularity class and degree. It is obvious that the journals that are in the group 1 have higher degree. The group 6, on the other hand, has the smallest degree which is bizarre because it has all the journals with the highest SJR and H-Index. That is happening because SJR and H-Index do not have linear relationship with degree.

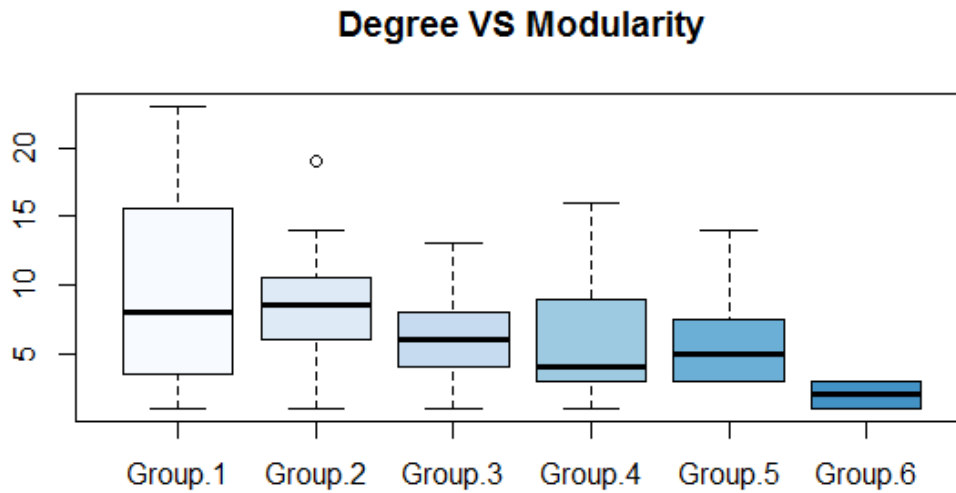


Figure 166

4.2.4 Density

Network density describes the part of the potential connections in a network that are actual connections. Also, measures how close the network is to complete. A complete graph has all possible edges and density equal to 1. The maximum possible number of edges in a simple graph is $\binom{n}{2} = \frac{1}{2}n(n-1)$. The connectance or density p of a graph is the fraction of these edges that are actually present:

$$p = \frac{m}{\binom{n}{2}} = \frac{2m}{n(n-1)} = \frac{c}{n-1} \quad (1)$$

where we have made use of 5. The density lies strictly in the range

$0 \leq p \leq 1$. Most of the networks we are interested in are sufficiently large that

1 can be safely approximated as $p = \frac{c}{n}$. A network for which the density p tends to a constant as $n \rightarrow \infty$ is said to be dense. In such a network, the fraction of non-zero elements in the adjacency matrix remains constant as the network becomes large. A network in which $p \rightarrow 0$ as $n \rightarrow \infty$ is said to be sparse, and the fraction of non-zero elements in the adjacency matrix also tends to zero. In particular, a network is sparse if c tends to a constant as n becomes large. These definitions of dense and sparse networks can, however, be applied only if one can actually take the limit $n \rightarrow \infty$, which is fine for theoretical model networks but doesn't work in most practical situations. You cannot for example take the limit as an empirical metabolic network or food web becomes large—you are stuck with the network nature gives you and it can't easily be changed. [55] A potential connection is a connection that could potentially exist between two nodes – regardless of whether or not it actually does. For example, this journal could share editorial board members with that journal. Whether or not they do connect is irrelevant when you're talking about a potential connection. By contrast, an actual connection is one that actually exists. It is also sometimes used as a measure of connectivity of the network. Our

network has 0.039 graph density which is low. That tell us that the number of people who actually know each other – is likely to be quite low relative to all the potential relationships there.

4.2.5 Clustering

The clustering coefficient (Watts-Strogatz) is the average clustering coefficient over all of the nodes in the network. In effect, it measures the density of triangles in the networks and it is of interest because in many cases it is found to have values sharply different from what one would expect on the basis of chance. [55] There are a number of reasons why a real collaboration network might contain more triangles than one would expect by chance, but in our case, it might be that people introduce pairs of their collaborators in the editorial board to one another and those pairs then go on to collaborate themselves. In social networks, nodes tend to create tightly knit groups characterized by a relatively high density of ties; this likelihood tends to be greater than the average probability of a tie randomly established between two nodes. Two versions of this measure exist: the global and the local. The global version was designed to give an overall indication of the clustering in the network, whereas the local gives an indication of the embeddedness of single nodes[Wikipedia]. The number of triangles refers to global clustering and the clustering coefficient refers to local clustering. The global clustering coefficient is based on triplets of nodes. A triplet consists of three connected nodes. A triangle therefore includes three closed triplets, one centered on each of the nodes (this means the three triplets in a triangle come from overlapping selections of nodes). The global clustering coefficient is the number of closed triplets (or 3 x triangles) over the total number of triplets (both open and closed).

4.2.5.1. Triangles

Firstly, the triangles were examined.

Title	triangles	normalized triagles	Rank Triangles
Journal of Management Studies	86	1,00	1
Academy of Management Review	67	0,78	2
Human Relations	64	0,74	3
International Journal of Management Reviews	58	0,67	4
British Journal of Management	55	0,64	5
Academy of Management Journal	55	0,64	5
International Journal of Human Resource Management	51	0,59	7
Journal of Management Inquiry	49	0,57	8
Journal of International Business Studies	45	0,52	9
Journal of Organizational Change Management	42	0,49	10

Table 5

Below, the frequency diagram of triangles is shown as well as the boxplot of triangles. The majority of the journals have between 0 and 15 number of triangles. From the boxplot, also the median is shown which is 3 and the highest outlier is 86 and belong in the Journal of Management Studies.

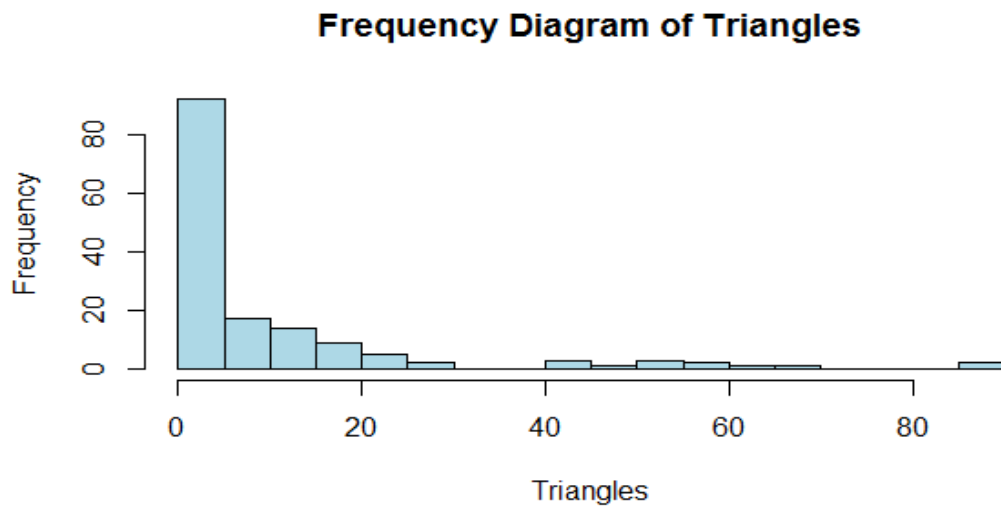


Figure 167

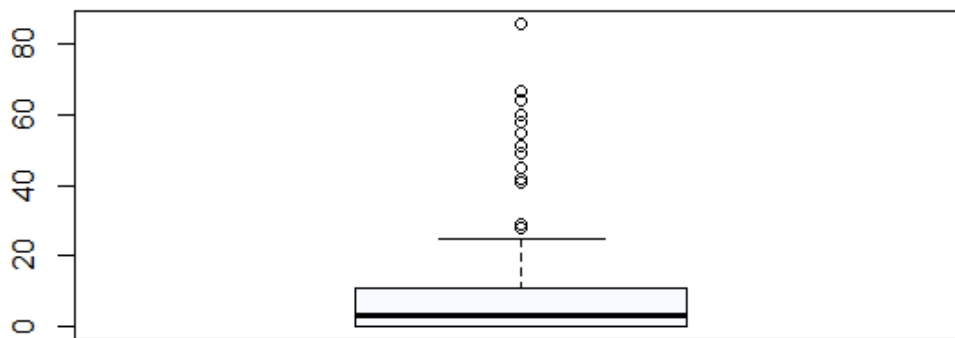


Figure 168

Secondly, the relationship between SJR with the triangles was examined and it is obvious that they don't have a linear relationship. Never the less, they're a lot of journals that have number of triangles equals to 0 and normalized SJR 0 as well. In the boxplot, also it can be observed that Q2 have the highest number of triangles.

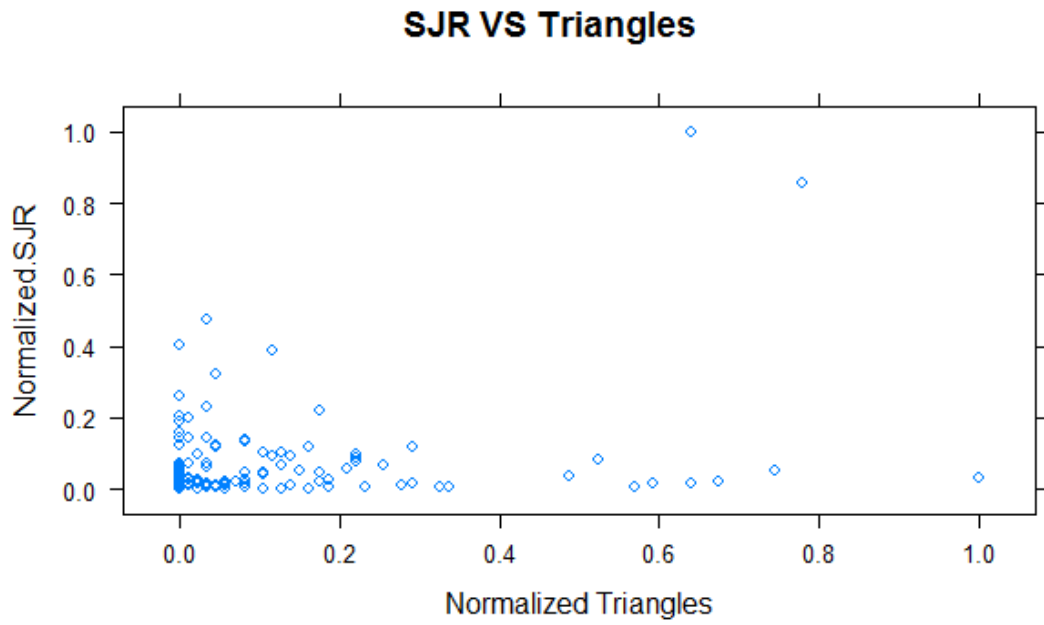


Figure 169

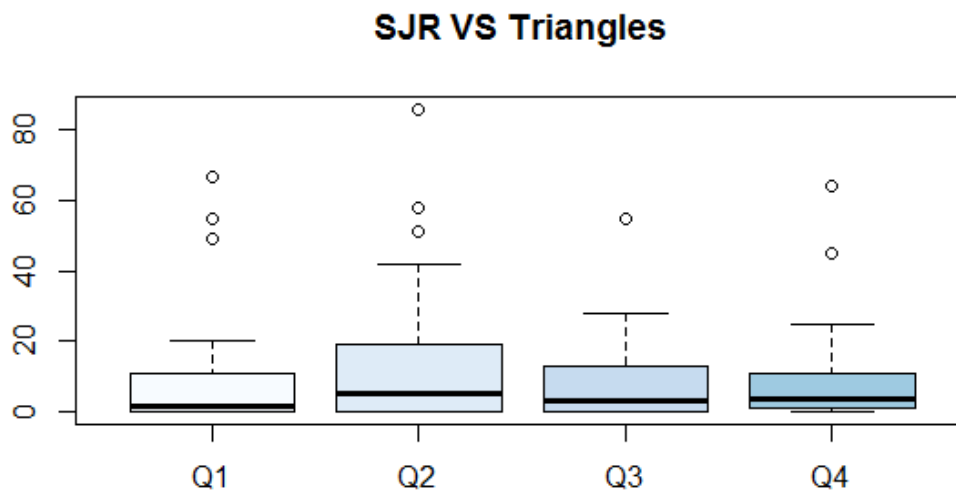


Figure 170

Thirdly, H-Index do not have linear relationship as well. The Q2 has the majority of journals with high number of triangles and after comes the Q4. Generally, H-Index has most of the other measures higher on Q2 and Q4.

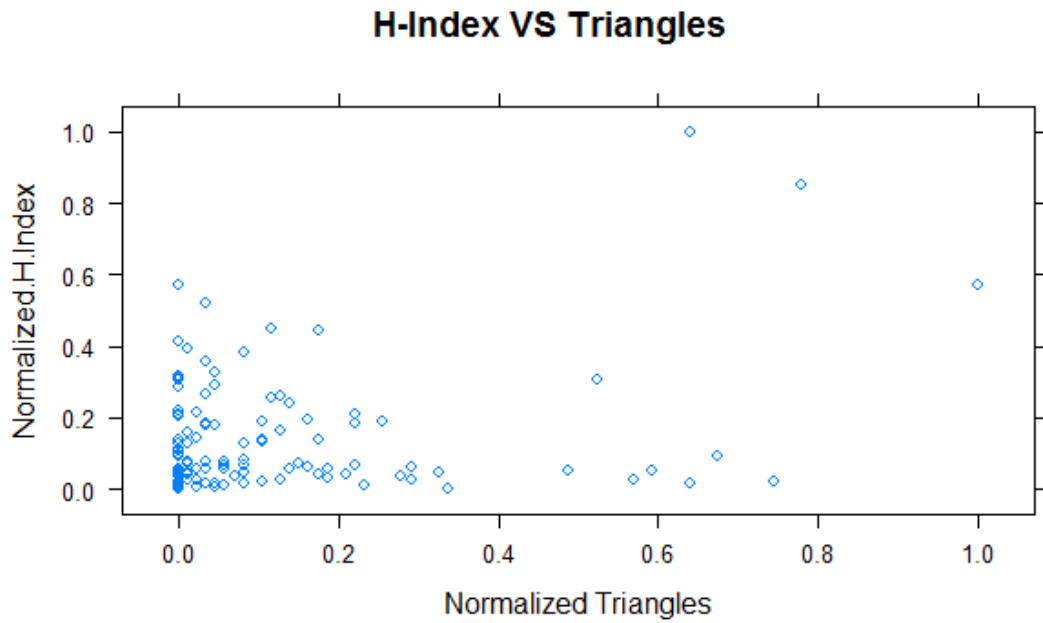


Figure 171

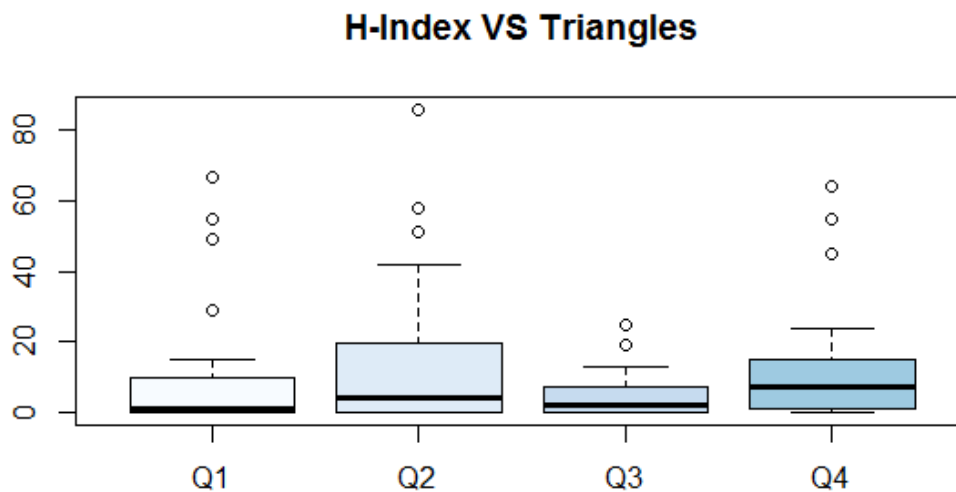


Figure 172

Furthermore, the relationship between triangles and degree was examined. As it is shown a lot of journals that are not following a linear relationship have a small number of triangles. That is happening because journals which have high degrees it is difficult to find other journals that have as high degrees as they do. For example, International Journal of Work Innovation has 0 number of triangles and normalized degree equals to 1 which is the highest.

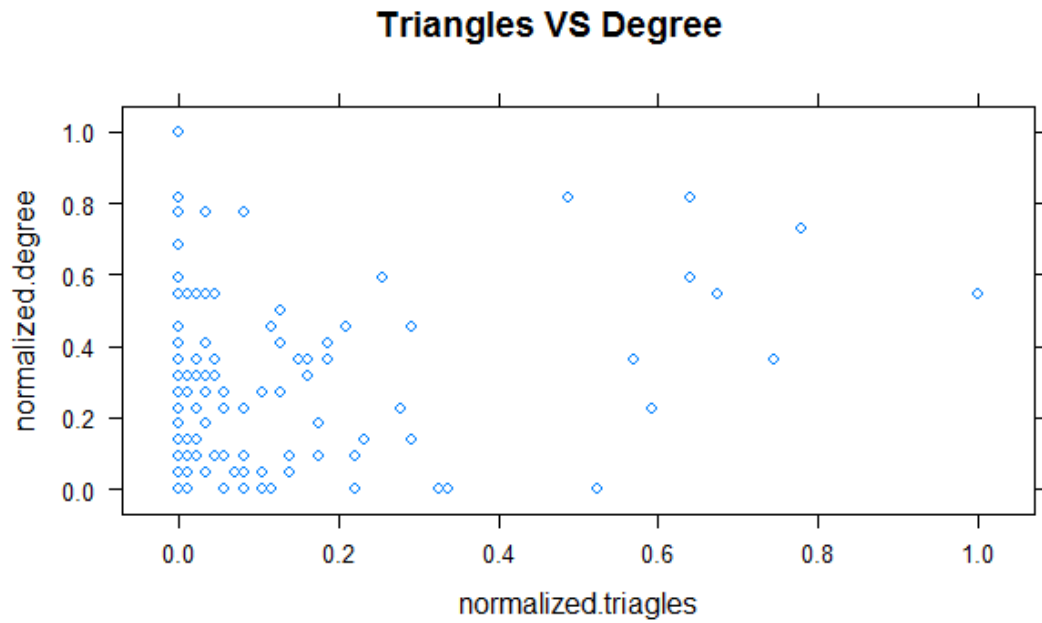


Figure 173

Finally, the relationship between modularity class and triangles was examined below. The group 1 has the highest number of triangles and after comes group 2 with a large difference.

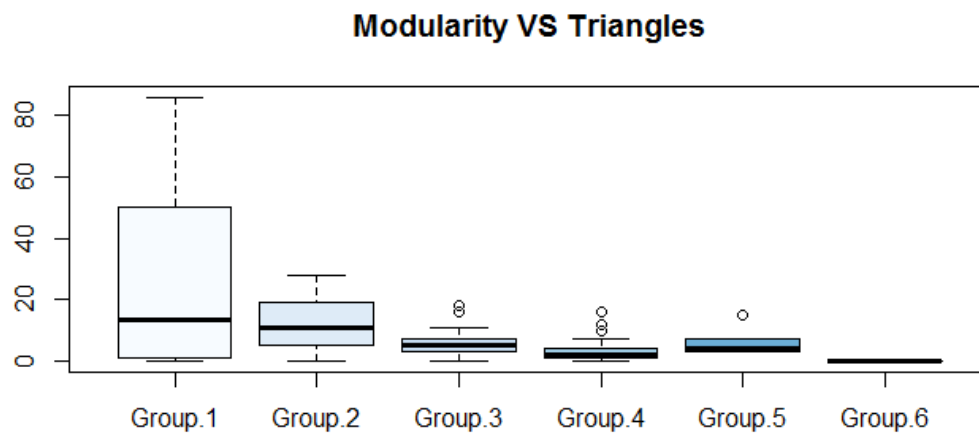


Figure 174

4.2.5.2 Clustering

Subsequently, the same analyses were made for clustering. Clustering do not have to be transformed for the comparison because normalized clustering is the same with clustering.

Title	clustering	normalized clus Rank Clustering	
Journal of Human Resources	1,00	1,00	1
Journal of Business Venturing Insights	1,00	1,00	1
International Journal of Operations and Quantitative Management	1,00	1,00	1
Asian Journal of Shipping and Logistics	1,00	1,00	1
Journal of High Technology Management Research	1,00	1,00	1
Journal of Technology Management and Innovation	1,00	1,00	1
International Labour Review	1,00	1,00	1
International Journal of Electronic Finance	0,90	0,90	8
Management Learning	0,81	0,81	9
Human Resource Management	0,71	0,71	10

Table 6

Firstly, the frequency diagram was constructed. The most common clustering number is again 0.0, the median of the boxplot is 0.2 and it has two outliers as the following diagram shows.

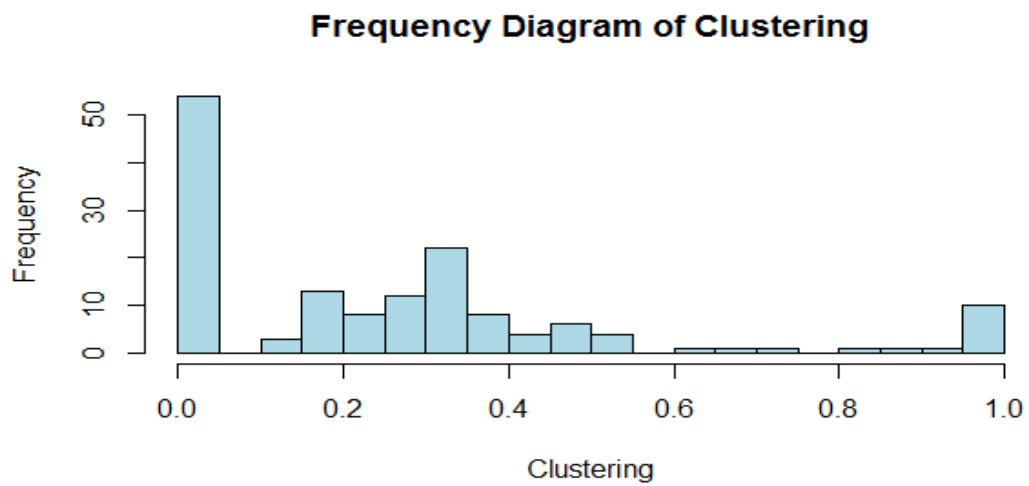


Figure 175

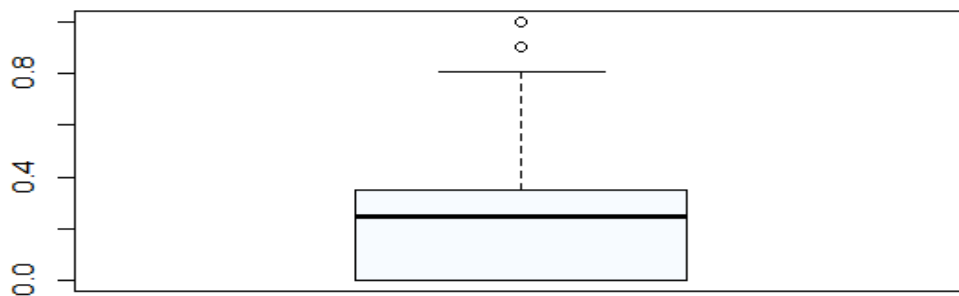


Figure 176

Secondly, the relationship between SJR and clustering was examined. They do not have a linear relationship as it was expected. Also, the journals with the highest clustering have pretty low SJR. An example is Public Management Review which has clustering equal to 1 and SJR just 0,106. The boxplot below also shows us that the higher clusters are in the Q3 but with not a large difference from the other Quartiles.

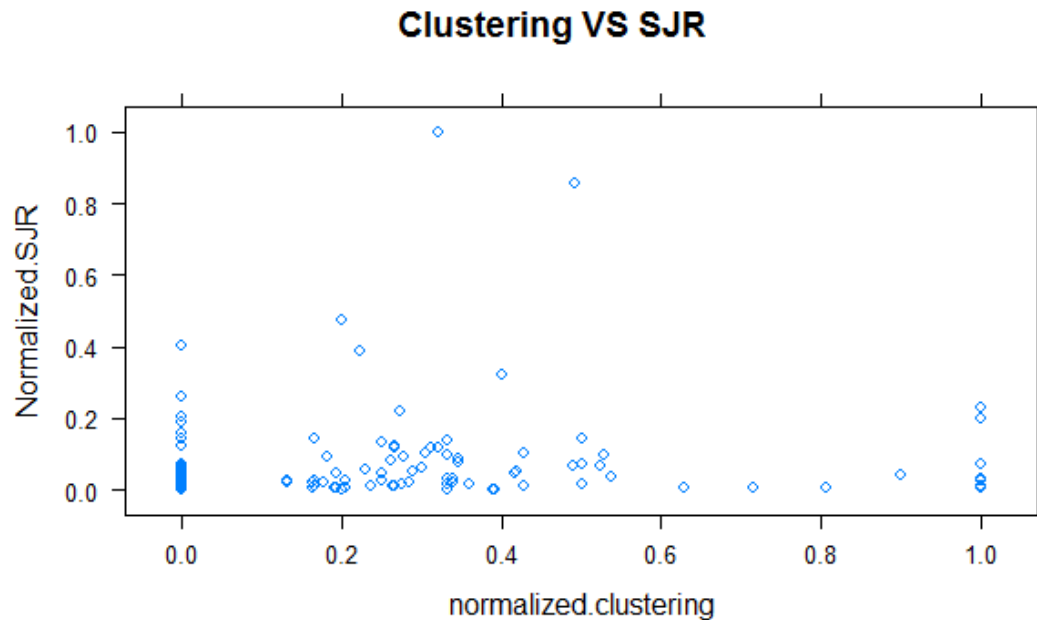


Figure 177

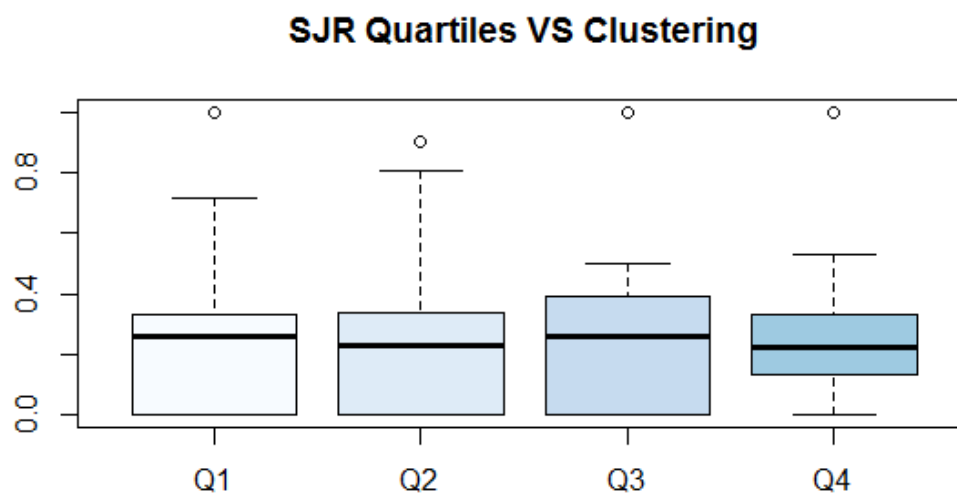


Figure 178

The same analyses were made for H-Index. In the scatterplot, we cannot detect a great difference from SJR VS Clustering scatterplot. H-Index of course do not have a linear relationship with clustering. In H-Index case as it was expected the Q2 has the highest clustering and Q4 follows.

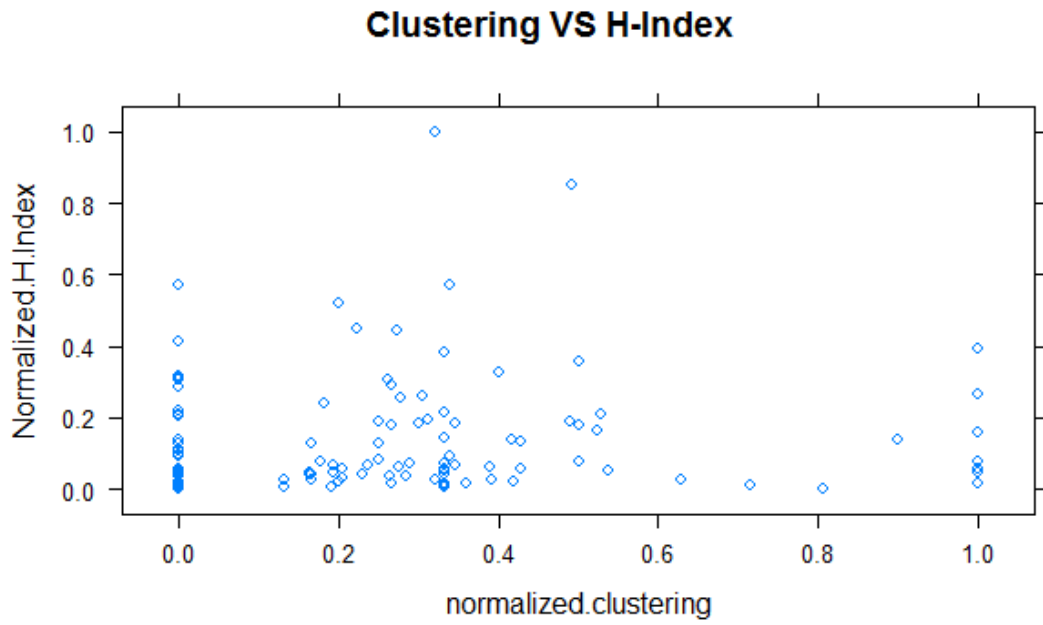


Figure 179

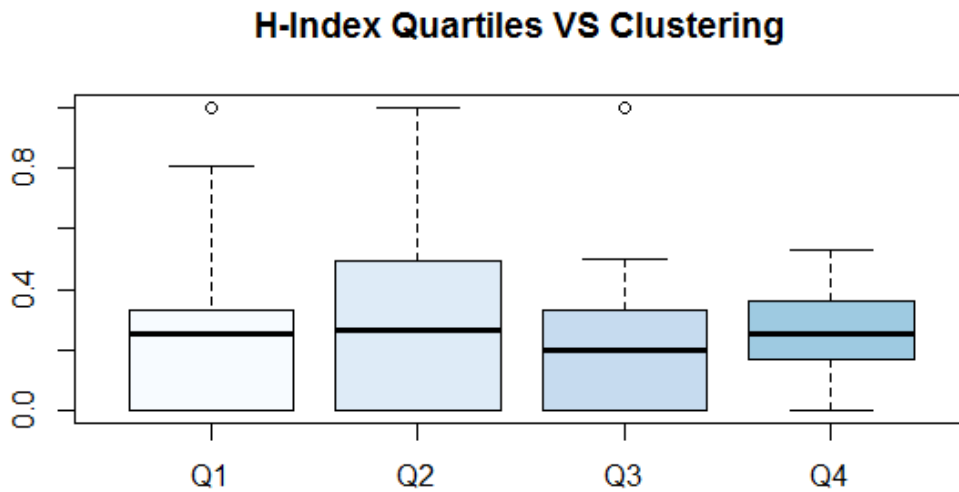


Figure 180

Furthermore, the relationship between clustering and degree was examined. Clustering has some journals that have high clustering number and low degree that means that a journal which has high clustering number is close with journals with high degree but this journal does not have a high degree.

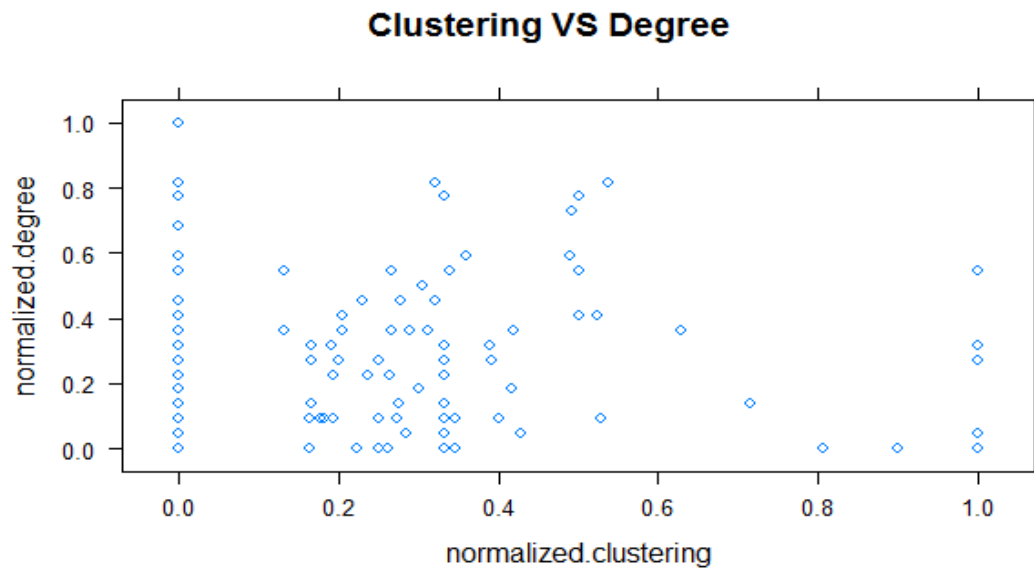


Figure 181

Moreover, the relationship between modularity and cluster were examined. In this case as it was with triangles group 1 has the highest cluster and after follows group 2 and group 6. Generally, the distribution of cluster into modules are better than triangles into modules.

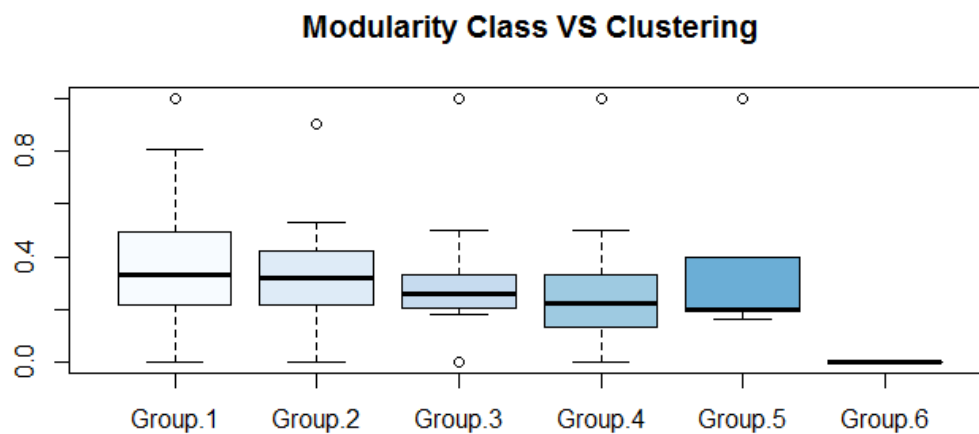


Figure 182

Finally, the relationship between clustering and triangles were examined. They do not have a linear relationship but it is a better relationship than with all the other measures that we examined. It is obvious from the scatterplot that some globally clusters are good and some locally they are not. For example, Journal of High Technology Management Research and Journal of Technology Management and Innovation have clustering number equals to 1 which is the highest and number of normalized triangles equals to 0.01.

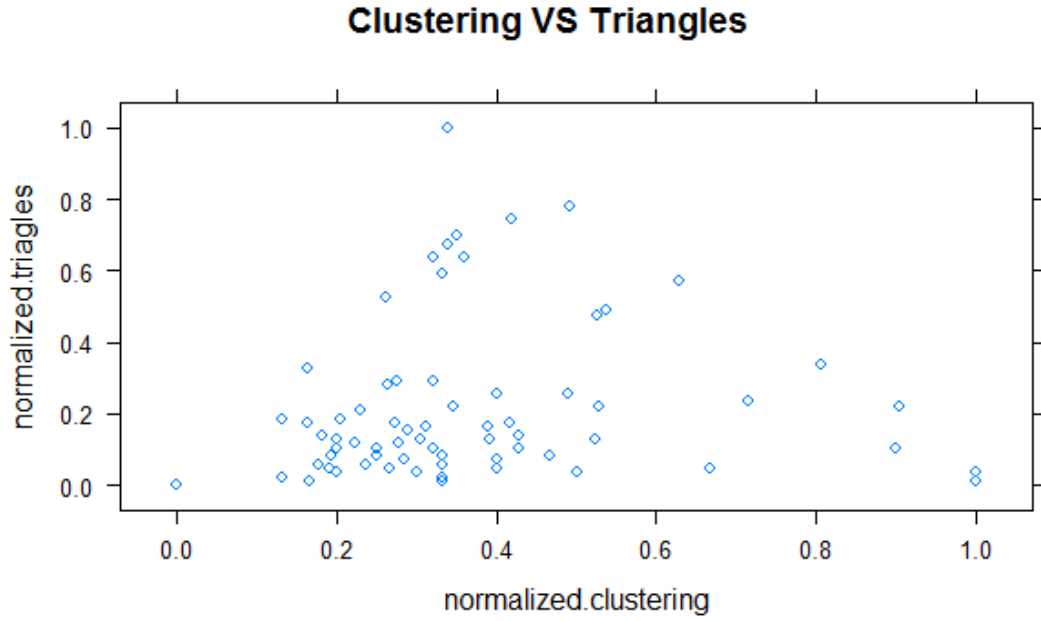


Figure 183

4.2.6 Paths

A path in a network is any sequence of vertices such that every consecutive pair of vertices in the sequence is connected by an edge in the network. In an undirected network, edges can be traversed in either direction. The length of a path in a network is the number of edges traversed along the path (not the number of vertices). Edges can be traversed more than once, and if they are they are counted separately each time they are traversed. It is straightforward to calculate the number of paths of a given length r on a network. For either a directed or an undirected simple graph the element

A_{ij} is 1 if there is an edge from vertex j to vertex i , and 0 otherwise. (We will consider only simple graphs for now, although the developments generalize easily to non-simple graphs.) Then the product $A_{ik} A_{kj}$ is 1 if there is a path of length 2 from j to i via k , and 0 otherwise. And the total number N_{ij} of paths of length two from j to i , via any other vertex, is

$$N_{ij} = \sum_{k=1}^n A_{ik} A_{kj} = [A^2]_{ij}$$

where $[...]_{ij}$ denotes the ij element of a matrix.

Similarly, the product $A_{ik} A_{kl} A_{lj}$ is 1 if there is a path of length three from j

to i via k and l , in that order, and 0 otherwise, and hence the total number of paths of length three is

$$N_{ij} = \sum_{k,l=1}^n A_{ik} A_{kl} A_{lj} = [A^3]_{ij}$$

Generalizing to paths of arbitrary length r , we see that

$$N_{ij}^{(r)} = [A^r]_{ij}. \quad [55]$$

Our average path length is 2.9484356894553883.

4.2.7 Eccentricity

For each journal, we could calculate the distribution of its geodesic distances to the other journals. A journal's largest geodesic distance is called its eccentricity – a measure of how far a journal is from the furthest other. If two nodes are not reachable from each other, their geodesic distance is infinite. Eccentricity does not have anything in common with all the others centralities we have examine as far. From eccentricity, we can see the diameter of our network. The diameter of a network is the maximum eccentricity over all the journals of the network. The diameter of a network gives the number of steps that are sufficient to go from any node to any other node. Our diameter is 7 and its sometimes used as a measure of connectivity of a network.

Title	eccentricity	Rank
Group Decision and Negotiation	7	1
International Journal of Human Capital and Information Technology Professionals	7	1
Journal of High Technology Management Research	7	1
Review of Industrial Organization	7	1
Asian Journal of Shipping and Logistics	6	5
Electricity Journal	6	5
Electronic Commerce Research and Applications	6	5
Electronic Markets	6	5
European Journal of Industrial Relations	6	5
Interfaces	6	5

Table 7

Firstly, the frequency diagram was examined. That shows us that the majority of our journals have eccentricity equals to 5 which is also the median. The min of eccentricity is 4.

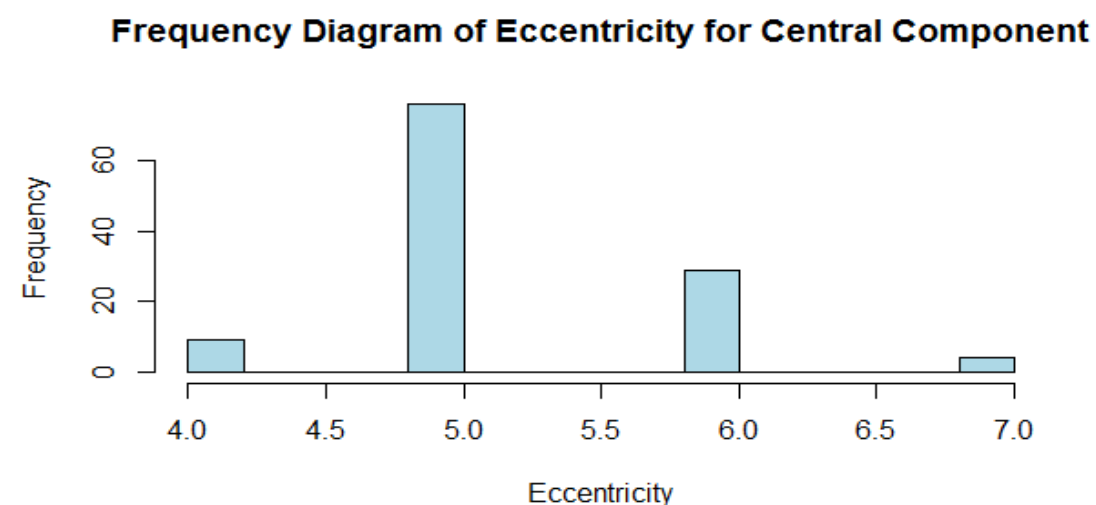


Figure 184

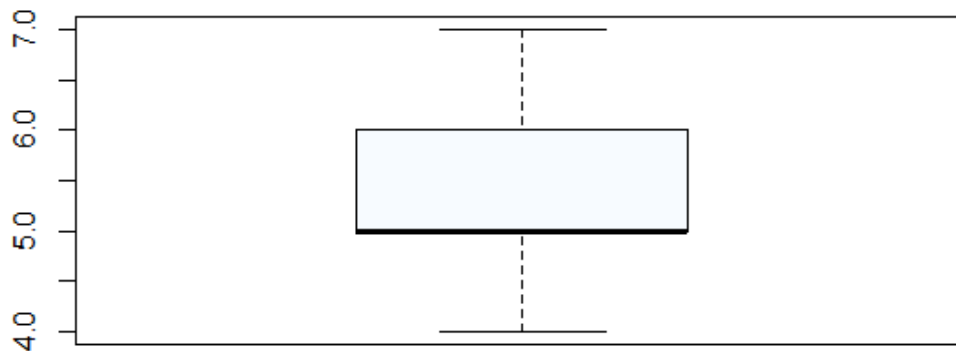


Figure 185

Secondly, the relationship between SJR with eccentricity were examined. In all the scatterplots below the normalized eccentricity is used. Clearly, from the scatterplot it is evident that there is not any relationship. In the boxplot, the journals in Q1 and Q2 have equal eccentricities, in Q3 the majority of our journals have eccentricity equals to 0,71 which is the min of eccentricity and Q4 has lower eccentricities that Q1 and Q2.

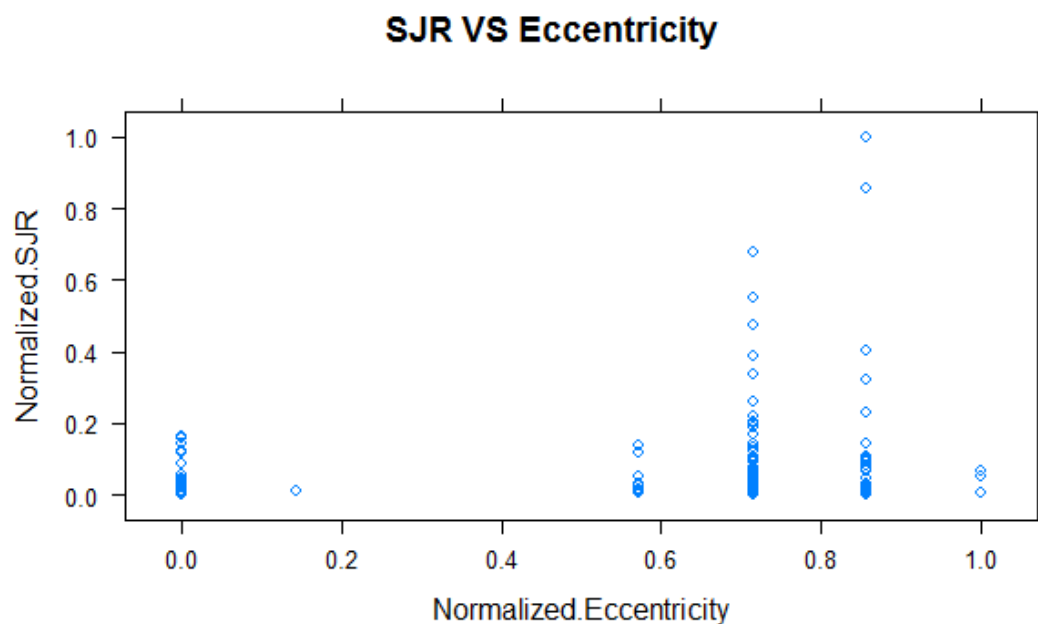


Figure 186

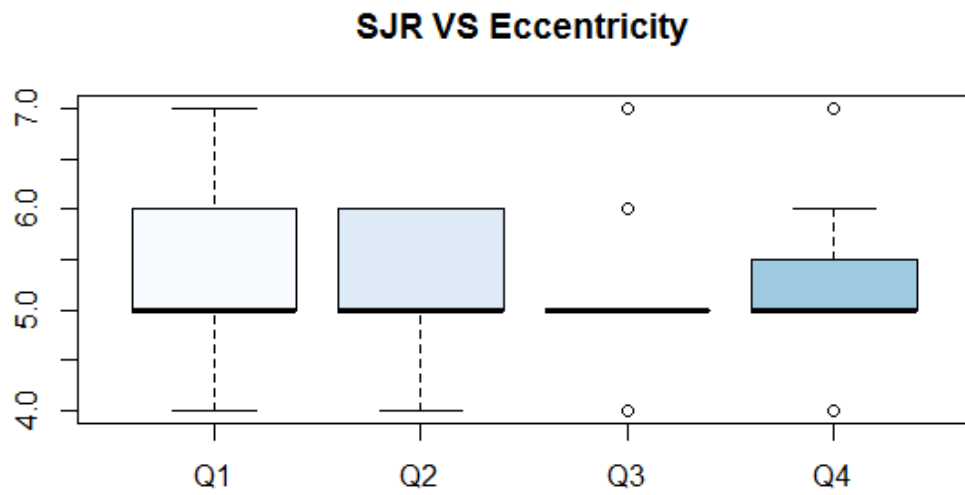


Figure 187

H-Index also, do not have a linear relationship with eccentricity. In the boxplot, all the eccentricities are almost equal except the Q1 which has the lower eccentricity of all.

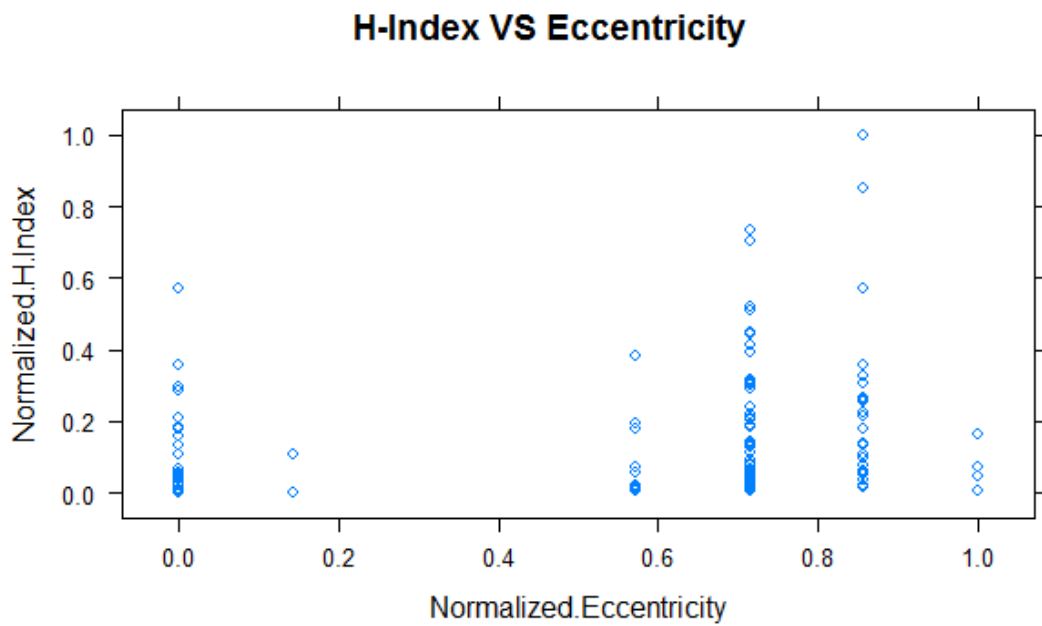


Figure 188

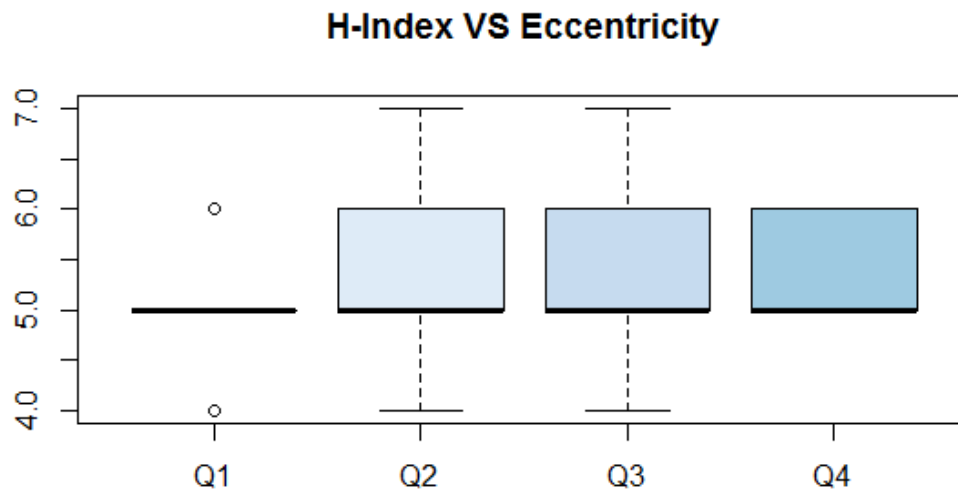


Figure 189

Furthermore, the relationship between eccentricity and degree was examined. They do not have a linear relationship and the journals with the highest eccentricity have the lowest degrees as it is shown in the scatterplot below. On the other hand, the highest degree has eccentricity equals to 5 which is the most common eccentricity of all.

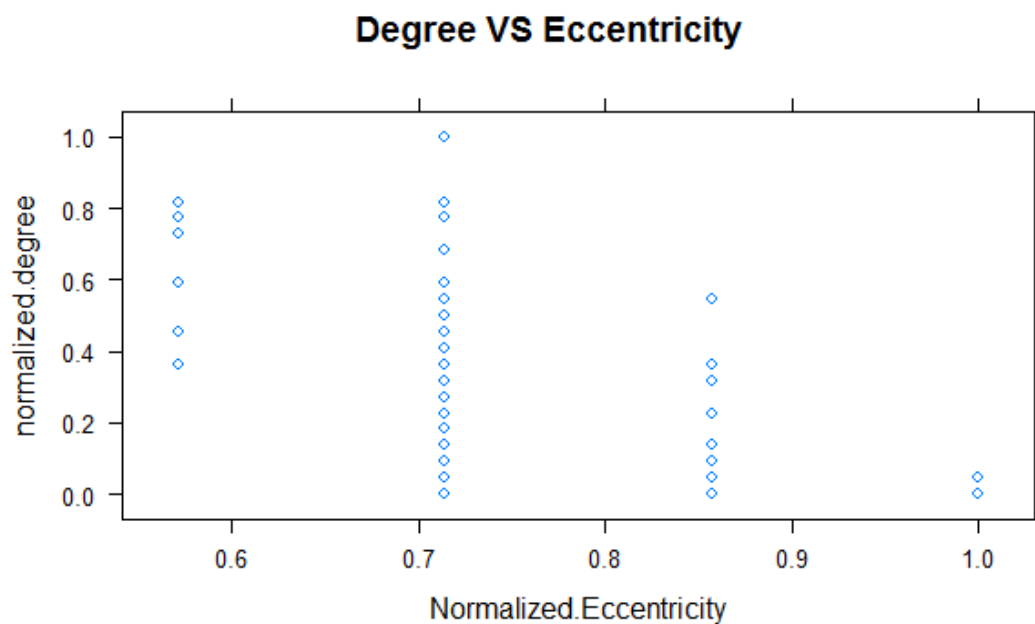


Figure 190

Moreover, the relationship between modularity class and eccentricity was examined. From the boxplot, the group 3,4 and 6 have the highest eccentricities but group 6 has higher median. Group 1,2 and 5 have equal eccentricities, their eccentricities are equals to 5. From that it is obvious that the journals that are in the group 6 have higher eccentricities because their median is higher than 5.

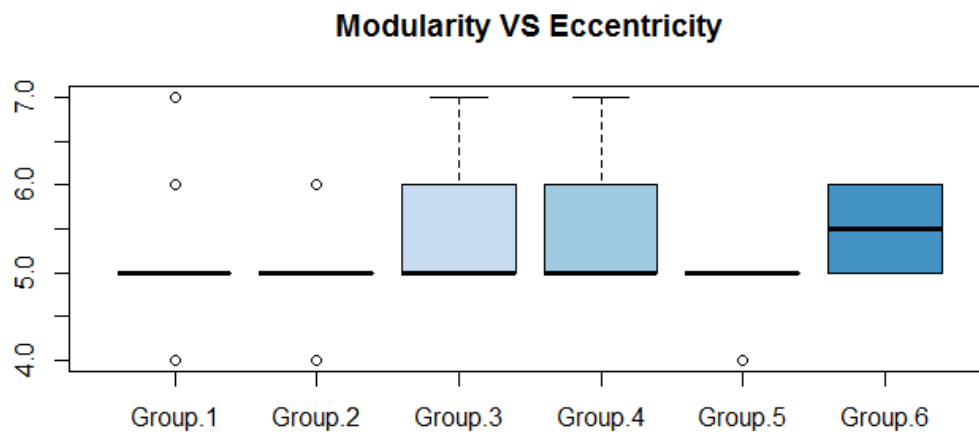


Figure 191

Finally, the relationship between eccentricity and number of triangles and clustering was examined. As it was expected eccentricity do not have a linear relationship with either of them.

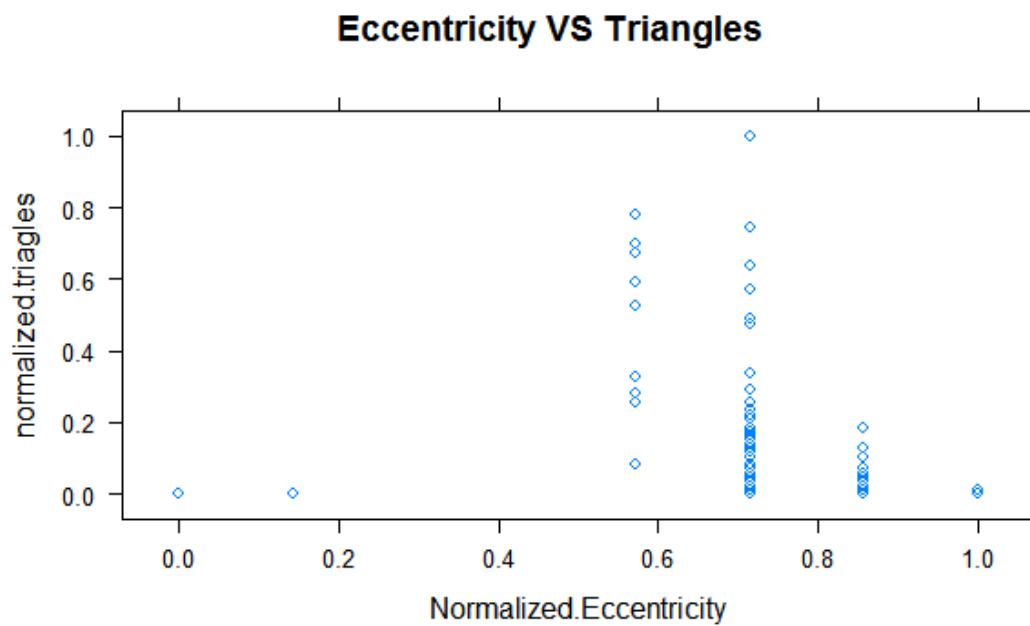


Figure 192

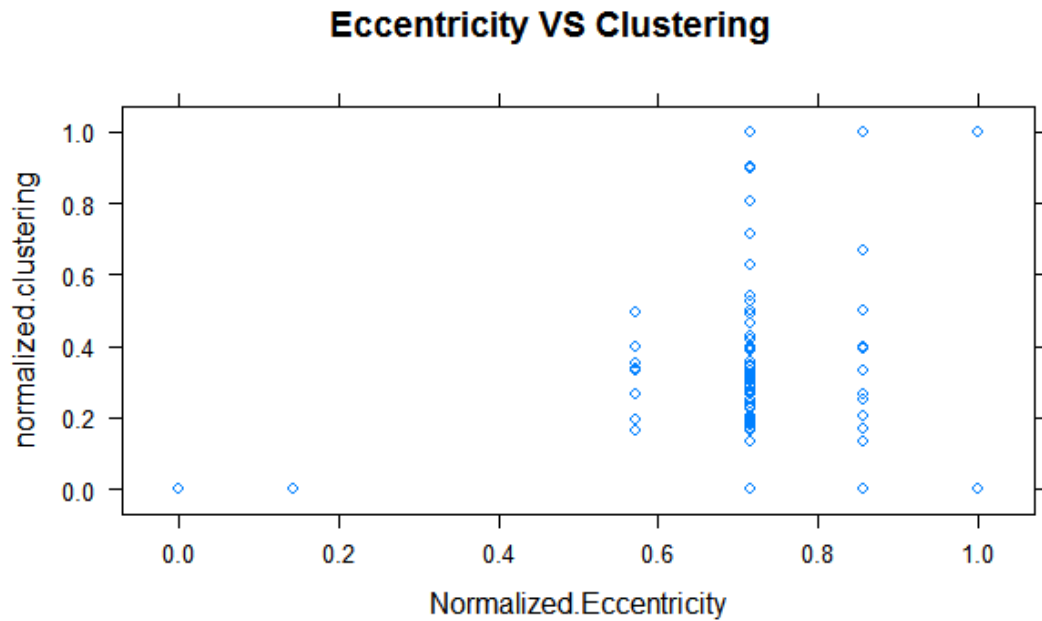


Figure 193

4.2.8 Centrality

A large volume of research on networks has been devoted to the concept of centrality. This research addresses the question, "Which are the most important or central vertices in a network?" In the section, we will try to answer this question. In a social network, for instance, it seems reasonable to suppose that individuals who have connections to many others might have more influence, more access to information for more prestige than those who have fewer connections. In order to calculate the betweenness, the closeness, the harmonic closeness and the eigenvector centralities and others the undirected option was selected as well as the normalization. In this section only the journals that belong in the central component was examined all the other journals were excluded.

4.2.8.1 Betweenness Centrality

The first centrality considered measure is the so-called betweenness centrality. The idea behind the index is that similar editorial aims between two non-adjacent journals might depend on other journals in the network, especially on those journals lying on the paths between the two. The other journals potentially might have some control over the interaction between two non-adjacent journals. Hence, a journal is more central in this respect if it is an important intermediary in links between other journals. From a formal perspective, the betweenness centrality of a journal is the proportion of all paths between pairs of other journals that include this journal. More in general, the overall betweenness centralization of the network, that is the ratio of the variation in betweenness centrality scores to the maximum possible variation in a network of similar dimension. If we wait a suitably long time until many messages have passed between each pair of vertices, how many messages, on average, will have passed through each vertex to route to their destination? The answer is that, since messages are passing down each geodesic path at the same rate, the number passing through each vertex is simply proportional to the number of geodesic paths the vertex lies on. Mathematically, let n_{st}^i , be 1 if vertex i lies

on the geodesic path from s to t and 0 if it does not or if there is no such path (because s and t lie in different components of the network). Then the betweenness centrality X_i is given by

$$x_i = \sum_{st} n_{st}^i \quad (1)$$

Note that this definition counts separately the geodesic paths in either direction between each vertex pair. Since these paths are the same on an undirected network this effectively counts each path twice. One could compensate for this by dividing x_i by 2, and often this is done, but we prefer the definition given here for a couple of reasons. First, it makes little difference in practice whether one divides the centrality by 2, since one is usually concerned only with the relative magnitudes of the centralities and not with their absolute values. [55] But what is a geodesic path? A geodesic path, also called simply a shortest path, is a path between two vertices such that no shorter path exists. This number of geodesic paths is what we call the betweenness centrality, or just betweenness for short. [55] In other words, strong betweenness centrality if it is situated on many shortest paths. In our case, we have an undirected network in which there is at most one geodesic path between any pair of vertices. Then the betweenness centrality of a vertex i is defined to be the number of those paths that pass-through i . We examine this measure because vertices with high betweenness centrality may have considerable influence within a network by their control over information passing between others as for example an editor has. Below the 10 journals with the highest centrality are listed the full table in attached in the end of the chapter.

Title	betweenness cer	Normalized Betweenness Centrality	Rank
Journal of International Business Studies	817,58	1,00	1
International Journal of Business Innovation and Research	654,33	0,80	2
Production and Operations Management	481,58	0,59	3
Journal of Management Studies	423,11	0,52	4
Journal of Small Business Management	406,61	0,50	5
Organization Studies	376,43	0,46	6
European Journal of Innovation Management	374,96	0,46	6
Academy of Management Journal	365,31	0,45	8
International Journal of Management Reviews	352,29	0,43	9
Canadian Journal of Administrative Sciences	328,87	0,40	10

Table 8

The journal with the highest centrality is the journal of international business studies with 818 which is logical because it has also high SJR and H-Index. The normalized betweenness centrality is simply the betweenness centrality but normalized

$$\text{Normal} = \frac{x - \min}{\max - \min}$$

Furthermore, the frequency diagram was constructed. The majority of our journals have betweenness centrality between 0 and 50. That means that from the majority of our journals 0 to 50 paths are passing through them. That is obvious in the boxplot below which shows us that the median is 50, the max is 400 and there are five outliers.

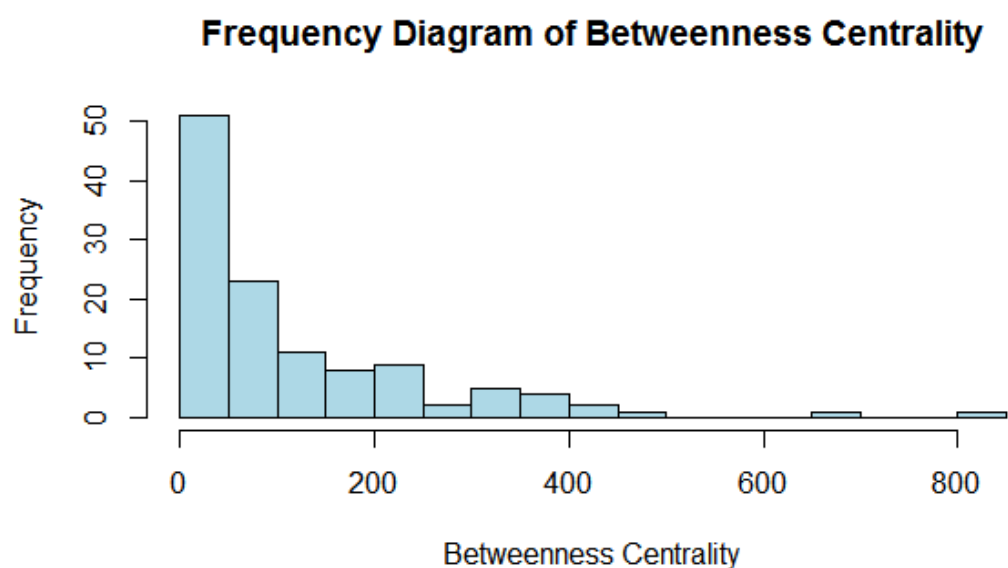


Figure 194

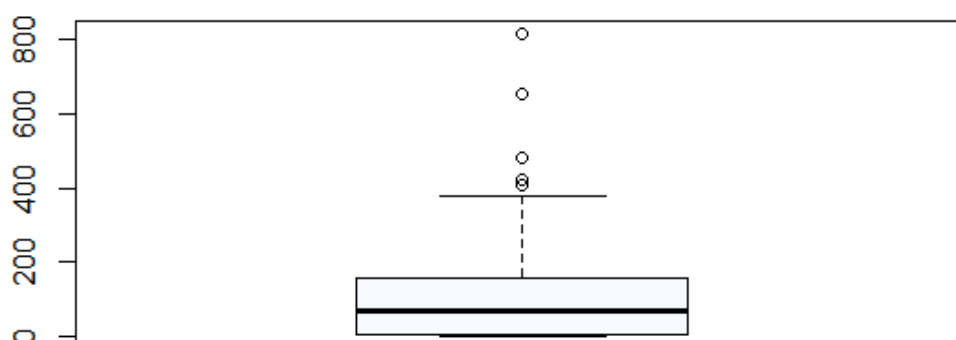


Figure 195

Moreover, the relationship between betweenness centrality and SJR were examined. First, a scatter plot of normalized SJR and normalized betweenness centrality was made. From that it is obvious that SJR and betweenness centrality do not have a linear relationship, but there are a lot of journals that have real low SJR that have real low betweenness centrality. Also, by the boxplot it is shown that the journals that have biggest centrality and in the Q2.

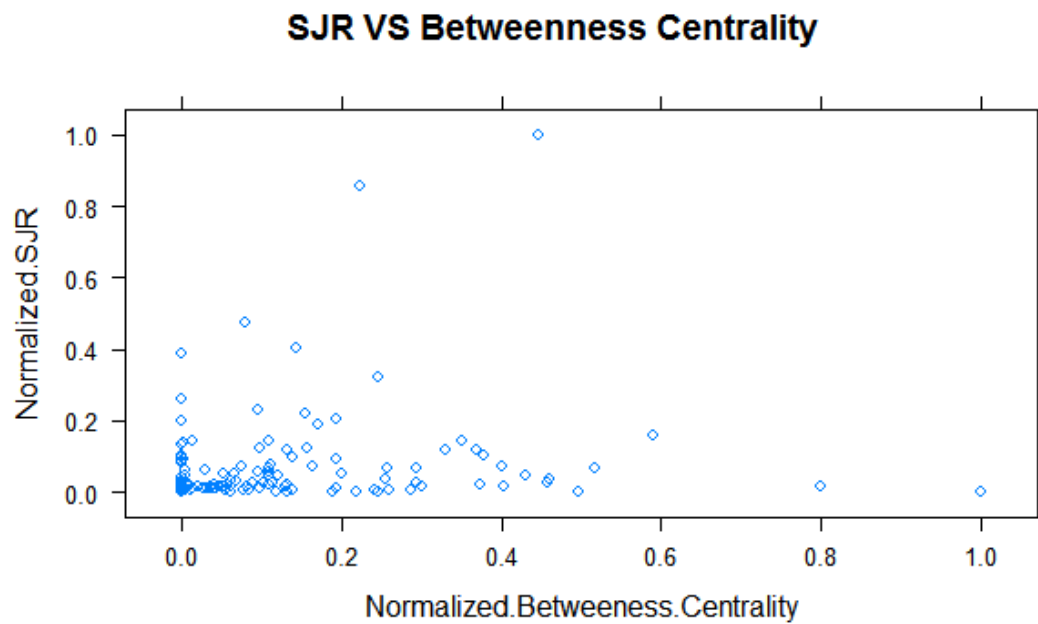


Figure 196

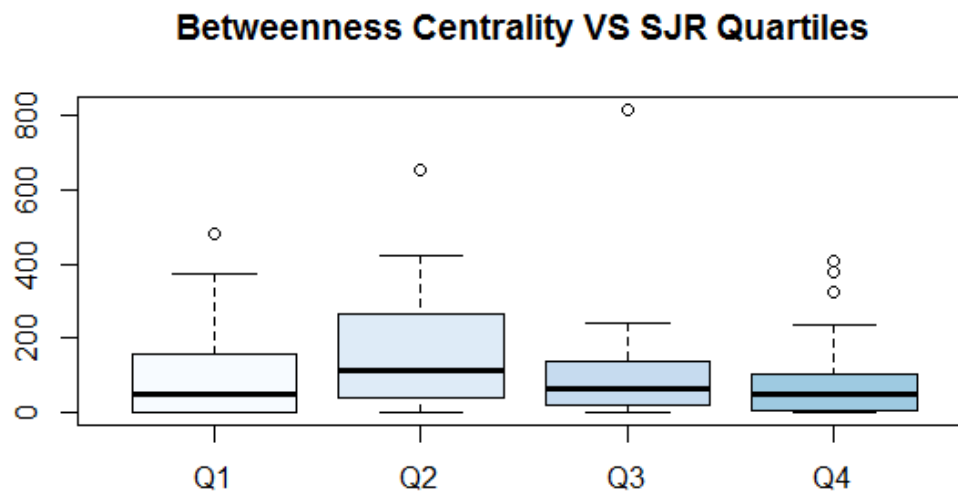


Figure 197

Again, the same procedures were made for H-Index and betweenness centrality. Firstly, from the scatterplot it is visible that H-Index and betweenness centrality do not have a linear relationship but the data are distributed better than SJR and betweenness centrality were. In this case also, there are a lot of journals that have low H-Index and low betweenness centrality. The better relationship between H-Index and betweenness centrality can be testified by the boxplot below. In the boxplot, the journals with the highest betweenness centrality are in the Q1 after in Q2 and Q3 and finally in the Q4.

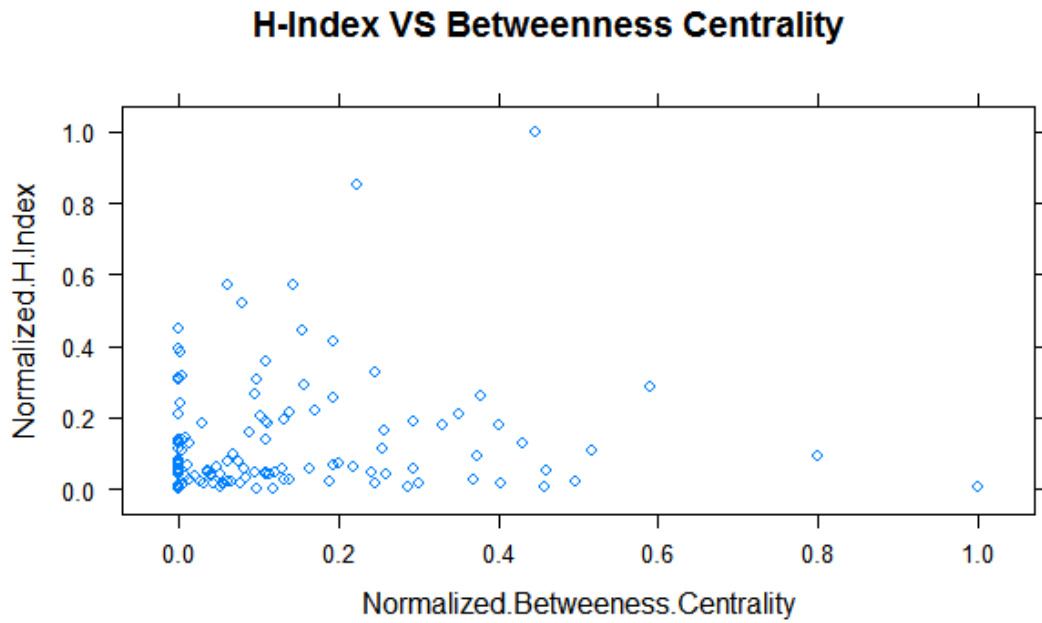


Figure 198

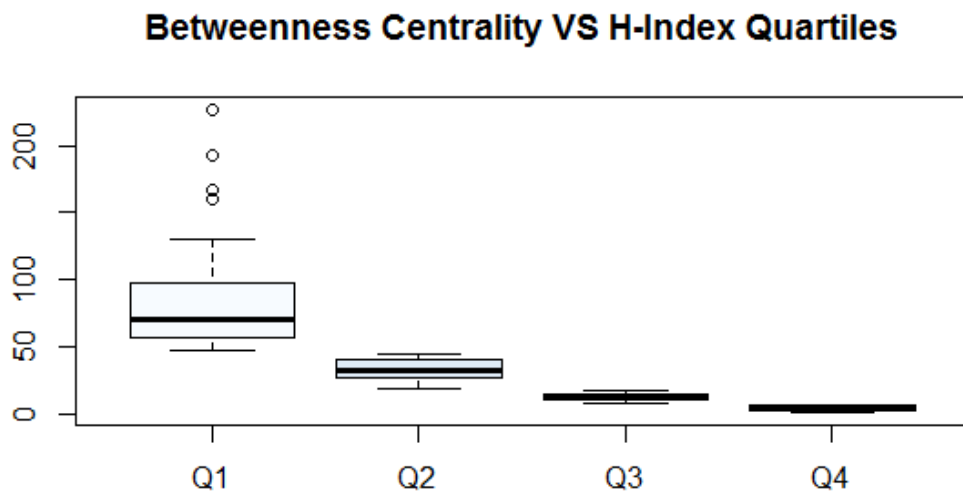


Figure 199

Additionally, the relationship between betweenness centrality and degree was examined. From the scatterplot, it is self-evident that betweenness centrality and degree have a linear relationship. That has expected because degree of a journal is the number of edges connected to it and betweenness centrality measures the extent to which a journal lies on paths between other journals.

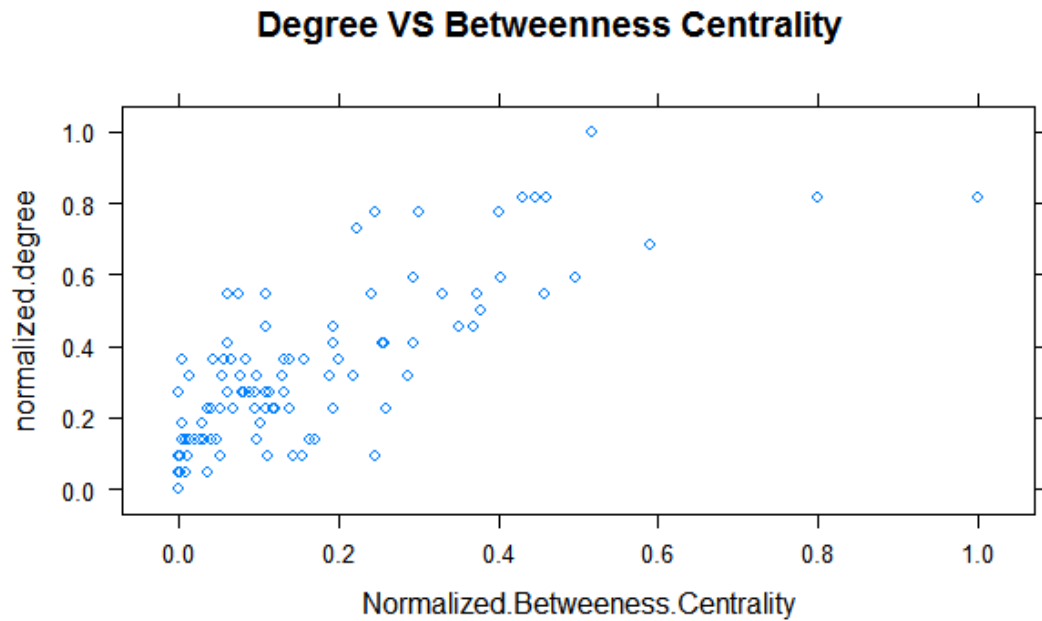


Figure 200

Over and above, the relation between modularity and betweenness centrality is shown in the boxplot below. Group 3 has the highest betweenness centrality and after comes group 1 and group 6.

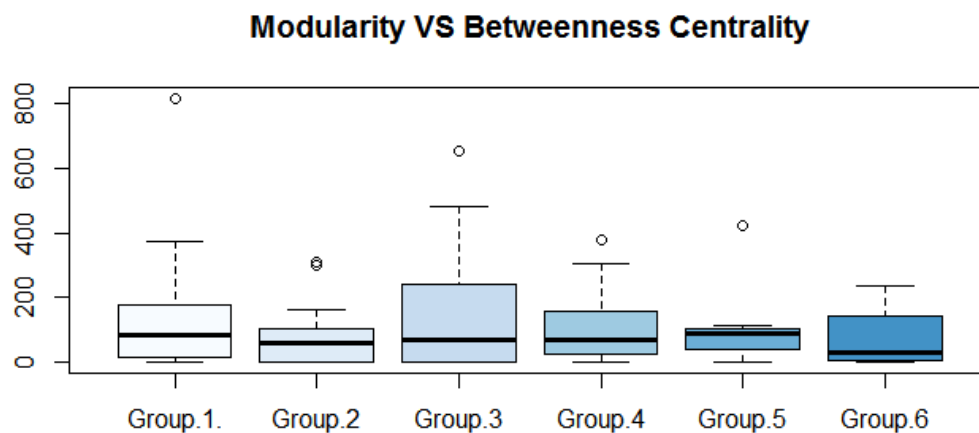


Figure 201

In this context, the relationship between clustering and triangles with betweenness centrality were examined. From the scatterplots, it is evident that they do not have a linear relationship. Also, there are a lot of journals for example Industry and Innovation that have high number of triangles and really low betweenness centrality. The same is happening with clustering where Human Relations had the highest clustering number and betweenness centrality just 201,62 (0.25 normalized).

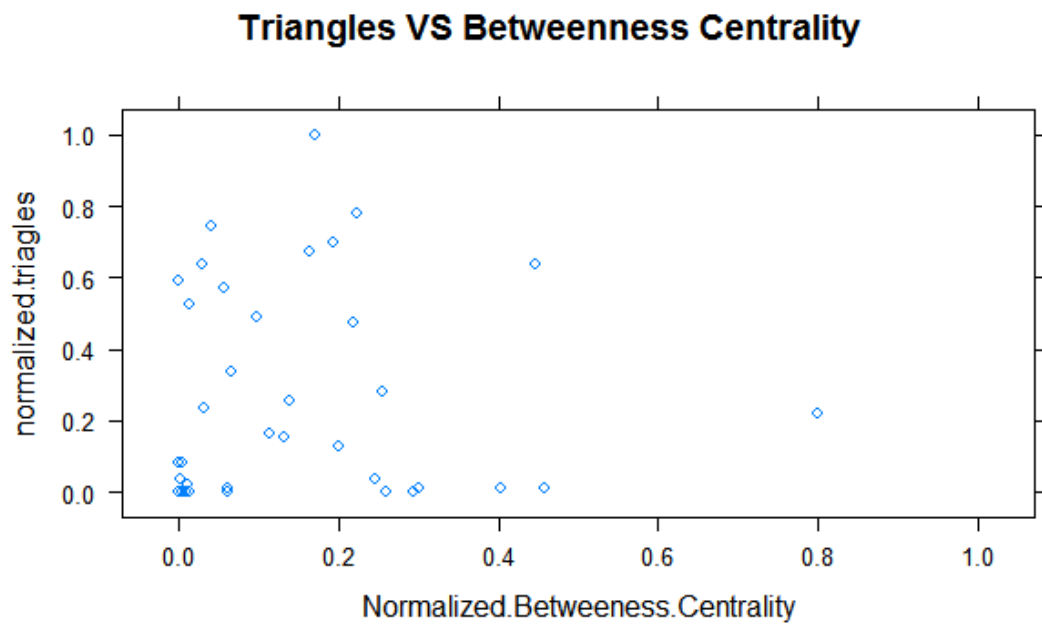


Figure 202

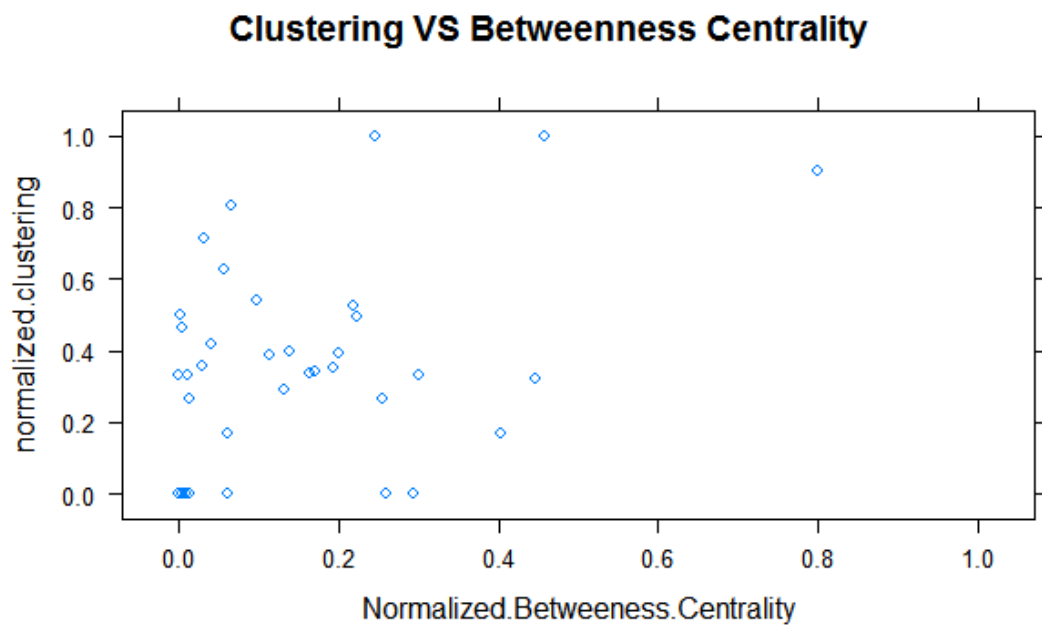


Figure 203

Finally, the relationship between eccentricity and betweenness centrality was examined. Eccentricity do not have a linear relationship with betweenness centrality. A clear example of that is Journal of International Business Studies which has the highest betweenness centrality and the lowest eccentricity.

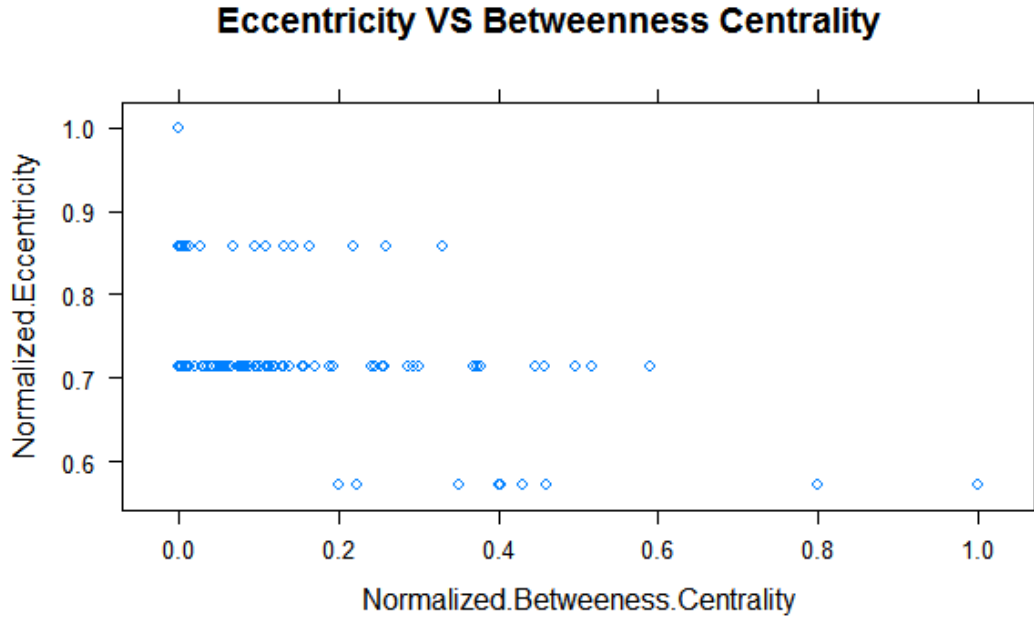


Figure 204

4.2.8.2 Closeness Centrality

The second centrality measure is given by closeness centrality, which is based on the distance between a journal and all the other journals. In the network analysis, the distance between two vertices is usually based on so-called geodesic distance. Geodesic is the shortest path between two vertices, while its length is the number of lines in the geodesic. Hence, the closeness centrality of a journal is the number of journals (linked to this journal by a path) divided by the sum of all the distances (between the journal and the linked journals). The basic idea is that a journal is central if its board can quickly interact with all the other boards. Journals occupying a central location with respect to closeness can be very effective in communicating information (sharing research, sharing papers, deciding editorial policies) to other journals. [4] Suppose d_{ij} is the length of a geodesic path from i to j , meaning the number of edges along the path. Then the mean geodesic distance from i to j , averaged over all vertices j in the network, is

$$l_i = \frac{1}{n} \sum_j d_{ij}. (1)$$

This quantity takes low values for vertices that are separated from others by only a short geodesic distance on average. Such vertices might have better access to information at other vertices or more direct influence on other vertices. In a social network, for instance, a person with lower mean distance to others might find that their opinions reach others in the community more quickly than the opinions of someone with higher mean distance. In calculating the average distance some authors exclude from the sum in (1) the term for $j = i$, so that

$$l_i = \frac{1}{n-1} \sum_{j(\neq i)} d_{ij},$$

which is a reasonable strategy, since a vertex's influence on itself is usually not relevant to the working of the network. In the social networks literature, therefore, researchers commonly calculate the inverse of l_i rather than l_i itself. This inverse is called the closeness centrality C_i :

$$C_i = \frac{1}{l_i} = \frac{n}{\sum_j d_{ij}}. \quad [55]$$

In our network, for instance, a journal with lower mean distance to other journals might find that their opinions reach others in the community more quickly than the opinions of some journals with higher mean distance. Below, the closeness centrality of our top 10 journals are listed. For all the scatterplots, the normalized closeness centrality was used and for all the other diagrams just the closeness centrality. The full table of closeness centrality can be found in the appendix.

Title	closeness centrality	Normalied Clos Rank	
Journal of International Business Studies	0,47	1,00	1
International Journal of Business Innovation and Research	0,45	0,92	2
International Journal of Management Reviews	0,44	0,89	3
European Journal of Innovation Management	0,44	0,88	4
Organization Studies	0,43	0,87	5
Academy of Management Review	0,43	0,85	6
Journal of Small Business Management	0,43	0,84	7
Journal of Management Studies	0,43	0,84	7
International Journal of Human Resource Management	0,42	0,83	9
Academy of Management Journal	0,42	0,83	9

Table 9

Firstly, the frequency diagram of closeness centrality was constructed. It is evident that our data do not start from zero because all of the journals that have closeness equals to zero do not belong in the central component. All the journals that do not belong in the central component are excluded from this section. From the frequency diagram, also it is obvious that our journals closeness centrality almost follows a normal distribution. Never the less, as it is shown the majority of our journals have closeness centrality between 0.3 and 0.4. That is been shown in the boxplot below as well. The median of closeness centrality is 0.35.

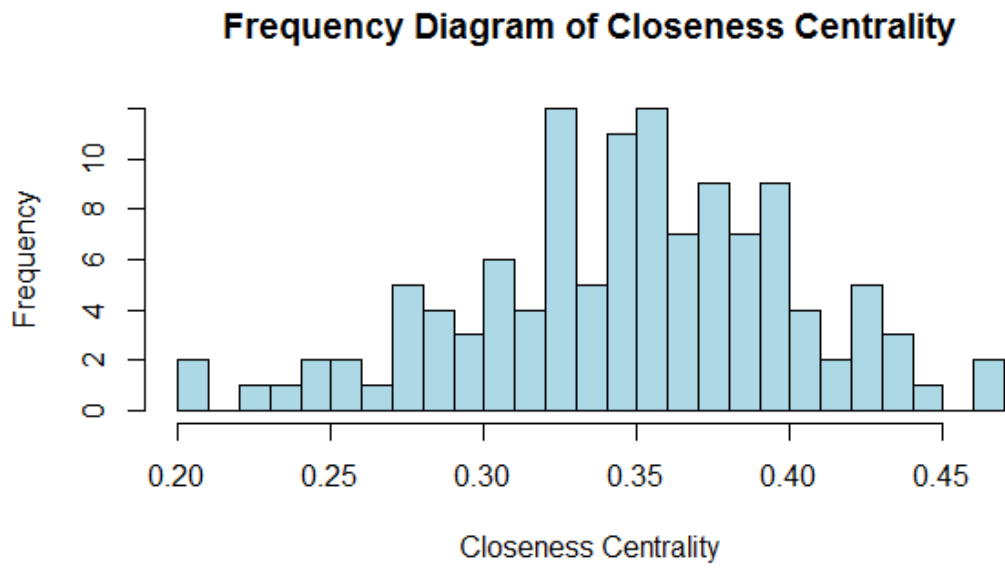


Figure 205

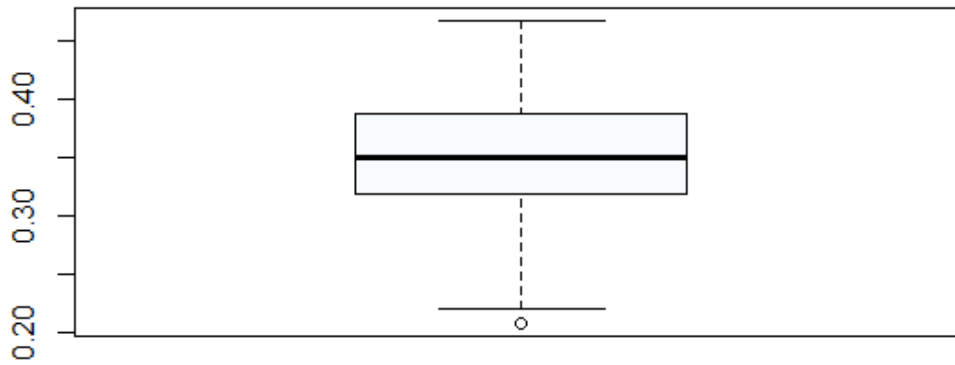


Figure 206

Furthermore, the relationship between closeness centrality and SJR was examined. SJR and closeness centrality do not have a linear relationship and Q3 has the highest closeness centrality and after follows Q1.

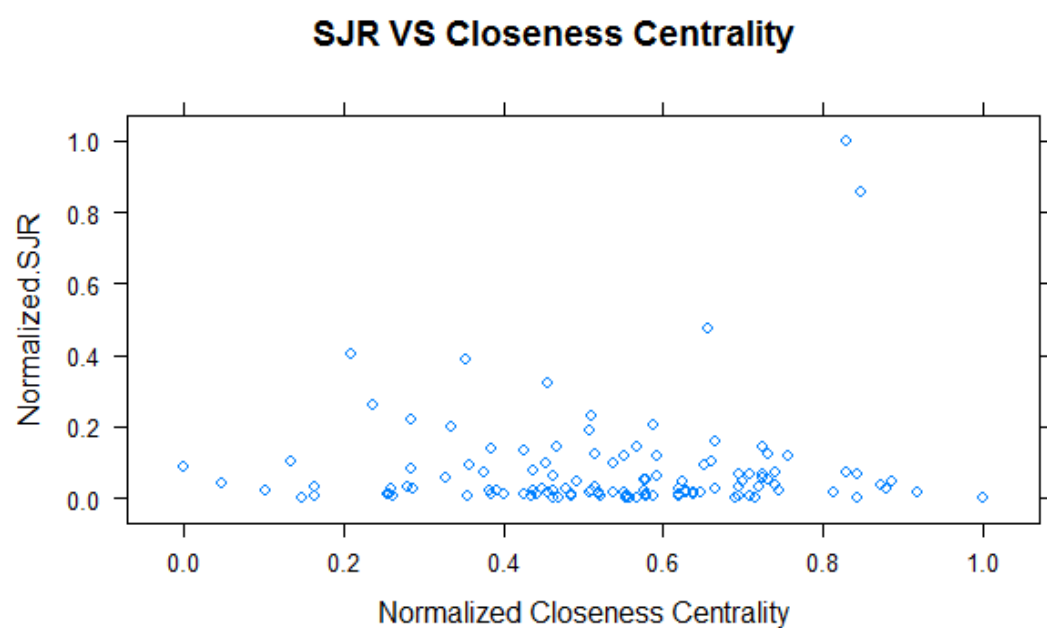


Figure 207

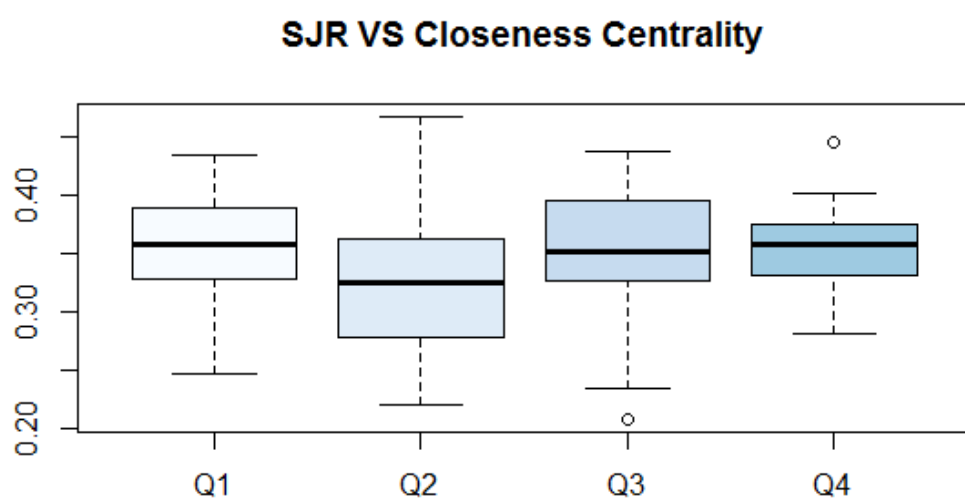


Figure 208

The same comparisons were made for H-Index as well. In this case also, there is not a relationship between the two measures and the Q3 has the highest closeness centralities.

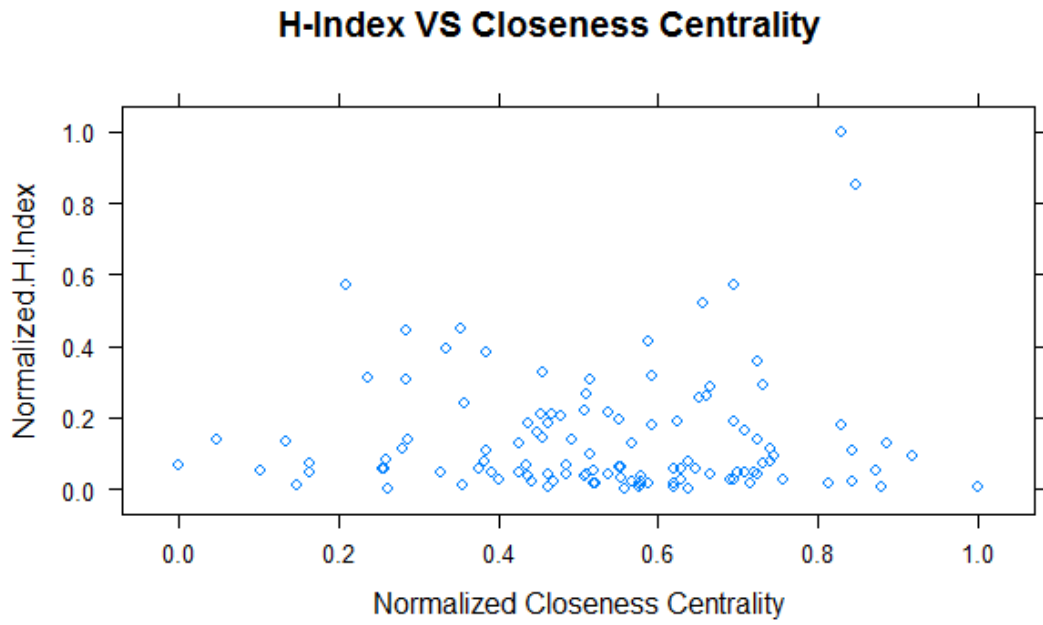


Figure 209

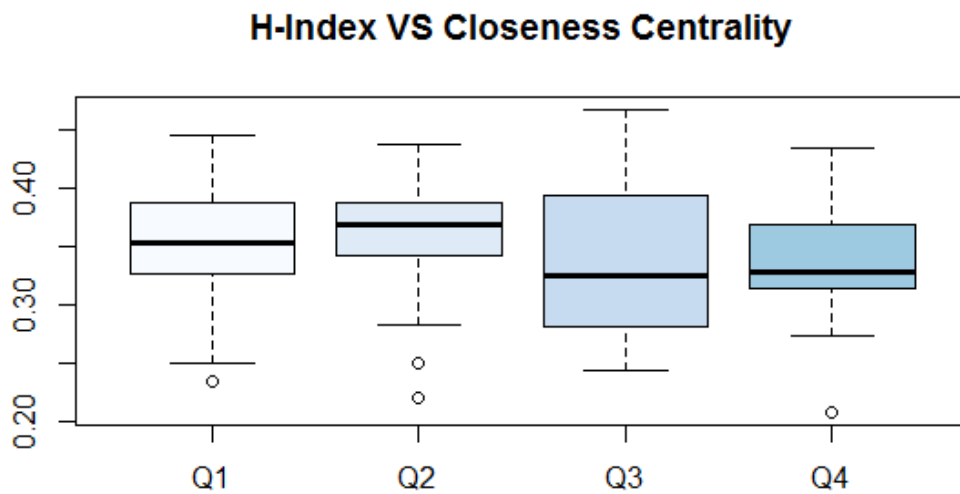


Figure 210

Clearly, SJR and H-Index don't have a linear relationship with closeness centrality. But what about closeness and degree do they have any relationship? Because betweenness centrality and

degree had a linear relationship. As it is shown in the scatterplot below closeness centrality and degree actually have a linear relationship as well.

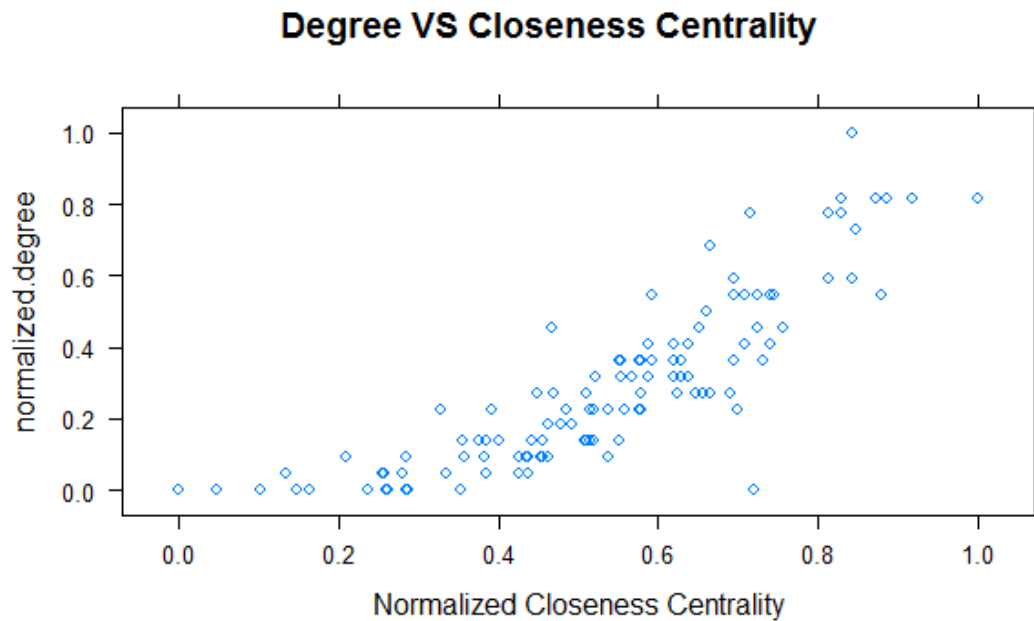


Figure 211

Moreover, the relationship between modularity with closeness centrality were examined. As it is shown the journals that belong in group 3, 4 and 5 have the highest closeness centralities.

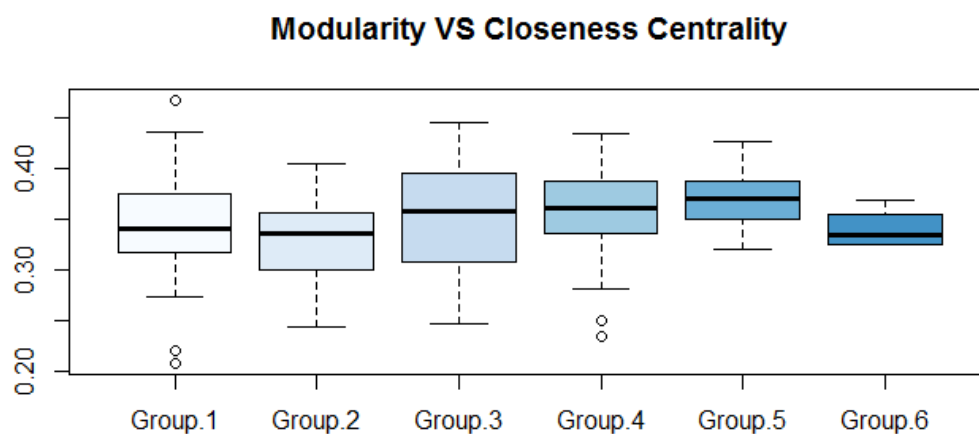


Figure 212

Additionally, the relationship between closeness centrality with triangles and clusters were examined. In the scatterplots, below it is evident that they do not have a linear relationship and that there are a lot of journals that have high closeness centrality and zero number of triangles as Journal of International Business Studies has. Clustering also has a lot of journals that have high clustering and low closeness centrality.

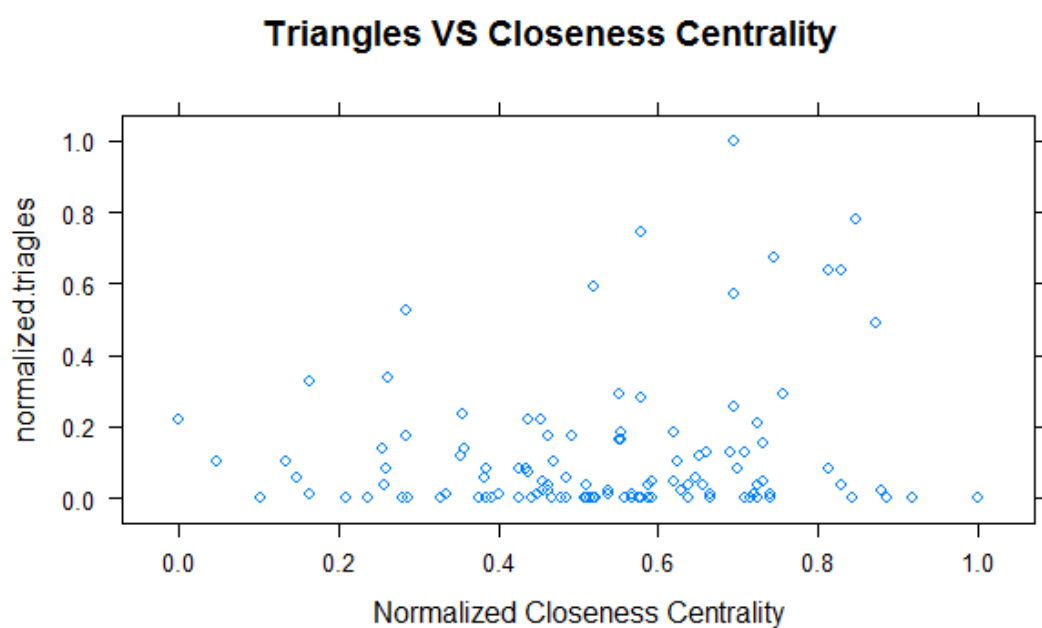


Figure 213

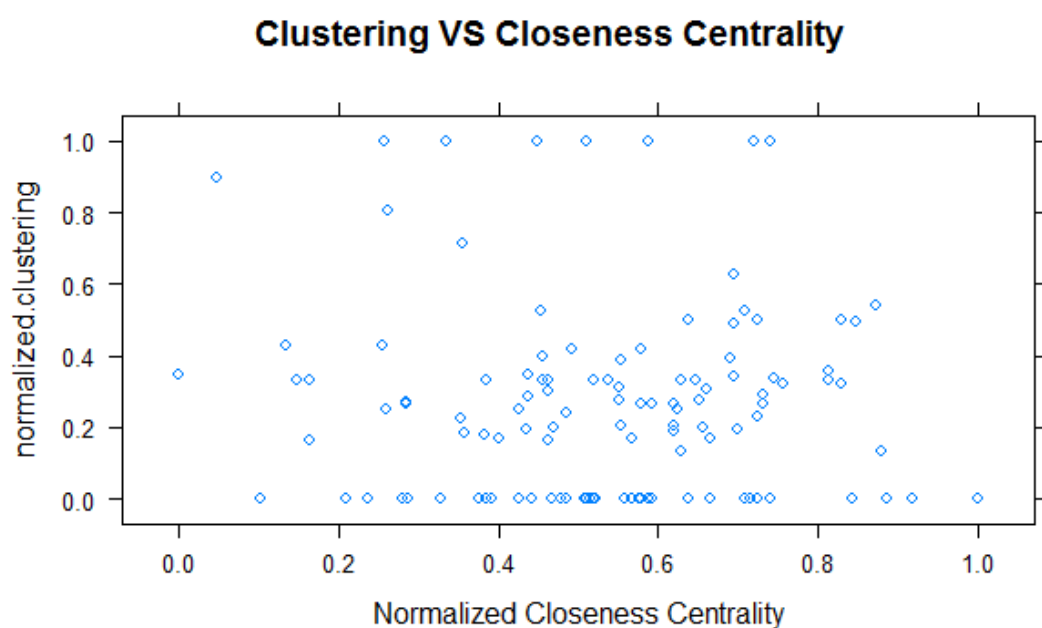


Figure 214

Finally, the relationship between closeness centrality and eccentricity is shown in the scatterplot below. Eccentricity as with almost all the measures that is compared with it does not a linear relationship with any of them. Closeness centrality was not an exception.

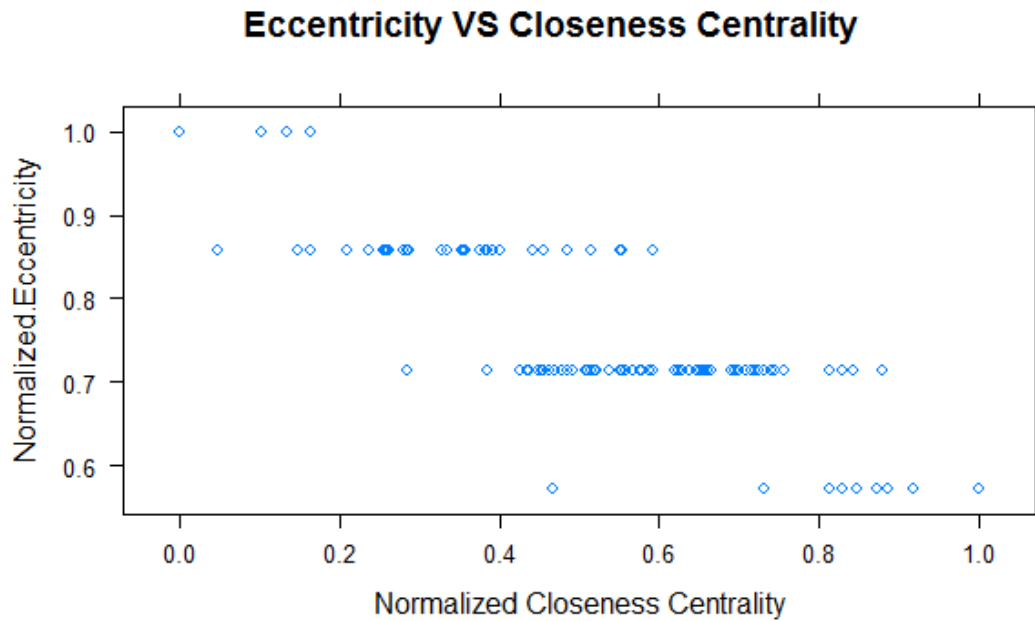


Figure 215

As a conclusion in this section its worth mentioning that closeness centrality has some problems. One problem is that its value tends to span a rather small dynamic range from largest to smallest. Also, if we define the geodetic distance between two vertices to be infinite, if the vertices fall in different components of the network, then closeness centrality is zero. The second problem can be solved with harmonic closeness centrality.

4.2.8.3 Harmonic Closeness Centrality

In graphs with infinite distances the harmonic mean behaves better than the arithmetic mean. Indeed, harmonic closeness centrality can be described as the denormalized reciprocal of the arithmetic mean of distances, whereas harmonic centrality is the denormalized reciprocal of the harmonic mean of distances. The harmonic centrality reverses the sum and reciprocal operations in the definition of closeness centrality. It is a better solution for the problems that closeness centrality has. Harmonic closeness centrality its more used for undirected networks. The first 10 journals based on their normalized harmonic closeness centrality are listed below.

Title	harmonicclosnesscentrality	Normalized Har Rank	
Journal of International Business Studies	0,53	1,00	1
Journal of Management Studies	0,52	0,95	2
International Journal of Business Innovation and Research	0,52	0,95	2
International Journal of Management Reviews	0,51	0,93	4
Organization Studies	0,51	0,92	5
Academy of Management Journal	0,50	0,90	6
International Journal of Human Resource Management	0,50	0,89	7
Academy of Management Review	0,50	0,88	8
European Journal of Innovation Management	0,49	0,87	9
British Journal of Management	0,49	0,87	9

Table 10

Moreover, the frequency diagram of harmonic closeness centrality is shown below. It is obvious that the majority of our journals have harmonic closeness centrality between 0.35 and 0.45. Again, our journals follow an almost normal distribution as they did in the closeness centrality and because only the central component is analyzed the data do not start from zero. As it is shown in the boxplot of harmonic closeness centrality below the median is 0.40.

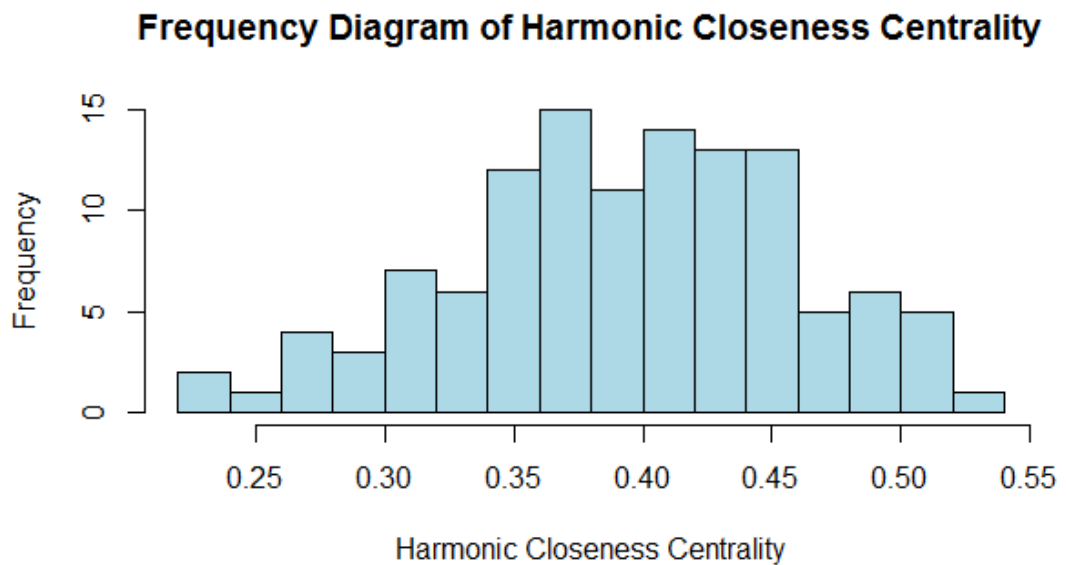


Figure 216

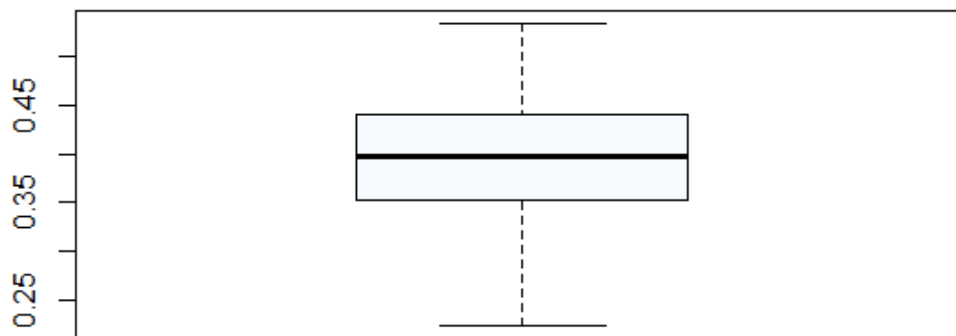


Figure 217

The first comparison that has been made is between SJR and harmonic closeness centrality. From the scatterplot, an assumption can be made that they do not have a linear relationship and harmonic closeness centrality is not affected by SJR. In the boxplot, it is obvious that Q2 has the journals with the highest harmonic closeness centrality.

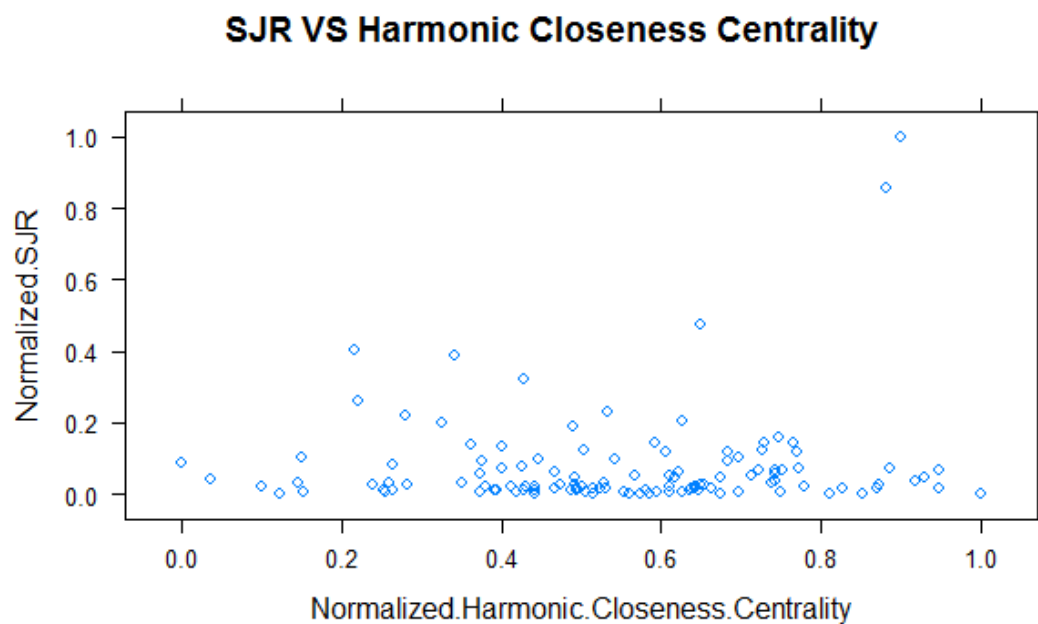


Figure 218

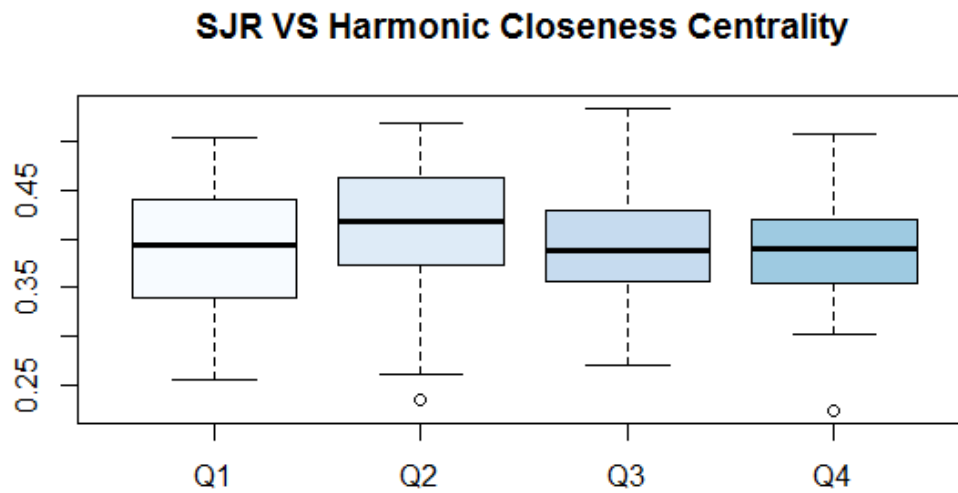


Figure 219

The same comparisons were made in order to examine the relationship between harmonic closeness centrality and H-Index. H-Index VS harmonic closeness centrality has an almost identical scatterplot with SJR VS harmonic closeness centrality. Of course, they do not have a linear relationship but Q1 has the highest harmonic closeness centrality which is a better sign of their relationship.

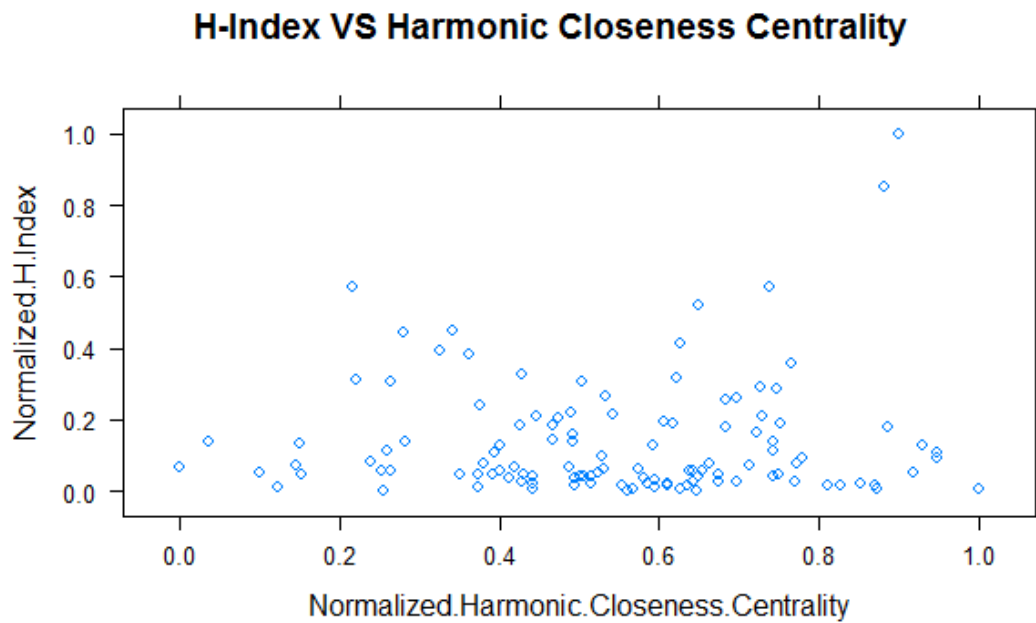


Figure 220

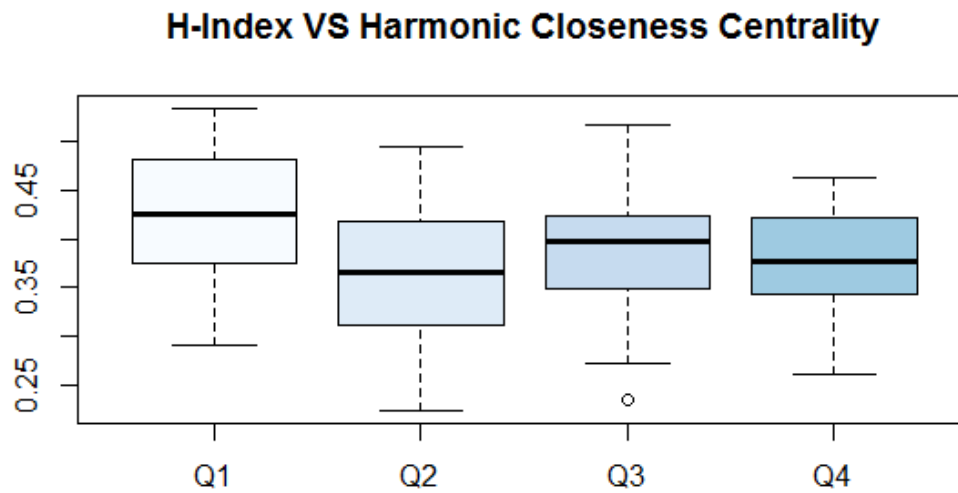


Figure 221

Supplementary, the relationship between harmonic closeness centrality and degree was examined. Again, degree has a linear relationship with harmonic closeness centrality. That has expected because degree of a journal is the number of edges connected to it and harmonic closeness centrality measures the reverses sum and the reciprocal operations in the definition of closeness centrality.

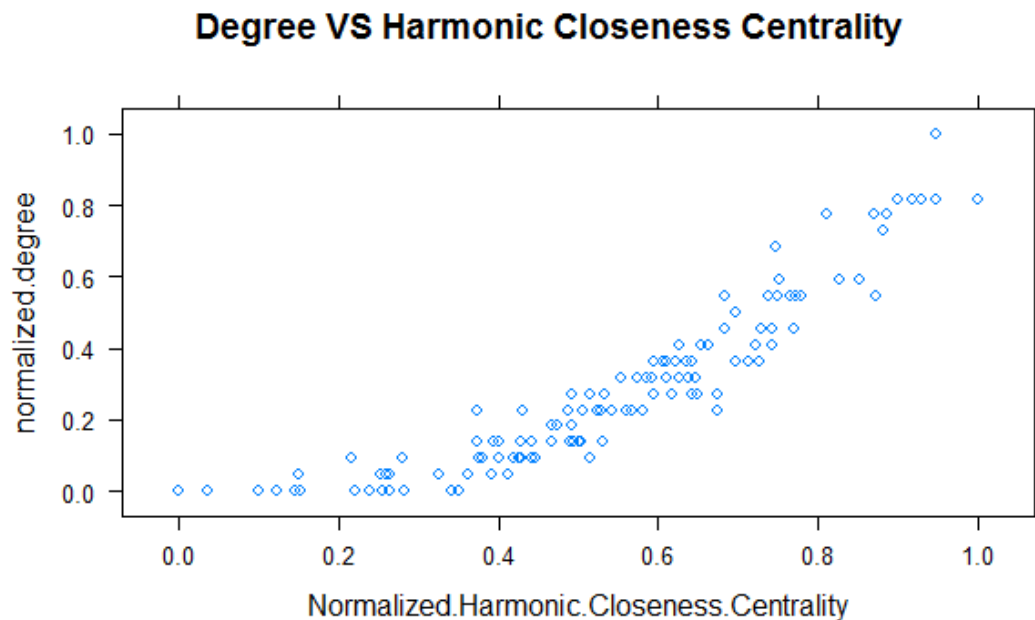


Figure 222

Furthermore, a boxplot which compares modularity and harmonic closeness centrality was constructed. The journals with the highest harmonic closeness centrality as it is shown in the boxplot belongs in the group 3 and 4. The same happened with closeness centrality but in closeness centrality the third most high group has 5 and in harmonic closeness centrality is group 1.

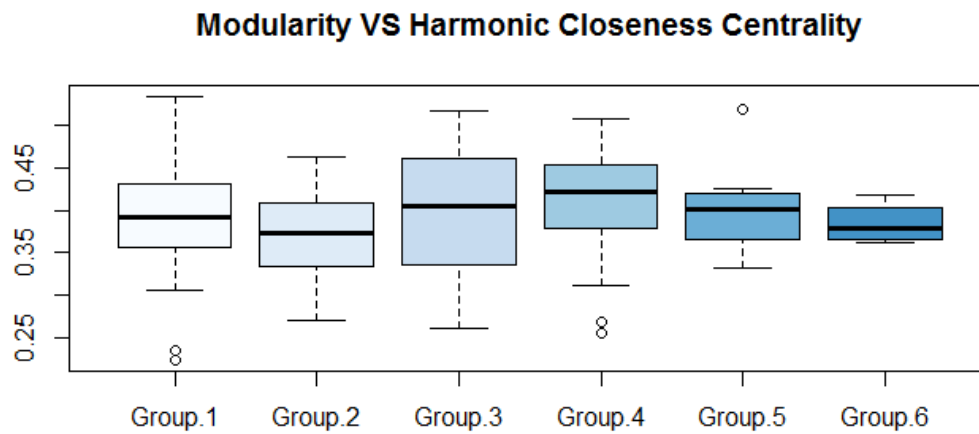


Figure 223

In this context, the relationship between harmonic closeness centrality and triangles and clusters was examined. The scatterplots in this case are almost the same as in the closeness centrality. The outcome is that triangles and clusters do not have again a relationship with harmonic closeness centrality.

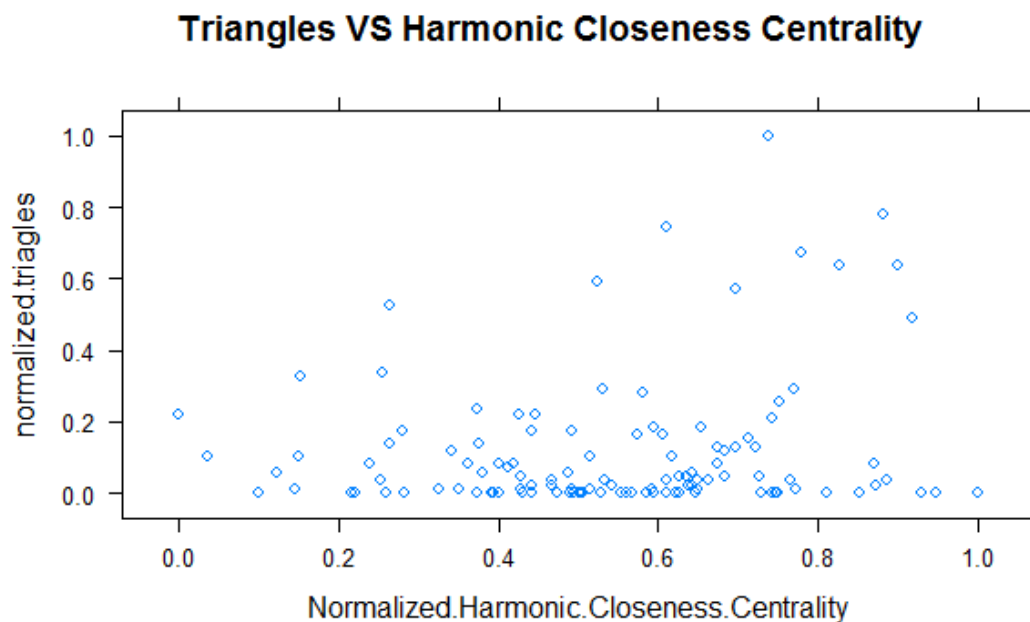


Figure 224

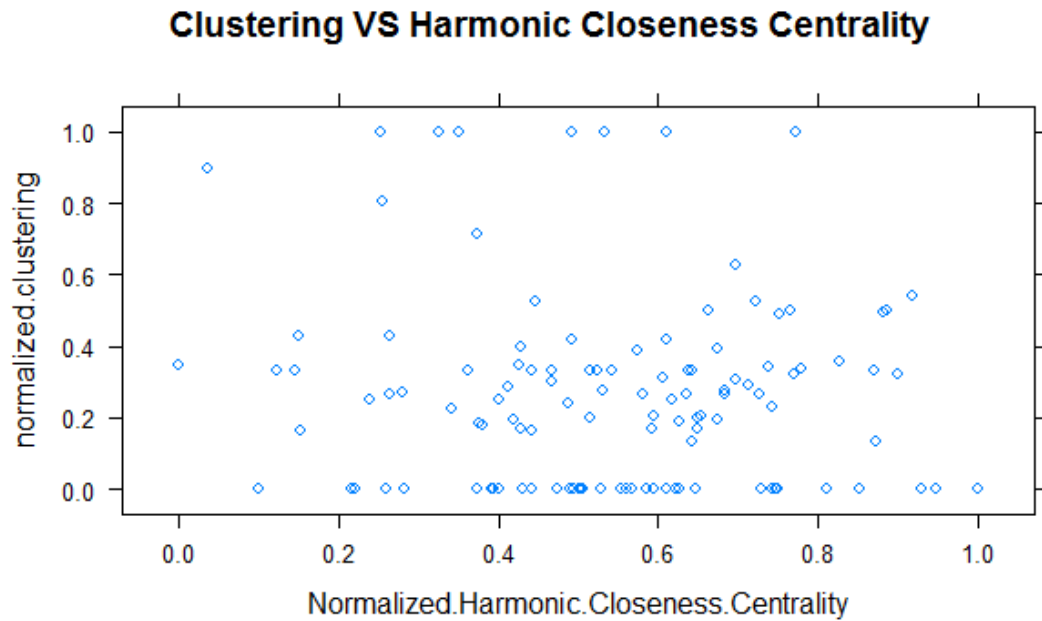


Figure 225

Finally, the last comparison was made again with eccentricity and harmonic closeness centrality. Eccentricity again do not have a linear relationship with harmonic closeness centrality. Actually, the highest eccentricity belongs to journals with the lowest harmonic closeness centralities.

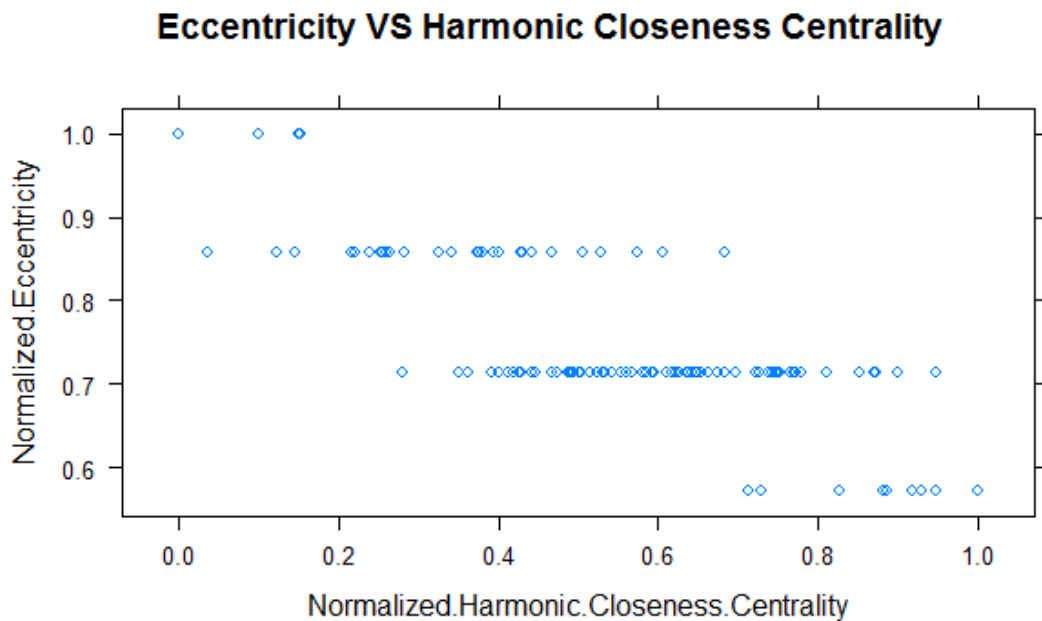


Figure 226

4.2.8.4 Eigenvector Centrality

Eigenvector centrality gives each vertex a score proportional to the sum of the scores of its neighbors. Here's how it works. Let us make some initial guess about the centrality x_i of each vertex i . For instance, we could start off by setting $x_i = 1$ for all i . Obviously this is not a useful

measure of centrality, but we can use it to calculate a better one $\acute{x}_i$, which we define to be the sum of the centralities of i's neighbors thus:

$$\acute{x}_i = \sum_j A_{ij} x_j,$$

where A_{ij} is an element of the adjacency matrix. We can also write this expression

in matrix notation, as $x' = Ax$, where x is the vector with elements x_i .

Repeating this process to make better estimates, we have after t steps a vector of centralities $x(t)$ given by

$$X(t) = A^t x(0)$$

Now let us write $x(0)$ as a linear combination of the eigenvectors v_i of the adjacency matrix thus:

$$x(0) = \sum_i c_i v_i$$

for some appropriate choice of constants c_i . Then

$$x(t) = A^t \sum_i c_i v_i = \sum_i c_i k_i^t v_i = k_1^t \sum_i c_i \left[\frac{k_i}{k_1} \right]^t v_i,$$

where the k_i are the eigenvalues of A , and k_1 is the largest of them. Since $\frac{k_i}{k_1} < 1$ for all $i \neq 1$, all terms in the sum other than the first decay exponentially as t becomes large, and hence in the limit $t \rightarrow \infty$ we get $x(t) \rightarrow c_1 k_1^t v_1$. In other words, the limiting vector of centralities is simply proportional to the leading eigenvector of the adjacency matrix. Equivalently we could say that the centrality x satisfies

$$Ax = k_1 x.$$

This then is the eigenvector centrality, first proposed by Bonacich in 1987.

As promised the centrality x_i of vertex i is proportional to the sum of the centralities of i's neighbors:

$$x_i = k_1^{-1} \sum_j A_{ij} x_j$$

which gives the eigenvector centrality the nice property that it can be large

either because a vertex has many neighbors or because it has important neighbors

(or both). [55] A journal in our network, for instance, can be important, by this measure, because the member of the editorial board of a journal may know lots of people who work at other journals (even though those journals may not be important themselves) or knows a few people how work in journals with high ranking. Eigenvector centrality works best for the undirected case. Below ten journals based on highest eigenvector centrality is listed. Eigenvector centrality is equal to the normalized eigenvector centrality that is why it not in the table below.

Title	eigencentrality	normalized eig Rank	
Journal of Management Studies	1,00	1,00	1
Academy of Management Review	0,87	0,87	2
International Journal of Management Reviews	0,86	0,85	3
Organization Studies	0,85	0,85	4
Human Relations	0,84	0,84	5
Academy of Management Journal	0,82	0,82	6
British Journal of Management	0,82	0,81	7
Journal of International Business Studies	0,81	0,80	8
International Journal of Human Resource Management	0,74	0,74	9
Journal of Management Inquiry	0,71	0,71	10

Table 11

The frequency diagram of eigenvector centrality is listed below. The majority of our journals have eigenvector centrality between 0.0 and 0.2. In the boxplot, it is also shown how the eigenvector centrality is distributed. The max is 1 and the min is 0.

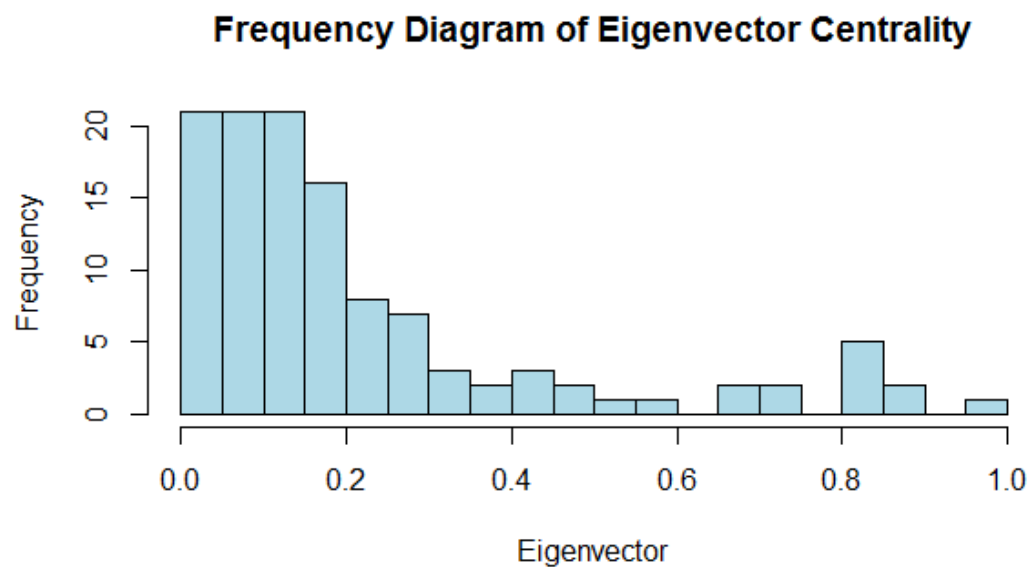


Figure 227

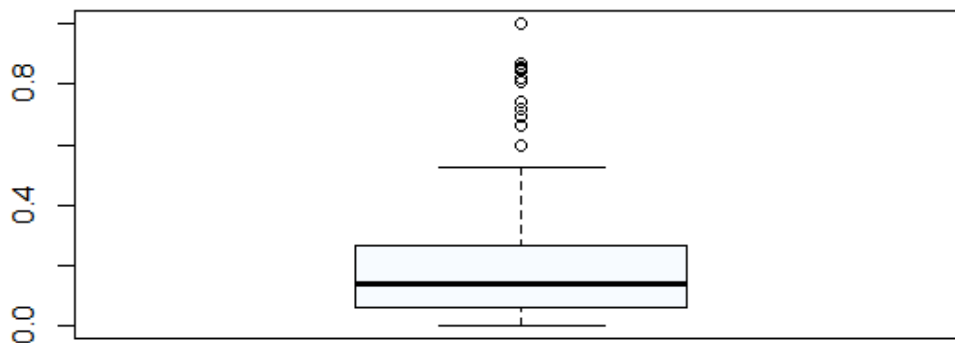


Figure 228

Furthermore, as with all the other sections in centralities the relationship of eigenvector centrality with SJR was examined and presented below. Eigenvector centrality do not have linear relationship with SJR and the journals with the highest eigenvector centrality are in the in the Q2. That is bizarre because eigenvector could have a potential relationship with SJR but the majority our journals have really low SJR compared with their high eigenvector.

SJR VS Eigenvector Centrality

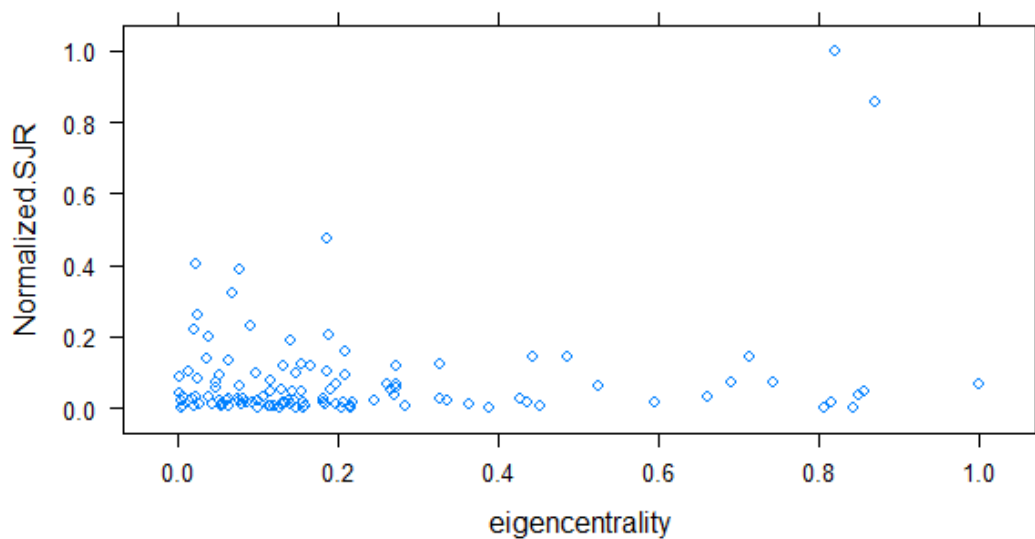


Figure 229

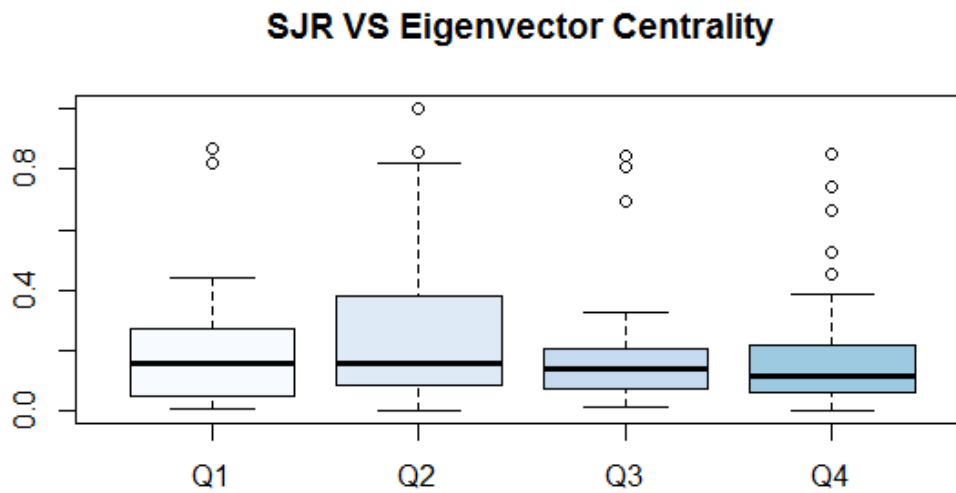


Figure 230

H-Index on the other hand, has a slightly better relationship with eigenvector centrality but again it is not linear. Never the less the data are better distrubiated in the scatterplot. Another good sign for their relationship is that the jounals with the highest eigenvector centrality are in the Q1 after comes Q2 and in the bottom are Q3 and Q4.

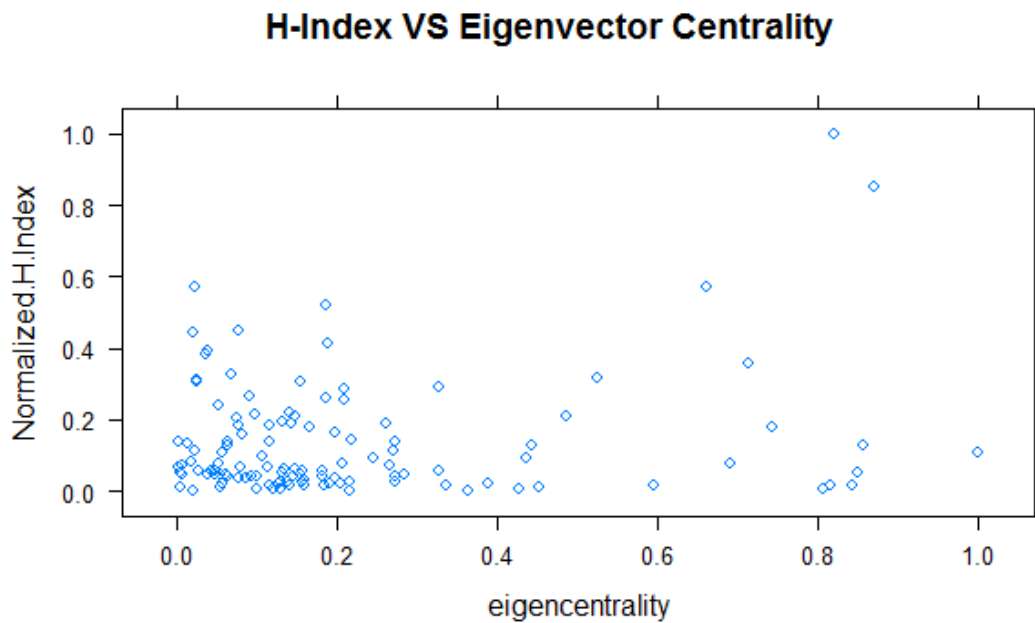


Figure 231

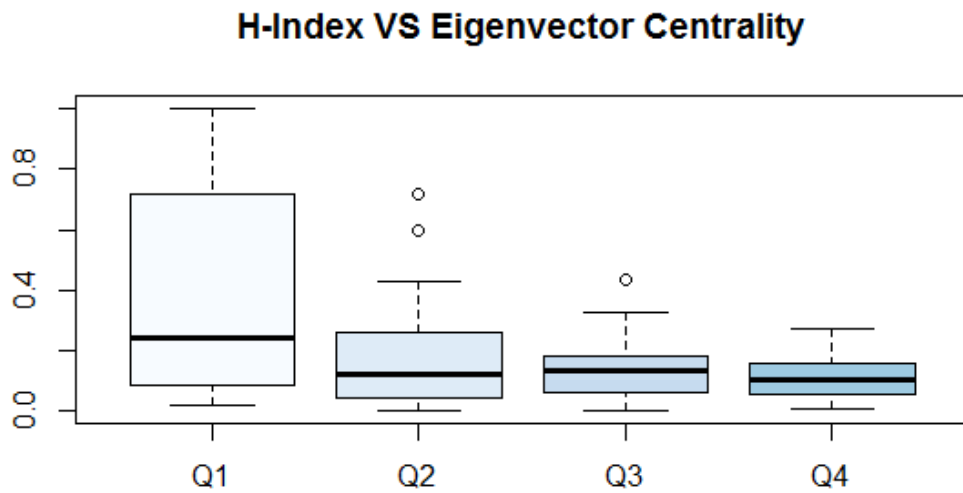


Figure 232

Degree has a linear relationship with eigenvector centrality. That was expected because degree of a journal is the number of edges connected to it and eigenvector centrality gives each vertex a score proportional to the sum of the scores of its neighbors. That make sense because if for example a journal has degree 23 means that 23 members of his editorial board are in other journals. If a journal has high eigenvector centrality means that maybe a member of the editorial board of a journal may know lots of people who work at other journals (even though those journals may not be important themselves) or knows a few people how work in journals with high ranking.

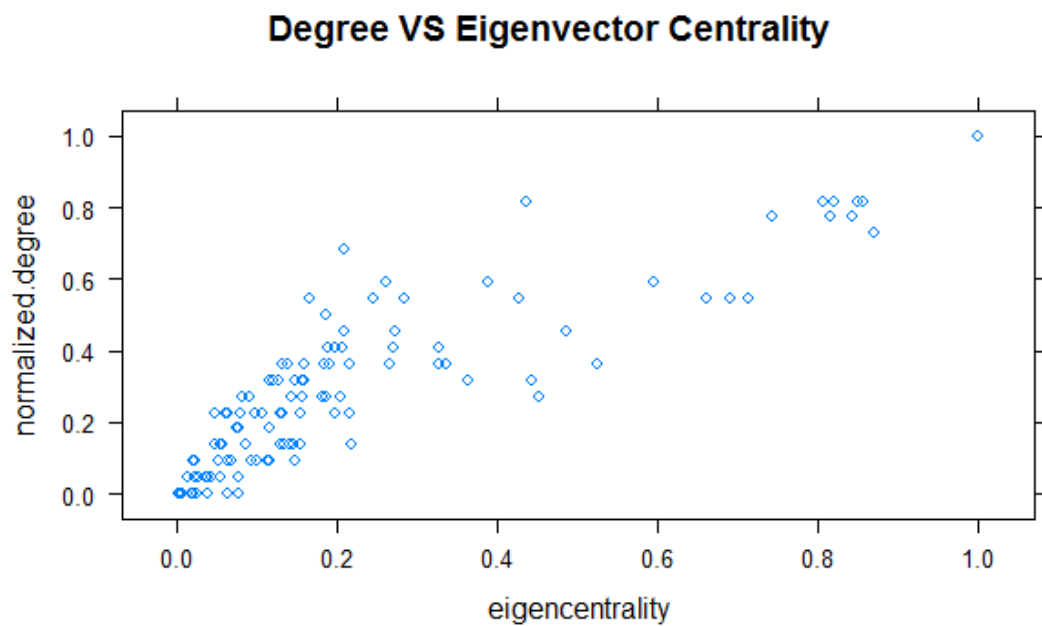


Figure 233

Moreover, the relationship with modularity class was examined. Group 3 and 4 have the highest eigenvector centrality after comes group 1.

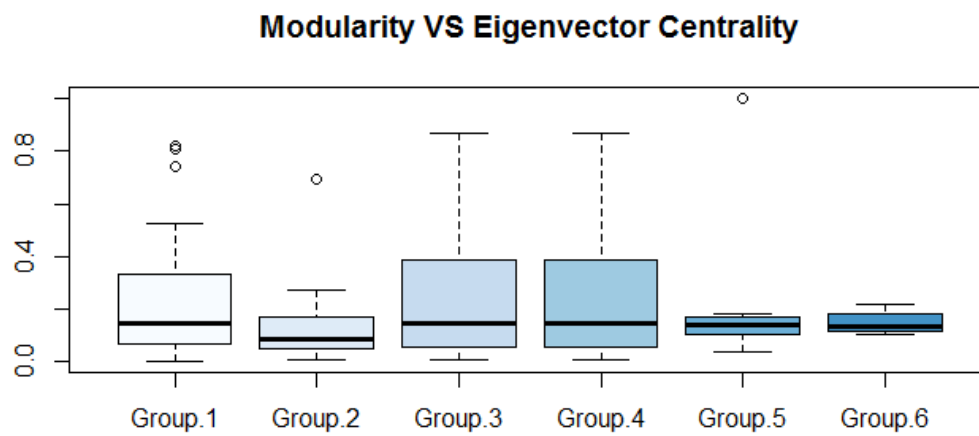


Figure 234

Triangles and clustering relationship with eigenvector was also examined. As with hubs and authority triangles has a better relationship with eigenvector that with clustering. Never the less, none of the relationships is linear.

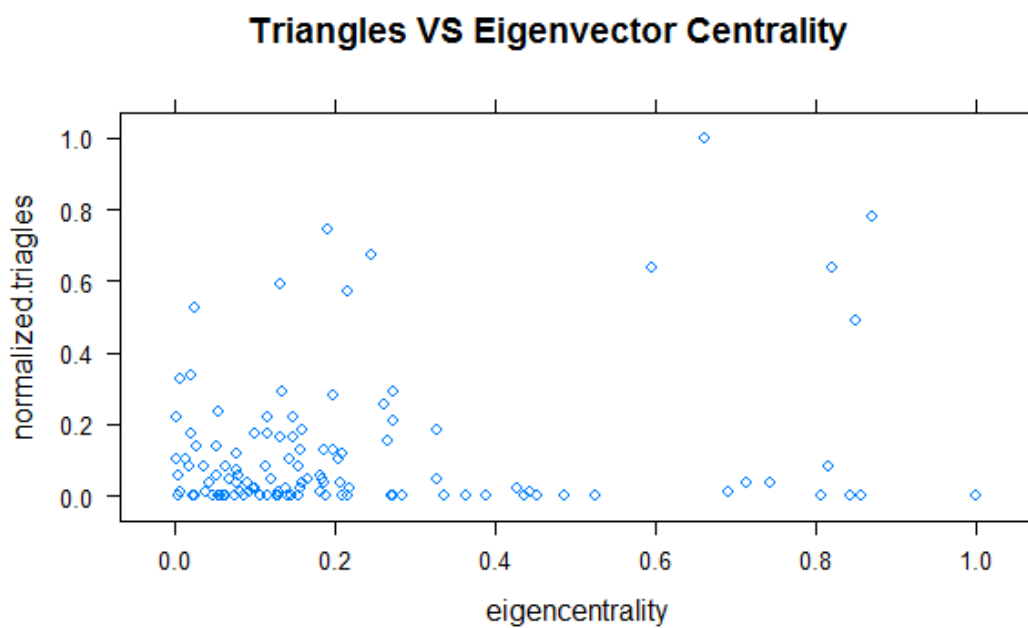


Figure 235

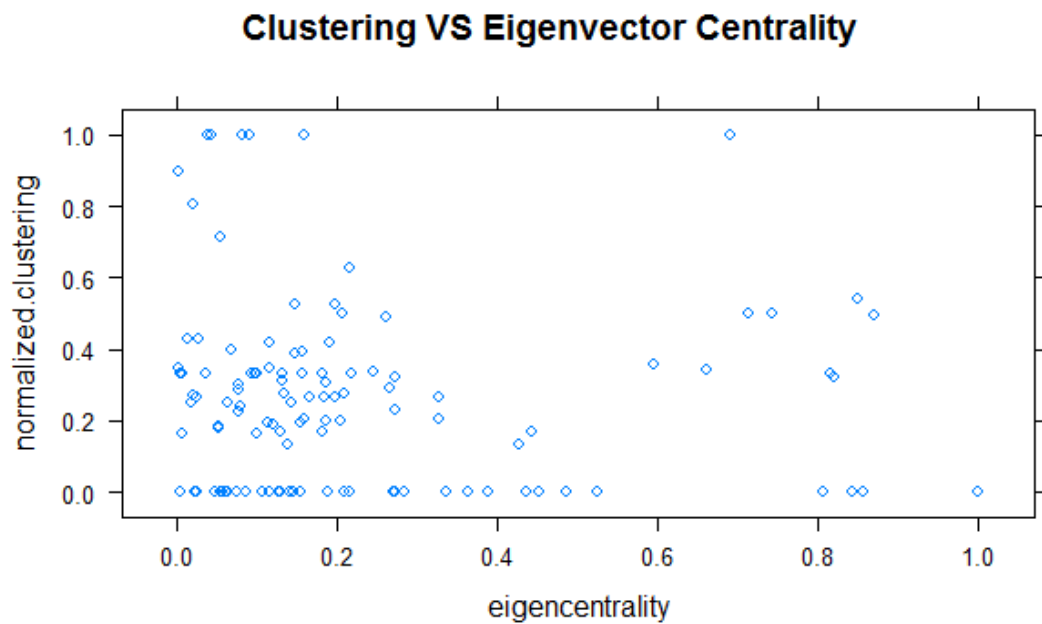


Figure 236

Finally, eccentricity do not have a relationship with eigenvector centrality as it was expected because eccentricity does not have a linear relationship with any of the measures examined.

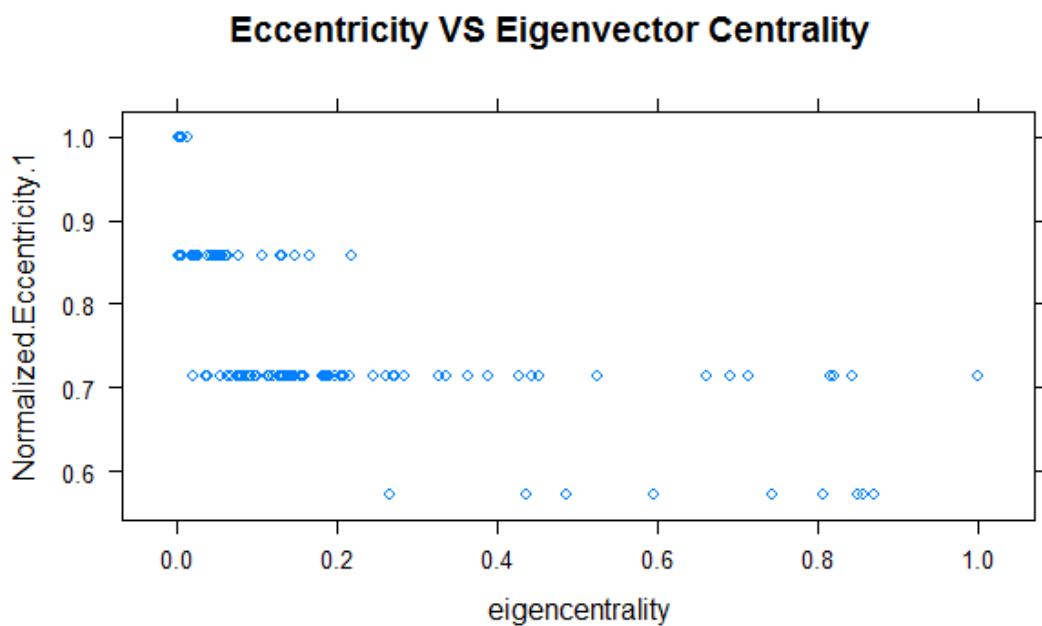


Figure 237

4.2.8.5 Hubs and Authorities

Gephi in order to calculate hubs and authorities uses the HITS metrics. The HITS metric determines two values for a page: its authority, which estimates the value of the content of the page, and its hub value, which estimates the value of its links to other pages. Actually, computes two different scores: hubs and authority. The authority score indicates the value of the page

(node) itself and hubs estimates the value of the links outgoing from the page (node). [Gephi github] Clearly hubs and authorities exist in directed networks, since in the undirected case there is no distinction between pointing to a vertex and being pointed to. Also, it's worth mentioning that HITS are like PageRank that it going to be discussed later on. There is all an iterative algorithm based on the linkage of the documents on the web. However, HITS do have some major differences. The authority centrality of a vertex is defined to be proportional to the sum of the hub centralities of the vertices that point to it:

$$x_i = \alpha \sum_j A_{ij} y_j,$$

where α is a constant. Similarly, the hub centrality of a vertex is proportional to the sum of the authority centralities of the vertices it points to:

$$y_i = \beta \sum_j A_{ji} x_j,$$

with α another constant. Notice that the indices on the matrix element A_{ji} are swapped around in this second equation: it is the vertices that i points to that define its hub centrality.

In matrix terms these equations can be written as

$$x = \alpha A y, \quad y = \beta A^T x,$$

or, combining the two,

$$\begin{aligned} A A^T x &= \lambda x, \\ A^T A y &= \lambda y \end{aligned}$$

where $\lambda = (\alpha\beta)^{-1}$. Thus the authority and hub centralities are respectively

given by eigenvectors of $A A^T$ and $A^T A$ with the same eigenvalue. [55]

Never the less, we calculated HITS and the ten journals with the highest hub and authority is the following. In Gephi the selections that was made were undirected and epsilon equals with 1.0E-4.

Title	authority or Normalized authority	Rank
Journal of Product and Brand Management	0,31	1,00 1
Academy of Management Review	0,27	0,87 2
International Labour Review	0,26	0,85 3
Research Policy	0,26	0,84 4
Journal of Knowledge Management	0,25	0,81 5
Academy of Management Journal	0,25	0,80 6
Industry and Innovation	0,24	0,77 7
Intangible Capital	0,22	0,73 8
Journal of Personal Selling and Sales Management	0,22	0,72 9
Journal of High Technology Management Research	0,21	0,68 10

Table 12

First of all, from the excel we can observe that authorities and hubs have the same values which is logical due to the fact that authority may also be a hub, and vice versa: review articles often contain useful discussions of the topic at hand as well as citations to other discussions. Also, this is happening because we have an undirected network where there is no distinction between pointing to a vertex and being pointed to. Firstly, the frequency diagram was constructed. From that it is evident that the majority of our journals have authority or hub 0.00 and 0.02. The median of authority and hub is 0.01920791 as it represented in the boxplot below.

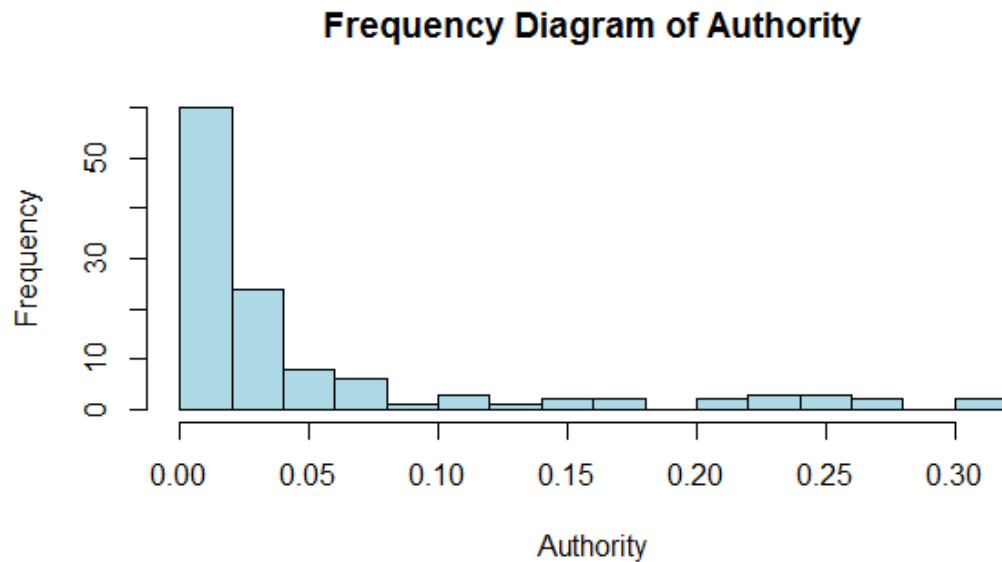


Figure 238

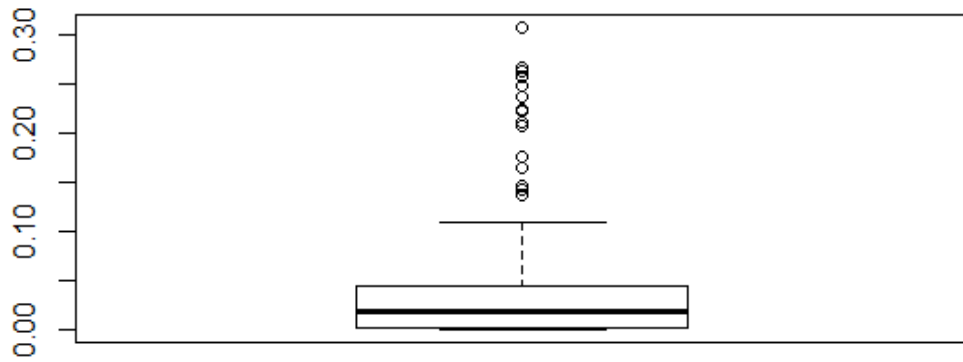


Figure 239

Moreover, the relationship between SJR with normalized authority were examined. Authority or Hub do not have a linear relationship with SJR. From the scatterplot, it is obvious that a big number of journals have zero SJR and zero authority. From the boxplot, it is evident that Q1 has the majority of journals with high authority and hub and second comes Q4.

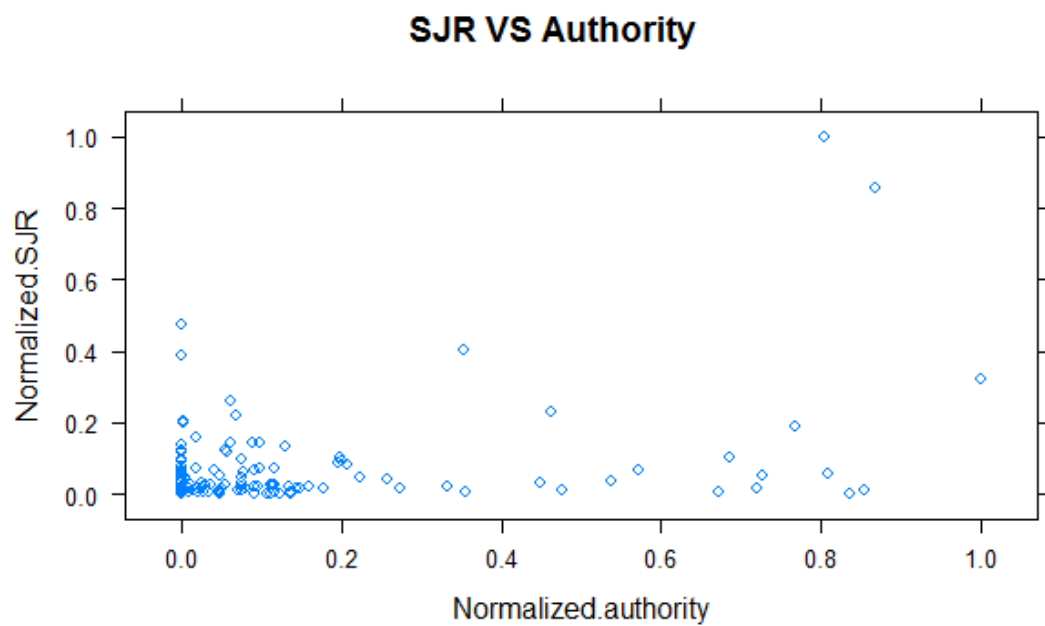


Figure 240

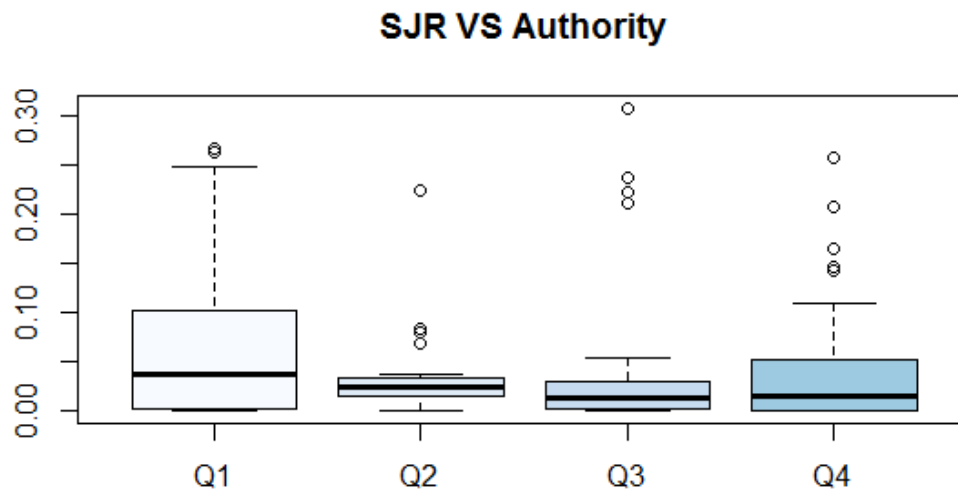


Figure 241

Furthermore, the same procedures were made for H-index as well. H-Index do not have a linear relationship with authority or hub. Also, there are a lot of journals which have high authority and SJR equals to zero. Again, Q2 has the journals with the highest authority. In general, the majority of our measures, that it has been examined as far, have their highest rank in the Q2 in refer to H-Index.

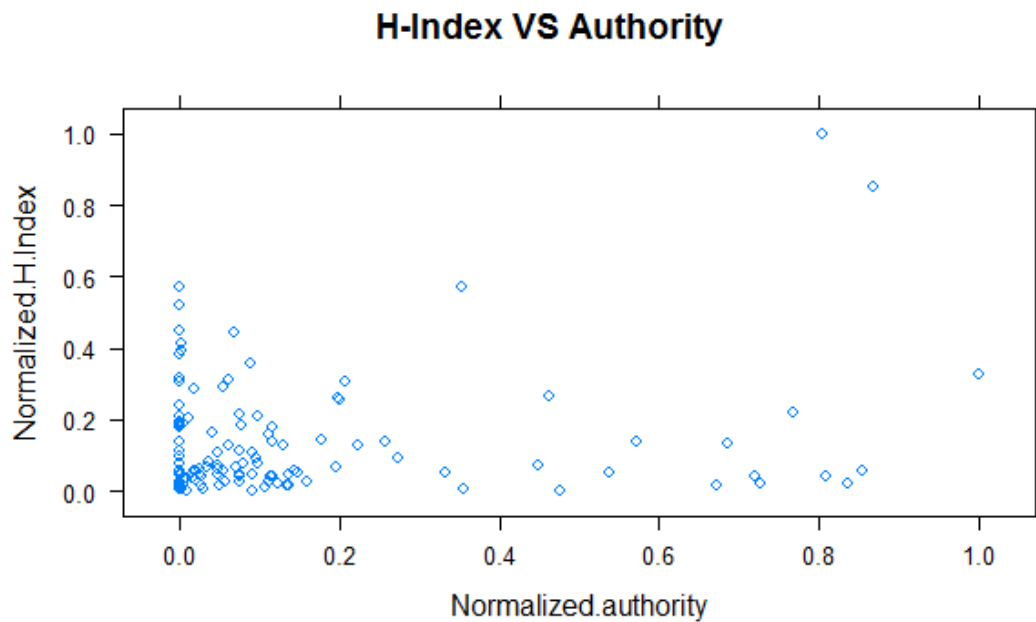


Figure 242

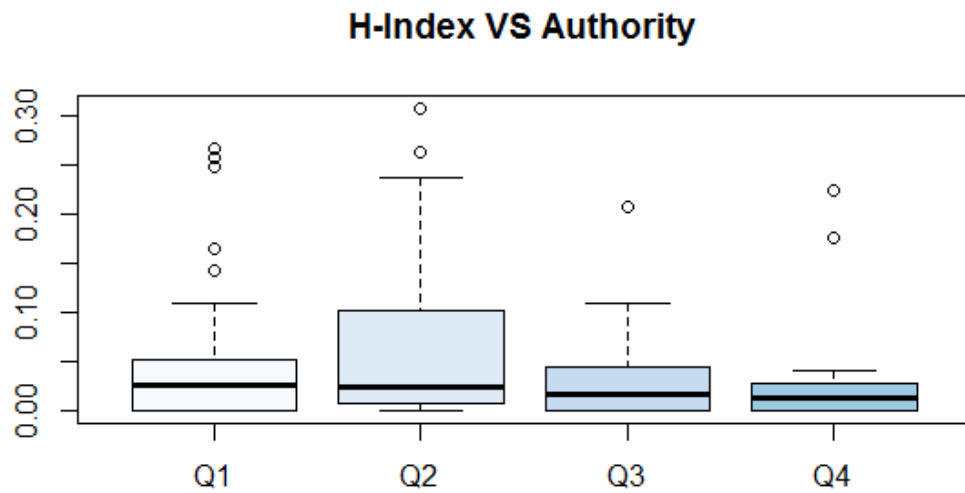


Figure 243

Degree and authority was also examined and they do not have a linear relationship. Hub and authority is the only centrality till now that do not a linear relationship with degree. In the scatterplot, it is clear that a lot of journals with low authority have high degree. For example, Journal of Management Studies has authority equals to 0.03 which is really low and one of the highest degrees.

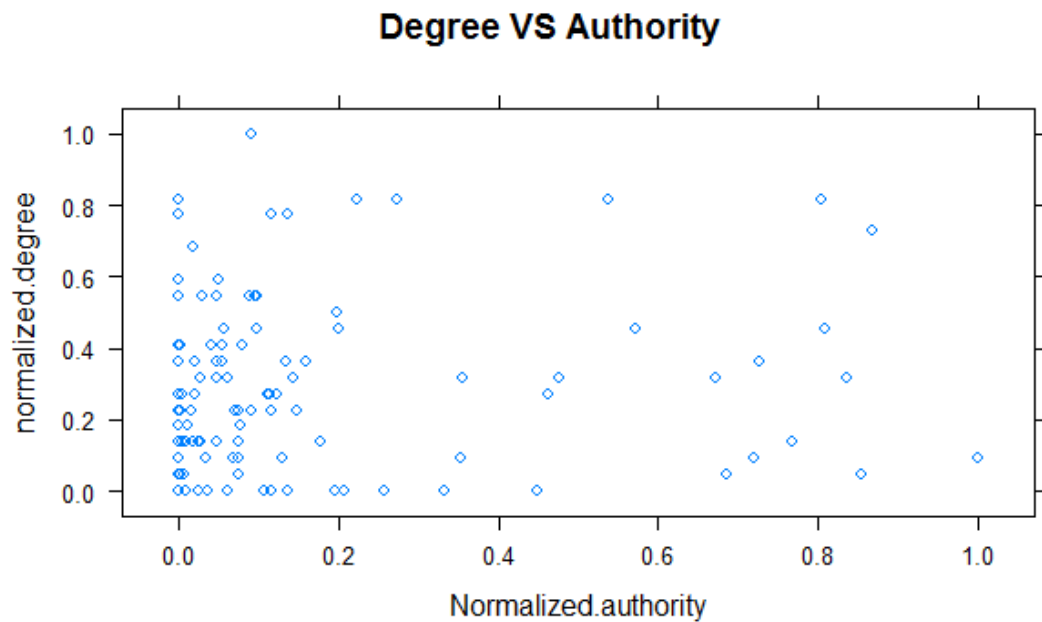


Figure 244

Modularity and authority was examined as well. Group 2 has the highest authority or hub and after comes group 6 and 4.

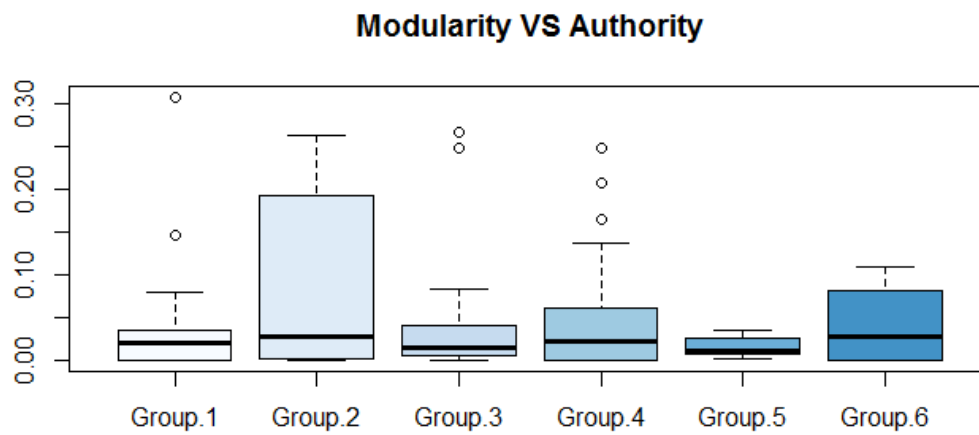


Figure 245

Moreover, the relationship between triangles, clustering and hub or authority was examined in the scatterplots below. Neither of those measures have a linear relationship with hub or authority, even though triangles have a slightly better relation.

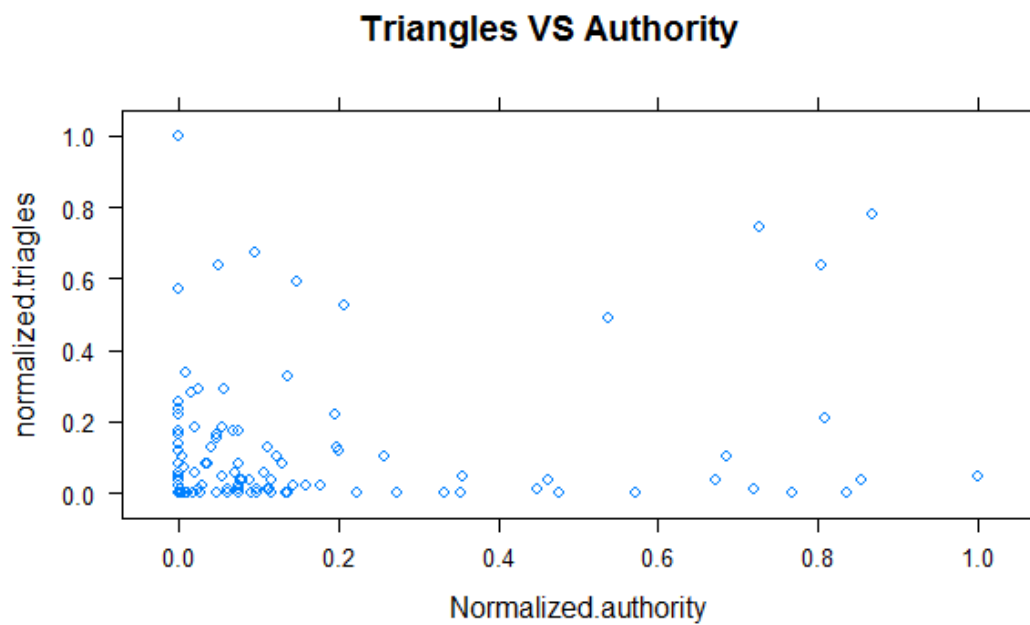


Figure 246

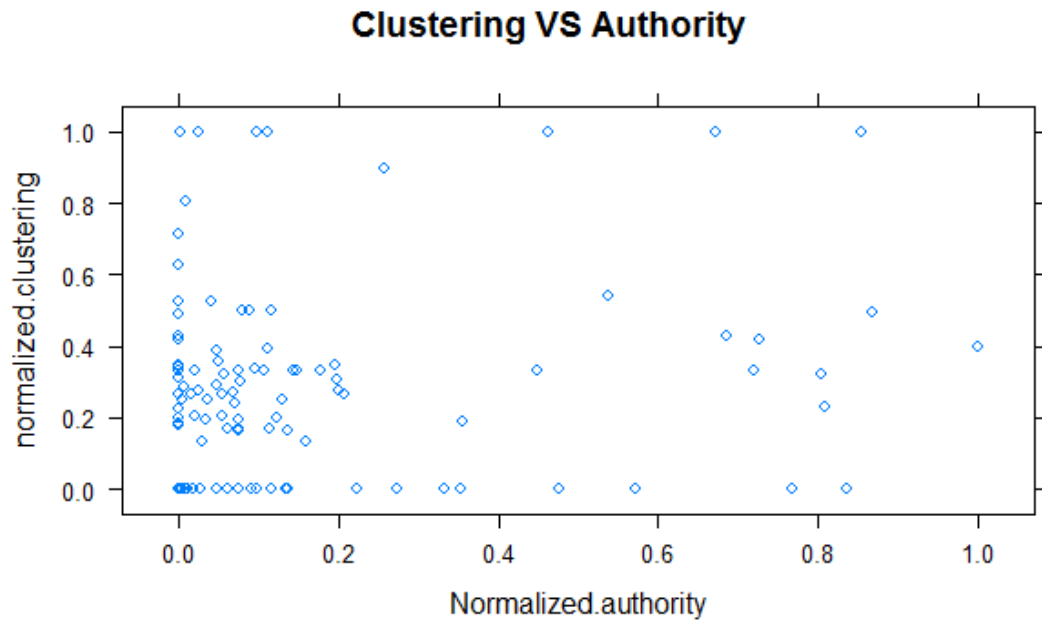


Figure 247

Finally, as it was expected eccentricity was compared with hub or authority and they do not have a linear relationship. Eccentricity in general do not have a relationship with any of the measures that it has been examined as far neither with centralities nor with the other measures.

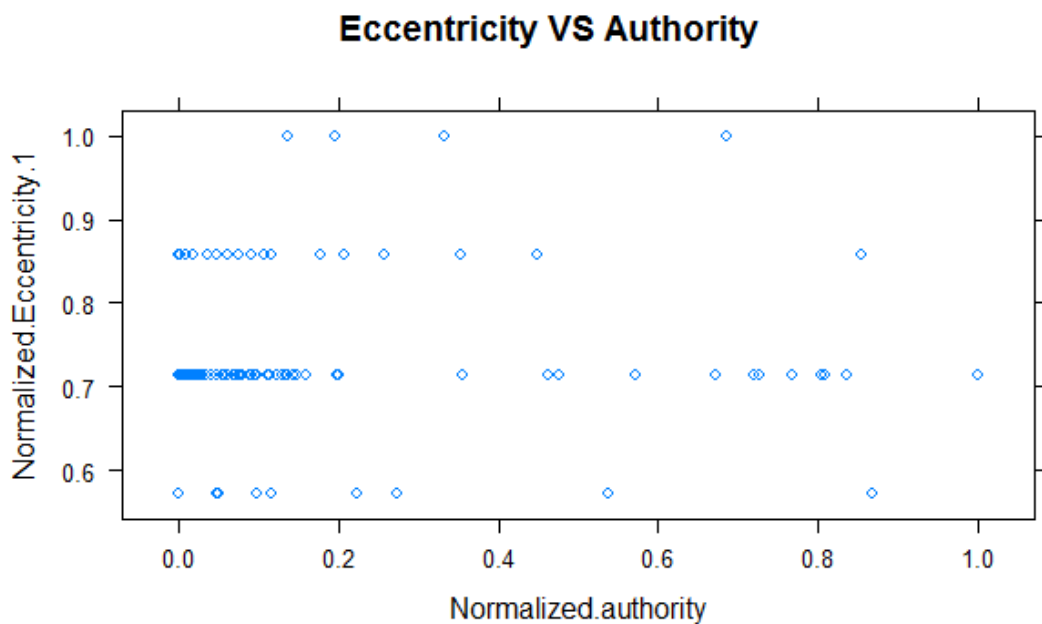


Figure 248

4.2.8.6 Page Rank

Page Rank is an iterative algorithm that measures the importance of each node within the network. The metric assigns each node a probability that is the probability of being at that page after many clicks. The page rank values are the values in the eigenvector that has the highest corresponding eigenvalue of a normalized adjacency matrix A' . The standard adjacency matrix is normalized so that the columns of the matrix sum to 1. [16]. For undirected networks, Page

Rank measure without the constant term, is the same as degree centrality. The ten journals with the highest Page Rank is the following. The selections that was made in Gephi were undirected, probability equals with 0.85 and epsilon equals with 0.001.

Title	pageranks	Normalized Page Ranks	Rank
Journal of Management Studies	0,02	1,00	1
International Journal of Business Innovation and Research	0,02	0,88	2
Production and Operations Management	0,02	0,88	2
Journal of International Business Studies	0,02	0,86	4
Academy of Management Journal	0,02	0,82	5
Organization Studies	0,02	0,79	6
International Journal of Human Resource Management	0,02	0,78	7
International Journal of Management Reviews	0,02	0,77	8
Human Relations	0,02	0,76	9
British Journal of Management	0,02	0,74	10

Table 13

As in all the other sections the frequency diagram is firstly, examined. The majority of our journals have page rank between 0.000 and 0.010. From the boxplot also, it is obvious that the median is 0.001 the max is 0.002 and the min is 0.000.

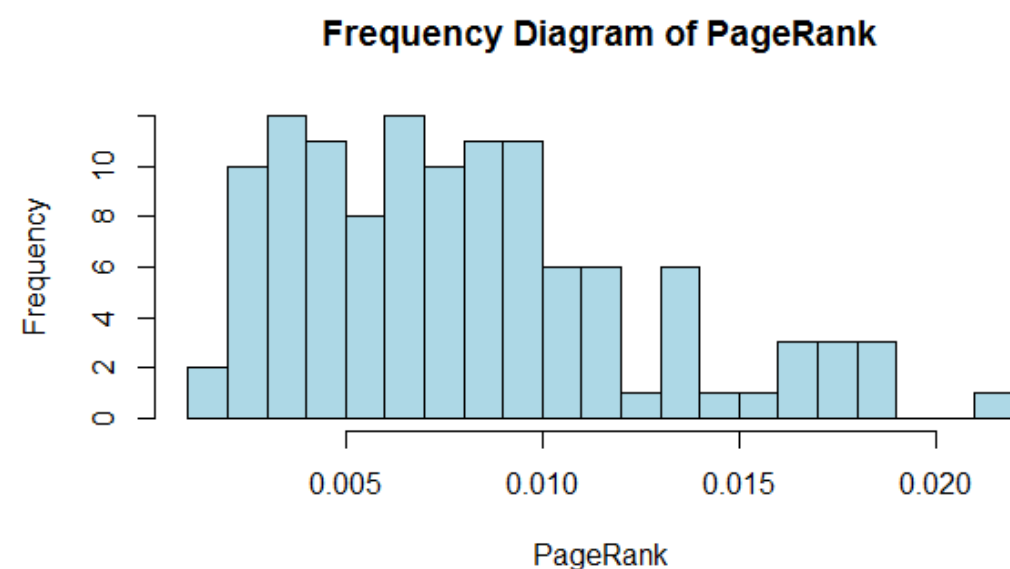


Figure 249

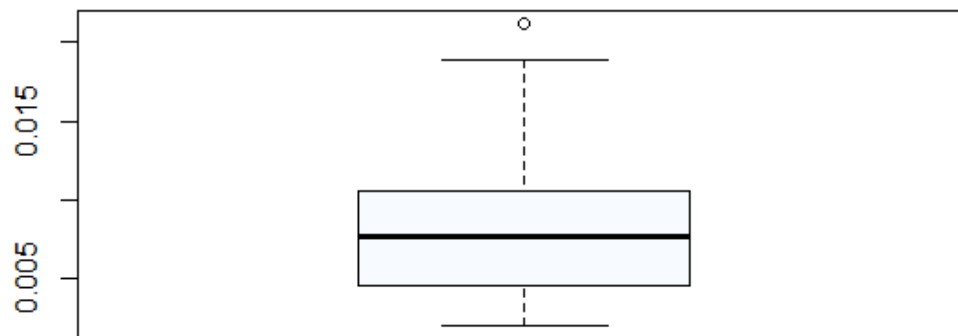


Figure 250

Moreover, the relationship between SJR and PageRank was examined. From the scatterplot, it is evident that these two measures do not have a linear relationship. There are a lot of journals that have high PageRank and really low SJR. For example, Journal of International Business Studies has SJR equals to 0.105 which relatively low and PageRank 0.02 which is the max PageRank. In the boxplot below, it is shown that the journals with the highest PageRank belong in the Q1, all the other quartiles have PageRank equal to 0.

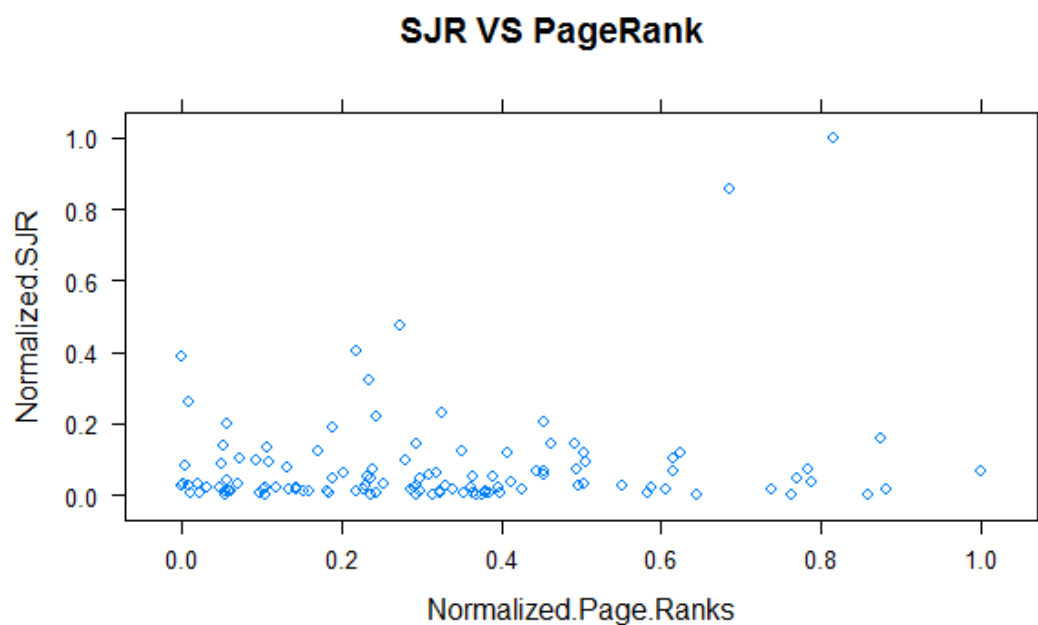


Figure 251

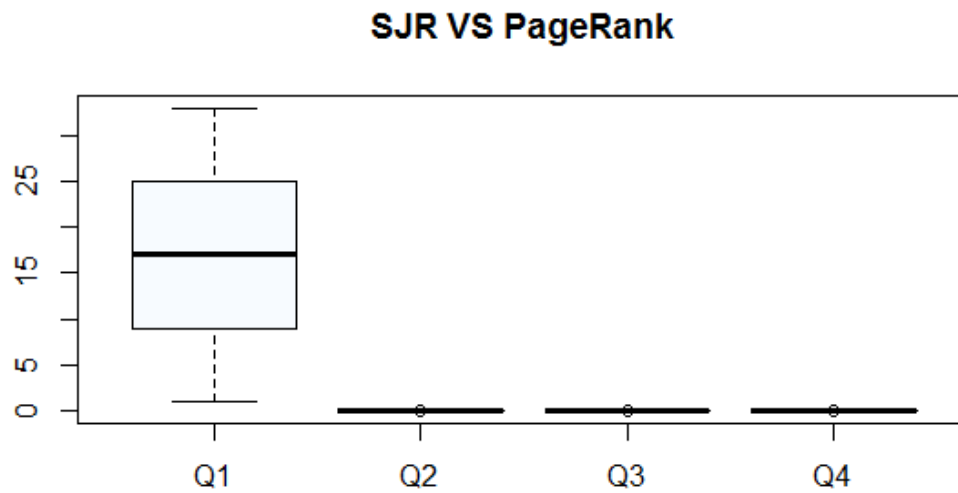


Figure 252

Furthermore, the same procedures were made in order to compare H-Index with Page Rank. Again, h-Index do not have a linear relationship with PageRank but it is a slightly different relationship than SJR with Page Rank had. There are still some extreme values but there are others which follow a linear relationship. From the boxplot, it is evident that again the journals that are in the Q2 in refer to H-Index have the highest PageRank after Q1 is following.

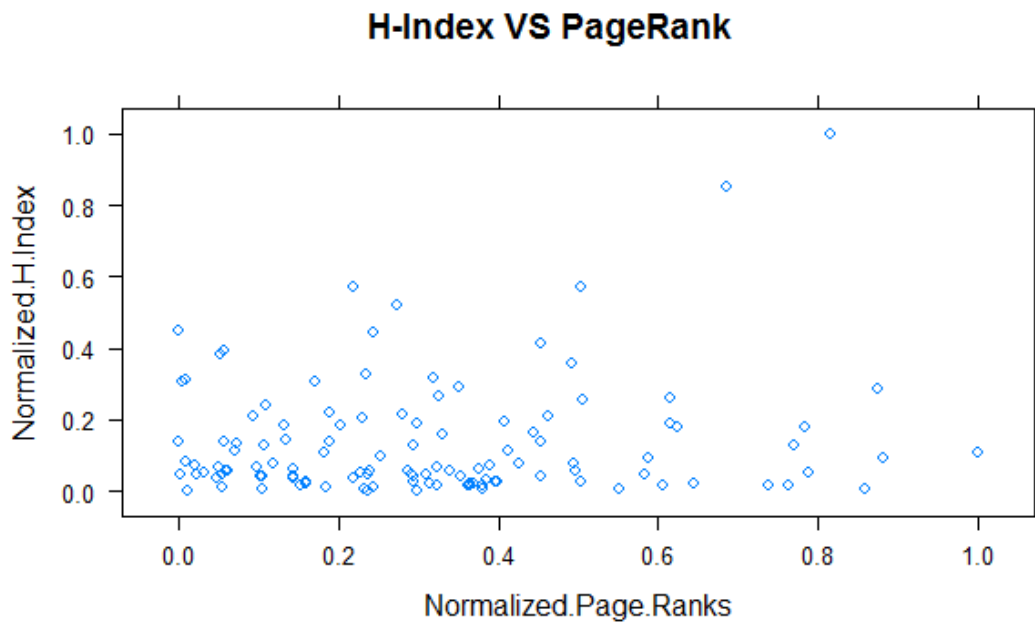


Figure 253

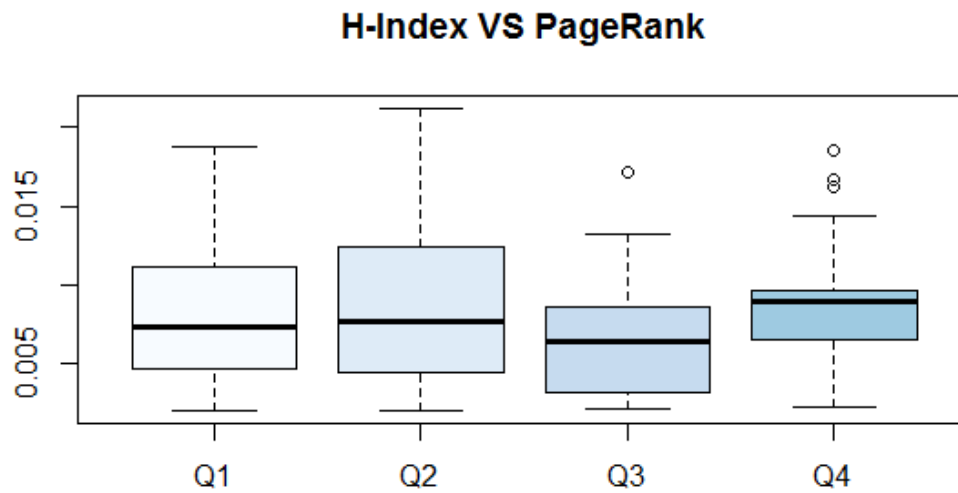


Figure 254

Degree and PageRank was compares as well. As with almost all the other centralities degree has a linear relationship with Page Rank. That is because PageRank and degree are almost the measures.

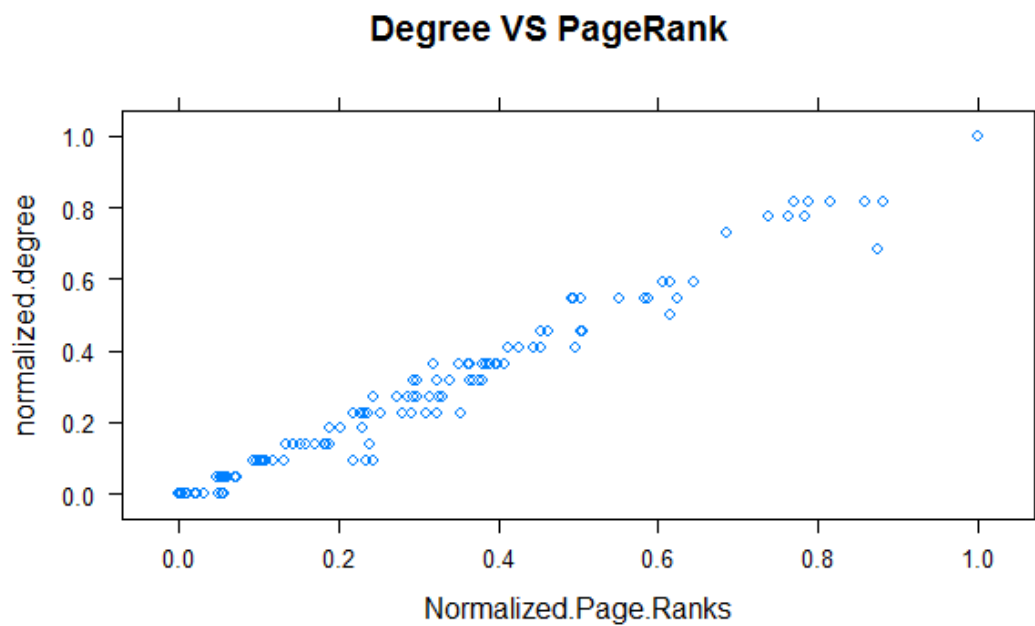


Figure 255

Modularity and PageRank relationship is shown below. The journals with the highest modularity belong in the group 3 and after comes group 4.

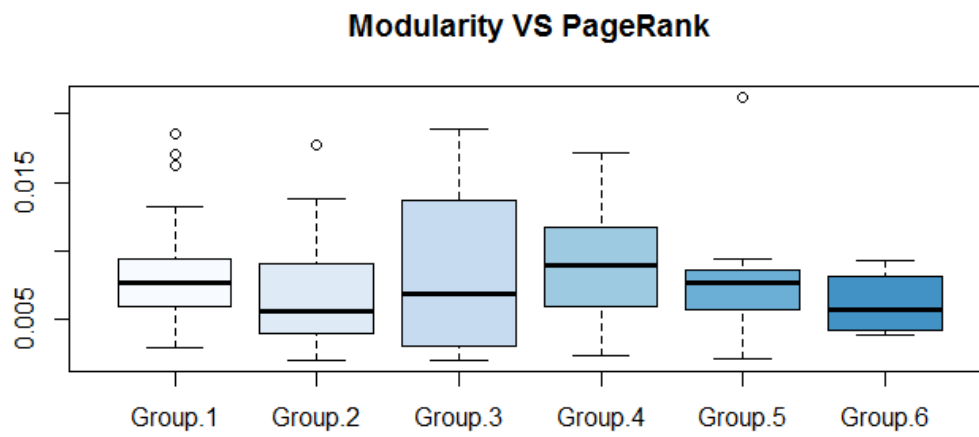


Figure 256

Additionally, triangles and PageRank relation is shown the scatterplot below. They do not have a linear relationship. The same is happening with clustering as it is shown in the image 114.

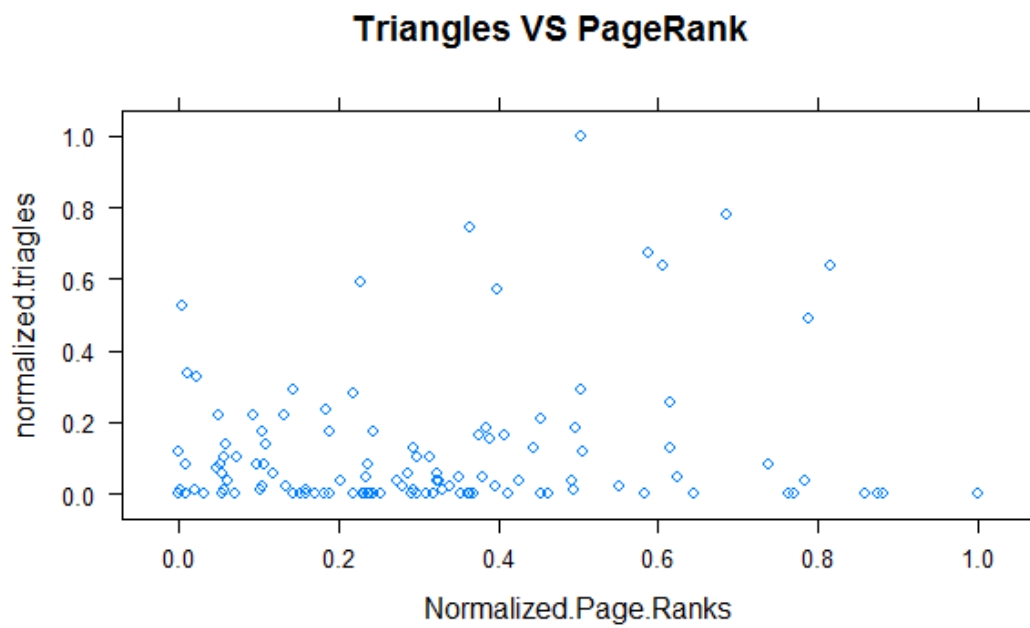


Figure 257

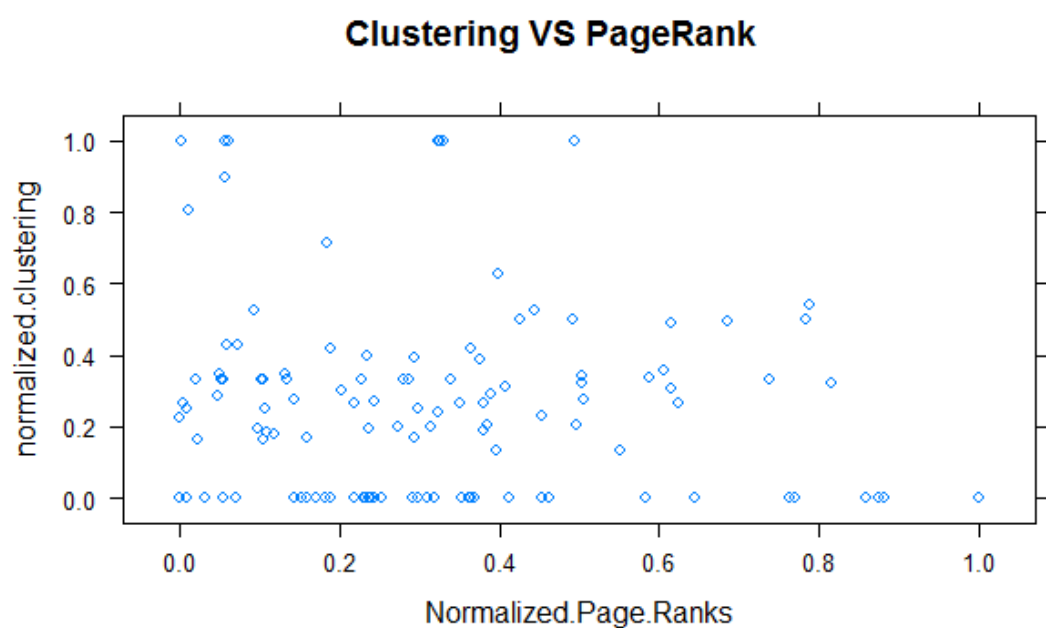


Figure 258

Finally, eccentricity as with all the other centralities do not a linear relationship with PageRank.

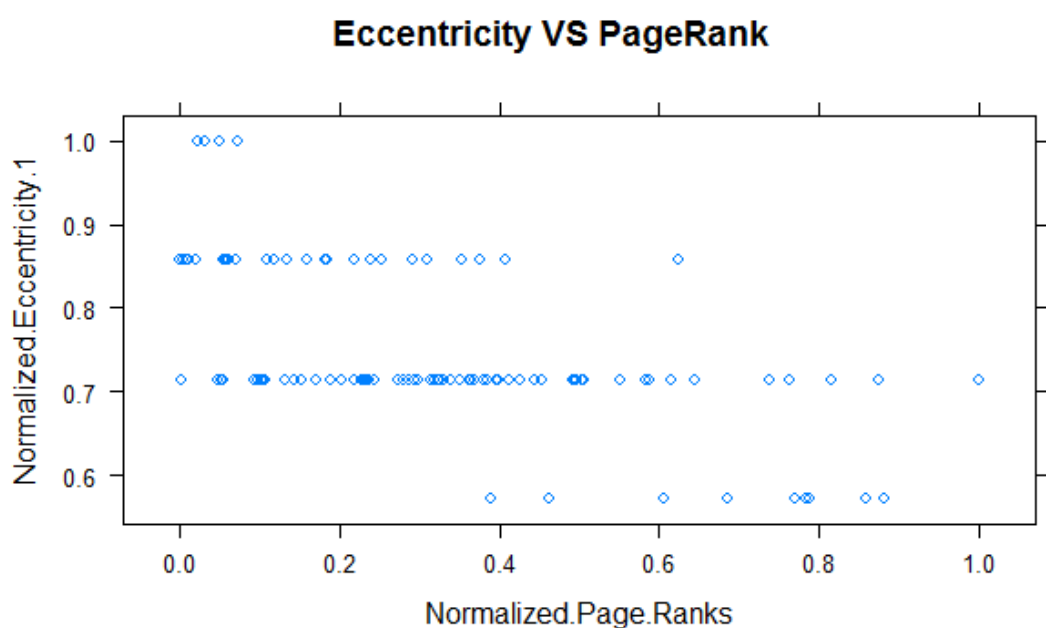


Figure 259

4.2.8.7 Comparisons between Centralities

In this section, all the centralities are going to be compared. For all the scatterplots below the normalized centralities are going to be used. Firstly, betweenness and closeness centrality were compared. From the scatterplot, it is obvious that they have a linear relationship. That is because betweenness centrality count the paths that pass through each journal and closeness centrality counts the average length between two journals. More specifically, closeness centrality is the sum of the lengths of closest paths between two journals. So, the journals that are going to have high betweenness centrality are going to have a high closeness centrality as well. In our scatterplot, the majority of data have really small closeness and betweenness centrality.

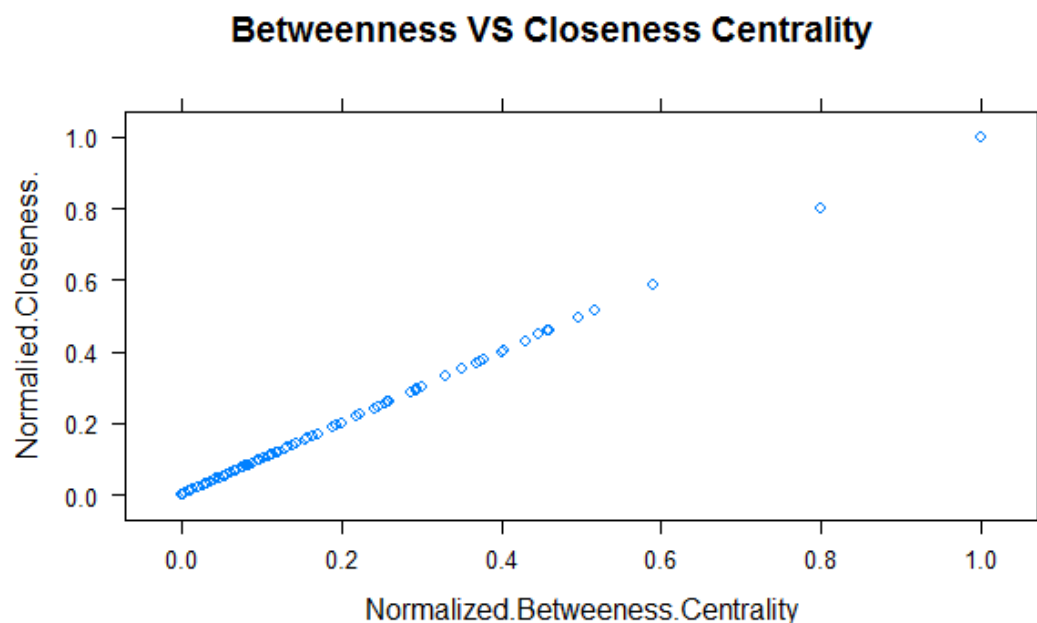


Figure 260

Furthermore, betweenness centrality and harmonic closeness centrality were compared. It is evident that they do not have a linear relationship. That is because harmonic closeness centrality counts the sum of mutual closest paths between two journals. On the other hand, betweenness centrality do not care if the path that cross each journal is mutual or not. For that reason, the scatterplot has a lot of journals that have high harmonic closeness centrality and low betweenness centrality.

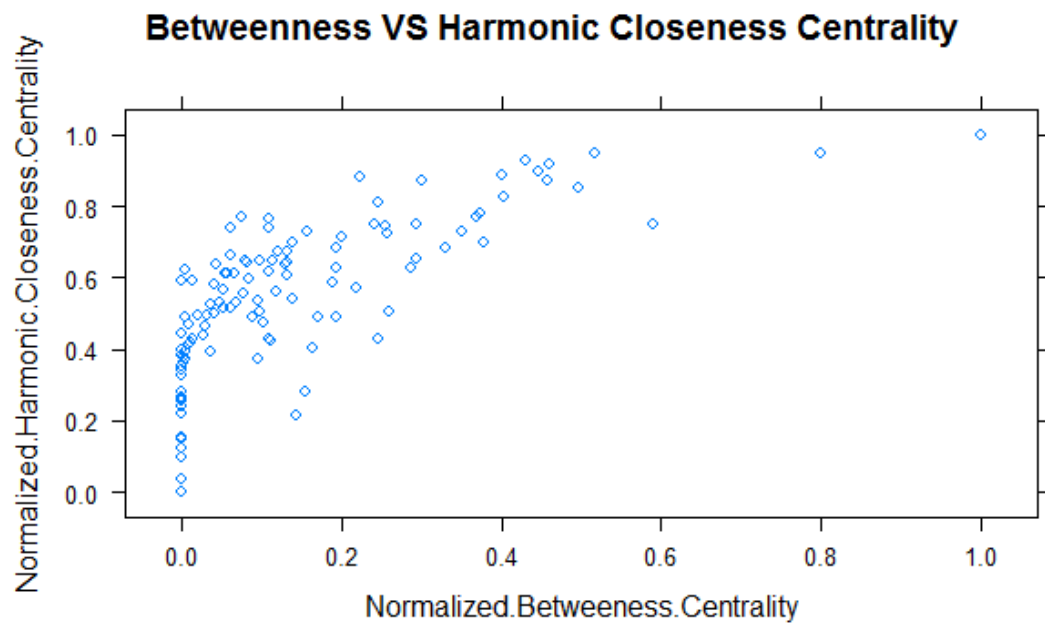


Figure 261

Moreover, betweenness centrality was compared with eigenvector centrality. They do not have a linear relationship as well. This scatterplot is almost identical with the scatterplot of harmonic closeness with betweenness centrality. There are a lot of journals that have high eigenvector centrality and low betweenness centrality. That is because eigenvector centrality gives a score to a journal based on the score of his neighbors.

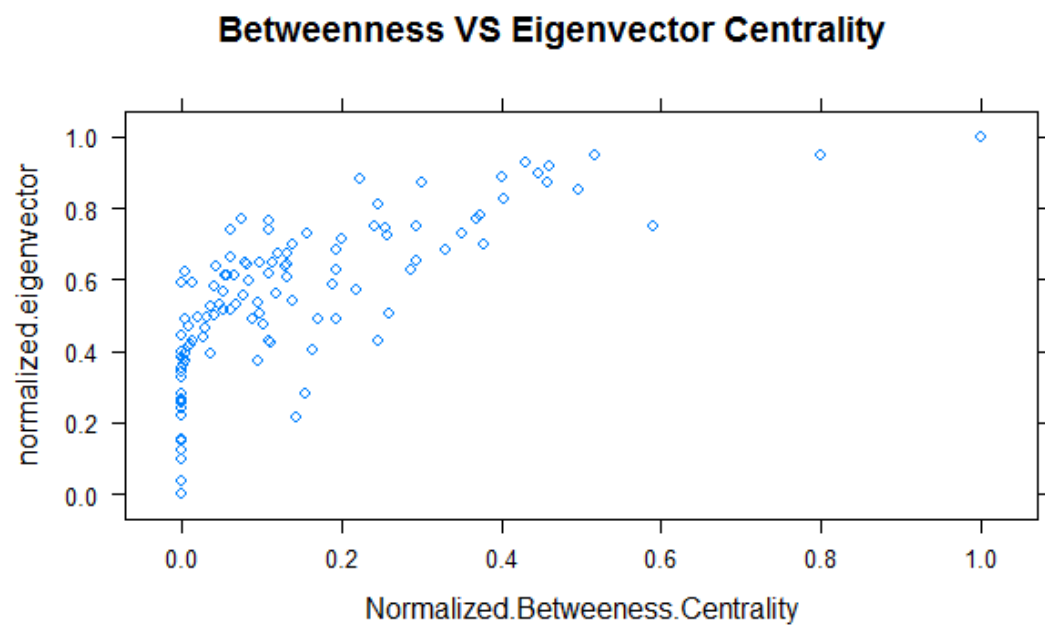


Figure 262

Betweenness centrality with hubs and authority were also compared. As it was expected they do not have a linear relationship. There are a lot of journals that have really high authority and betweenness centrality equals to 0. That is because hub or authority do not count the paths that

cross a journal. Authority counts the value of each page and hub counts the value of the links that a page may have.

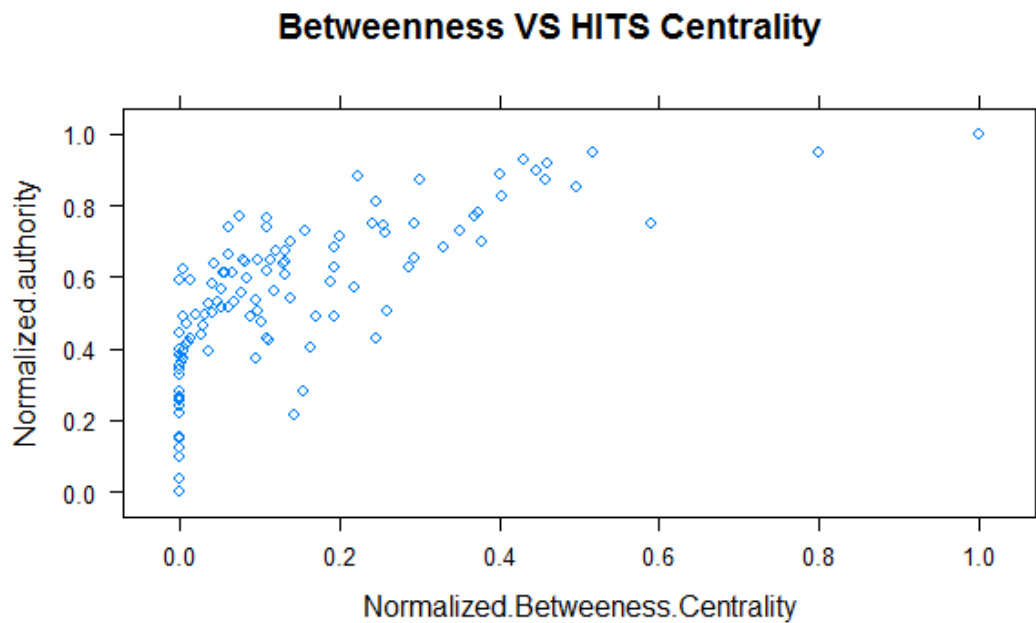


Figure 263

Finally, betweenness centrality was compared with PageRank. They do not have a linear relationship as it was expected because betweenness centrality does not have a linear relationship with degree. PageRank and degree are almost the same and they count the importance of a journal.

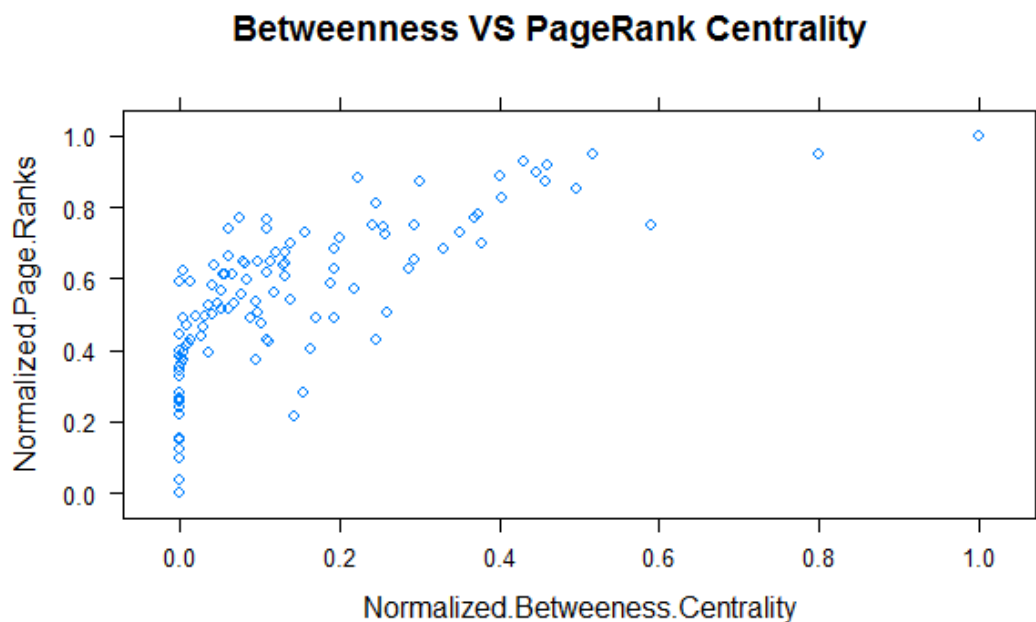


Figure 264

Furthermore, the same procedures were made in order to compare closeness centrality to all the remaining centralities. Firstly, closeness with harmonic closeness centrality were compared. As

it is shown in the scatterplot below there are lot of journals that have closeness centrality equals to zero and really high harmonic closeness centrality. That is because harmonic closeness centrality counts the sum of mutual connections and closeness centrality do not take into consideration if a journal was mutual connections.

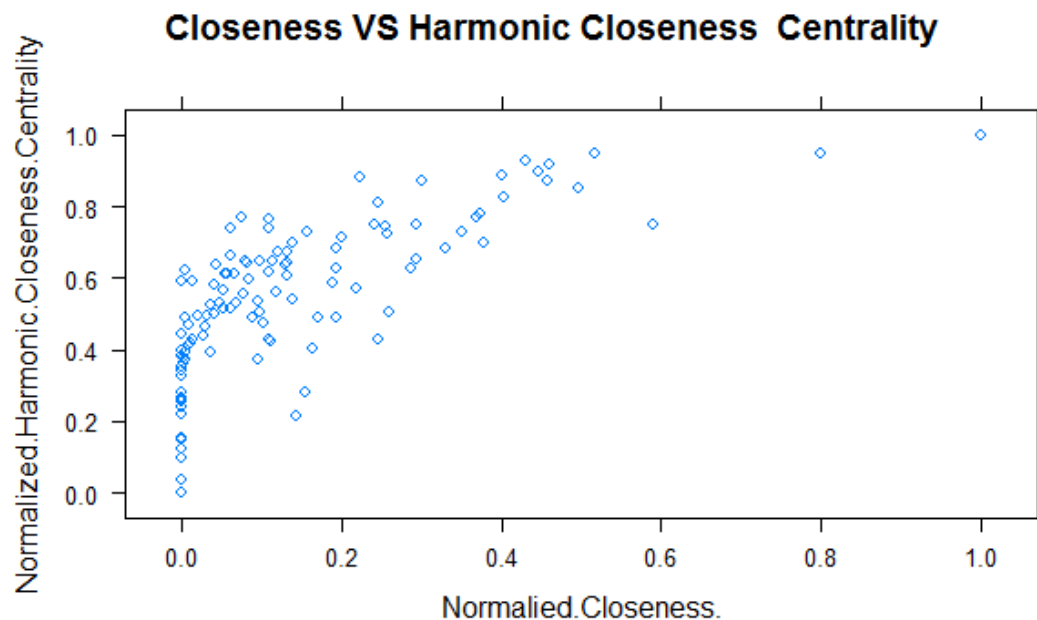


Figure 265

The same pattern is observed in the comparison of all the remaining centralities with closeness centrality. There are a lot of journals which have closeness centrality equals to zero and really high eigenvector, HITS or PageRank centrality. So, none of these centralities have a linear relationship with closeness centrality. The only centrality that has a linear relationship with closeness centrality is the betweenness centrality as it was examined in the image 116. That is happening because none of the other centralities count paths. The only other centrality that counts paths is betweenness centrality.

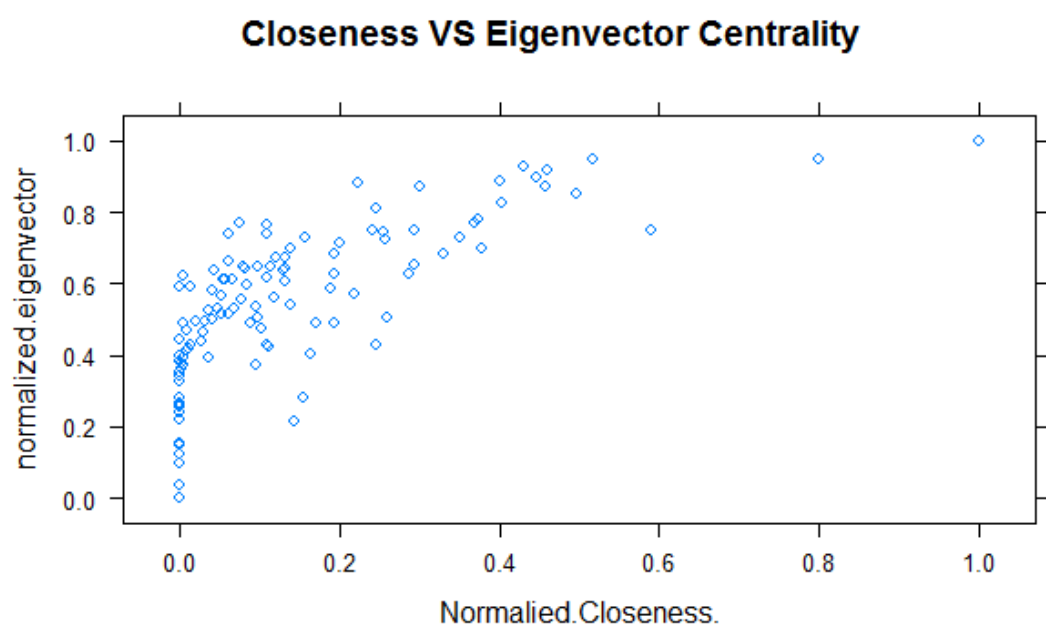


Figure 266

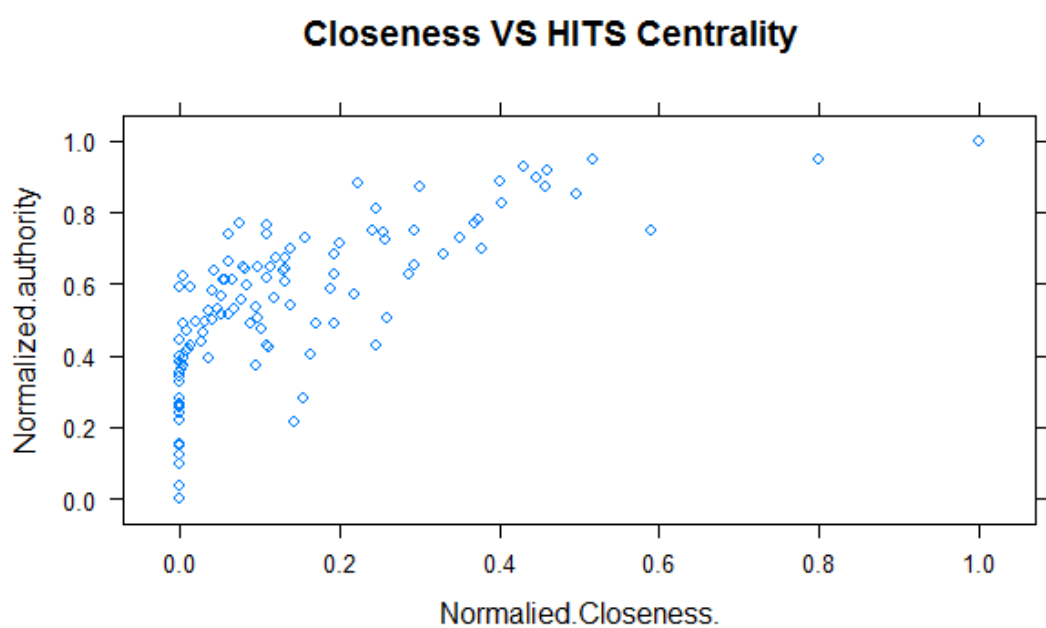


Figure 267

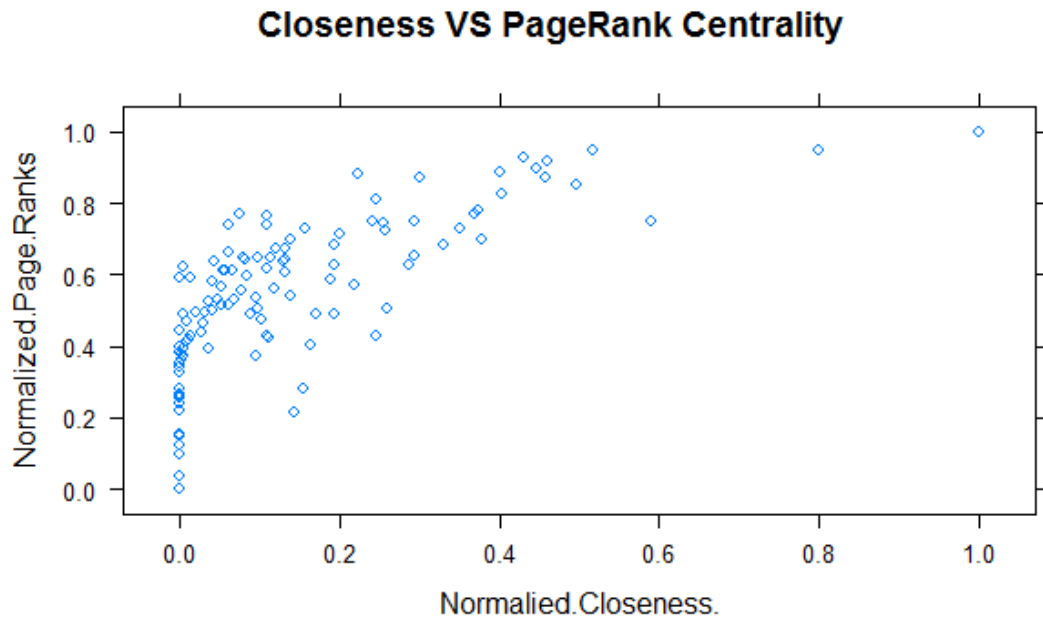


Figure 268

Likewise, harmonic closeness centrality was compared with the remaining centralities as well. Harmonic closeness centrality on the contrary with closeness centrality has a linear relationship with eigenvector, HITS and PageRank centralities. Eigenvector centrality has a linear relationship with harmonic closeness centrality because both of them care of the rank of their closeness neighbors. Harmonic closeness centrality also had a linear relationship with degree so that is why it has a linear relationship with PageRank. The scatterplots below show these relationships.

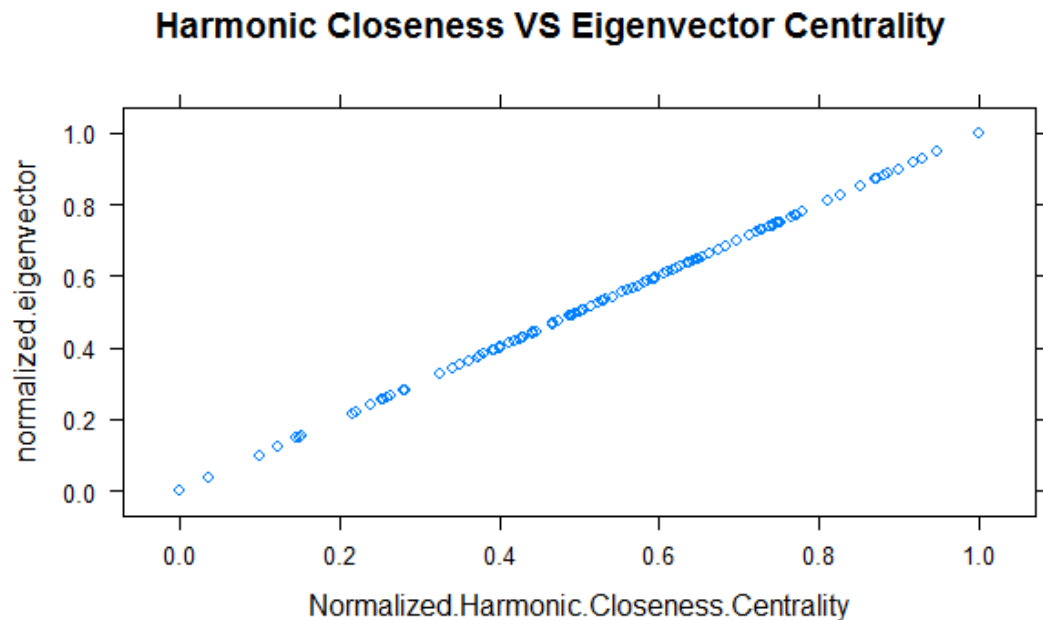


Figure 269

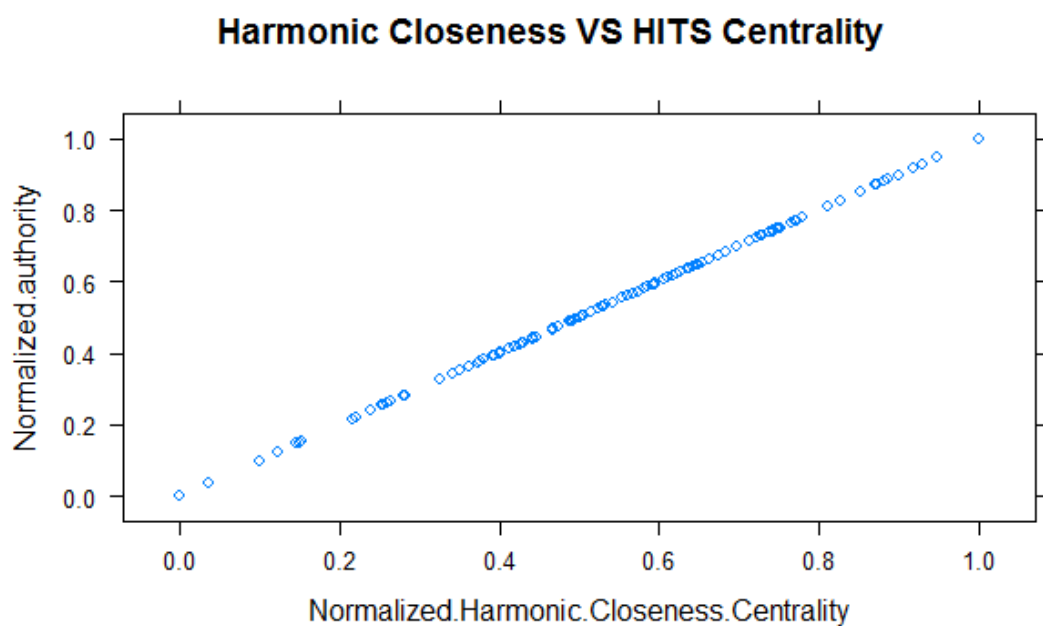


Figure 270

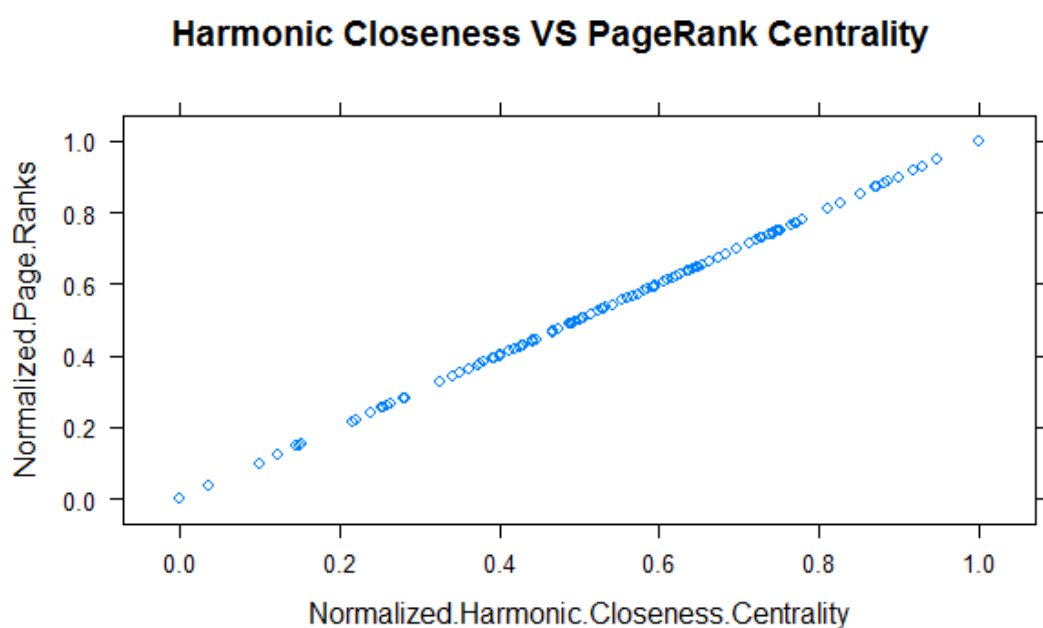


Figure 271

In this context, the relationship between eigenvector centrality with HITS and PageRank were examined. Eigenvector as it shown in the scatterplots below has a linear relationship with both HITS and PageRank. The linear relationship with Page Rank was not expected due to the fact that eigenvector centrality did not have a linear relationship with degree.

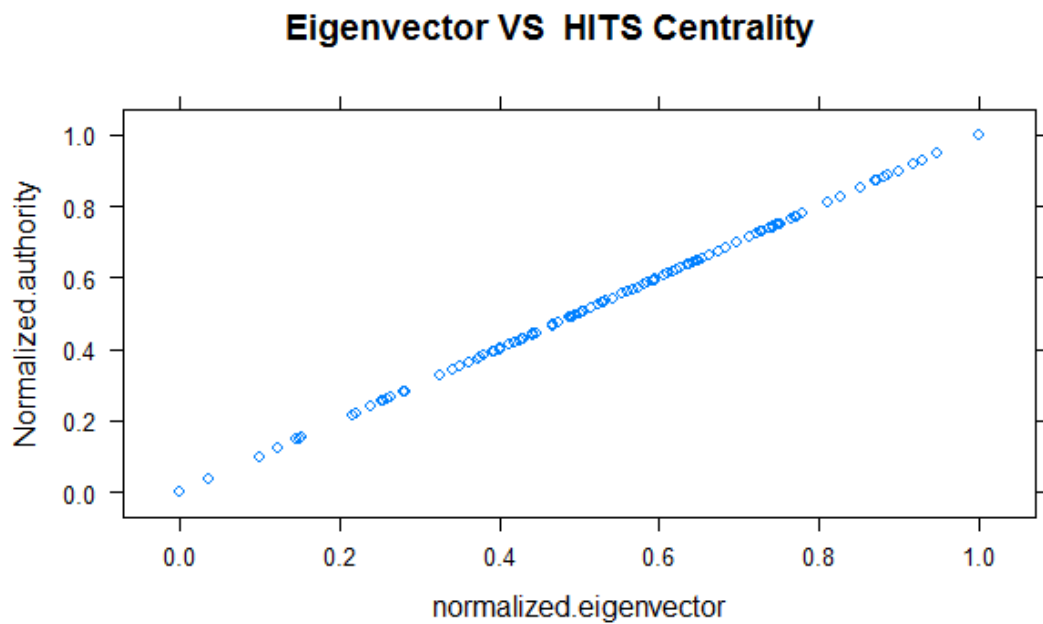


Figure 272

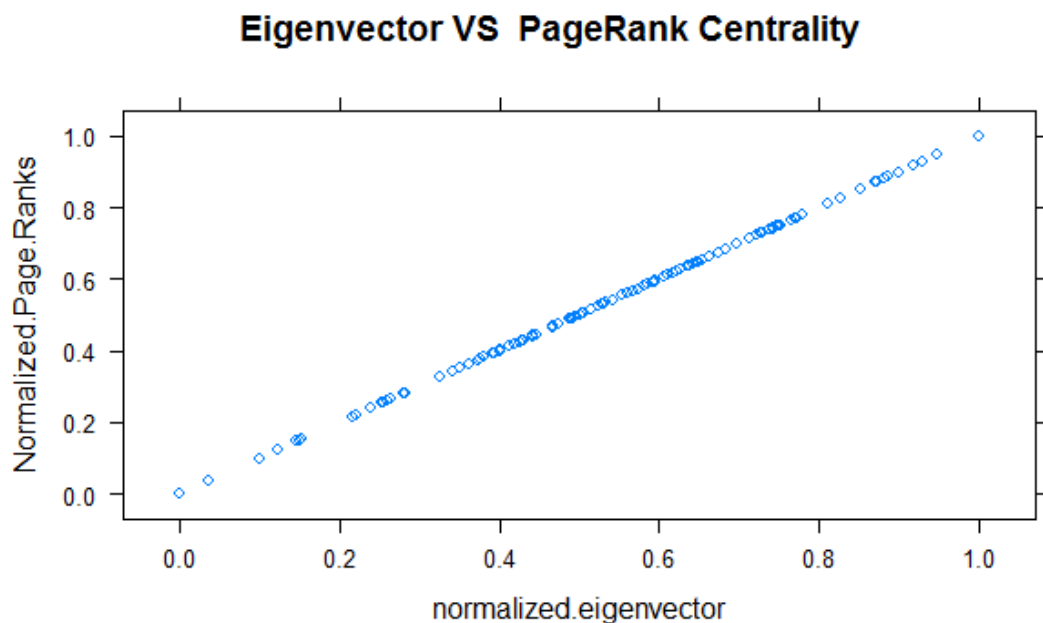


Figure 273

Finally, the last comparison that was made in this context was between HITS and PageRank. HITS and PageRank have a linear relationship. That was not expected because authority did not have a linear relationship with degree. Never the less, that is happening because PageRank computes a probability that is to be in this page after many clicks. That relates with hub which counts the value of links in other pages. So, if a journal has a lot of links in other pages it is relatively possible to be in the page of this journal after a lot of clicks.

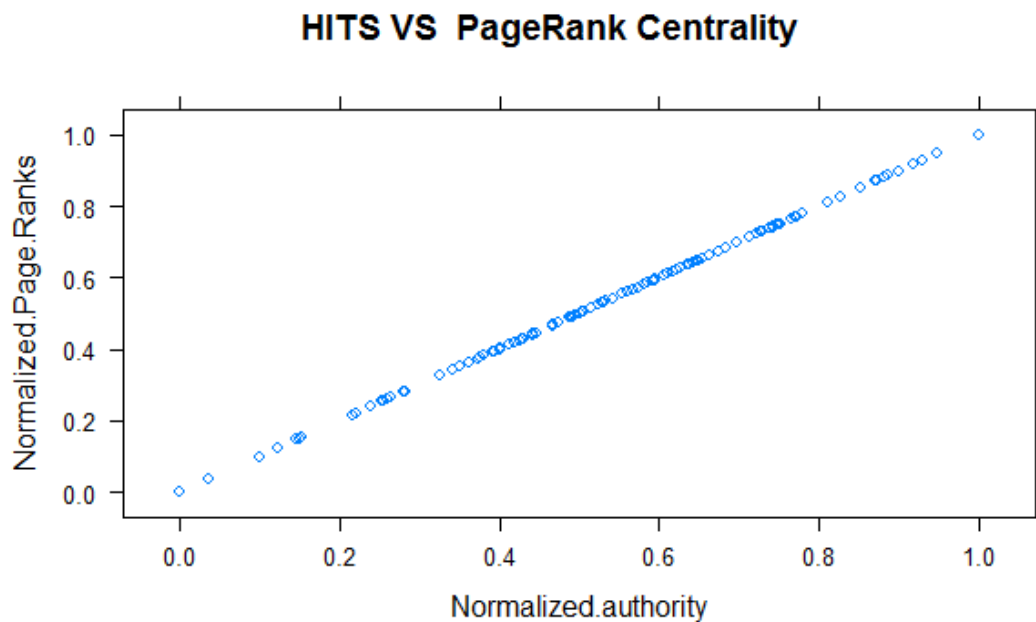


Figure 274

The conclusion to be drawn is that the centralities that affect one another are betweenness and closeness centrality, harmonic closeness and eigenvector centrality, harmonic closeness and HITS centrality, harmonic closeness and PageRank centrality, eigenvector and HITS, eigenvector and PageRank and finally HITS and PageRank.

4.3 Undirected- Weighted Network

Furthermore, the undirected-weighted network was inserted into Gephi in order to find the differences between the unweighted network and the weighted one. Weighted or valued networks can be represented by giving the elements of the adjacency matrix values equal to the weights of the corresponding connections. As we did in the unweighted one we convert the excel file into a csv file in order to insert it into Gephi. From the first side, we don't observe any significant change in the graph. Also, the edges are the same 434 as in the unweighted one. As it is reasonable the nodes in the weighted network remain 150. Moreover, the same measures that was calculated for the unweighted network was calculated for the weighted one too. From all those measures the only different measures are degree and modularity.

4.3.1 Degree

Vertex degrees are more complicated in weighted networks compared to the unweighted ones. Our network has an average degree of 5,787 which is the same as in the unweighted network but it also has an average weighted degree which is 12,2 which we didn't have in the unweighted network. Below, the weighted degree is going to be analyzed and more specifically the normalized weighted degree. The table shows the first ten journals sorted by weighted degree.

Title	weighted degree	Normalized Weighted Degree	Rank
Academy of Management Journal	127	1,00	1
Journal of Management Studies	123	0,97	2
Organization Studies	99	0,78	3
Academy of Management Review	85	0,67	4
Organization Science	68	0,54	5
Organization	57	0,45	6
Human Relations	53	0,42	7
Journal of International Business Studies	47	0,37	8
Knowledge Management	46	0,36	9
Journal of Knowledge Management	46	0,36	9

Table 14

From that we can come to the conclusion that in our case the degree is the same as in the unweighted network but the weighted degree is something we didn't have in the unweighted network. Also, the degree equals to 0 means that those journals didn't have any member of their editorial board in any other journal and they don't belong in the central component. So, that journals are isolated. Furthermore, the frequency diagram of weighted degree is shown below. It is obvious that the majority of our journals have weighted degree between 0 and 5. All the analysis is referred only to the journals that belong in the central component.

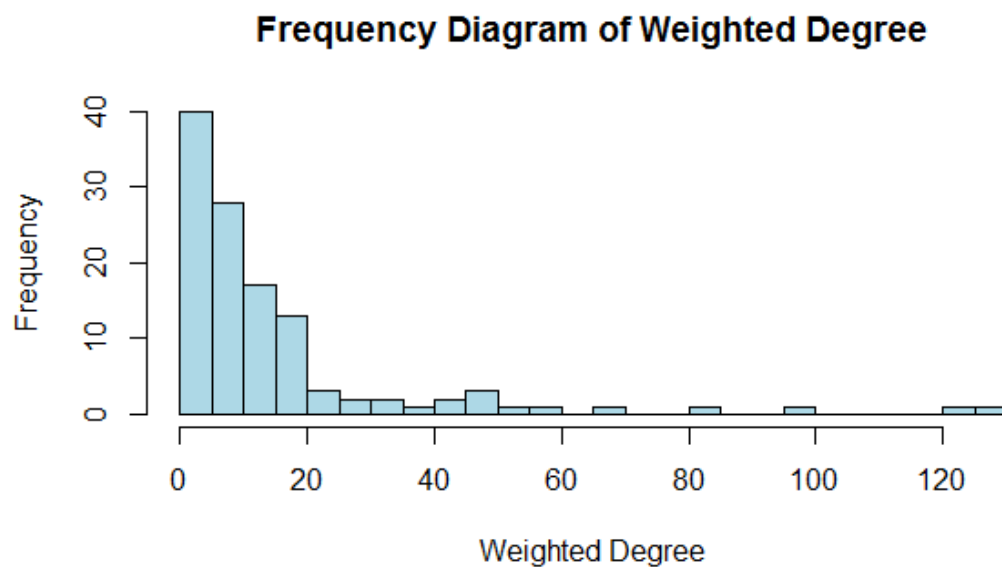


Figure 275

Further, the boxplot with the weighted degree is shown below. The outlier of the boxplot below are the Academy of Management Journal, Academy of Management Review, Organization Science, Production and Operations Management, Organization, International Journal of Human Resource Management, Journal of Management Studies, Knowledge Management, Journal of Knowledge Management, Organization Studies, Human Relations and Journal of International Business Studies.

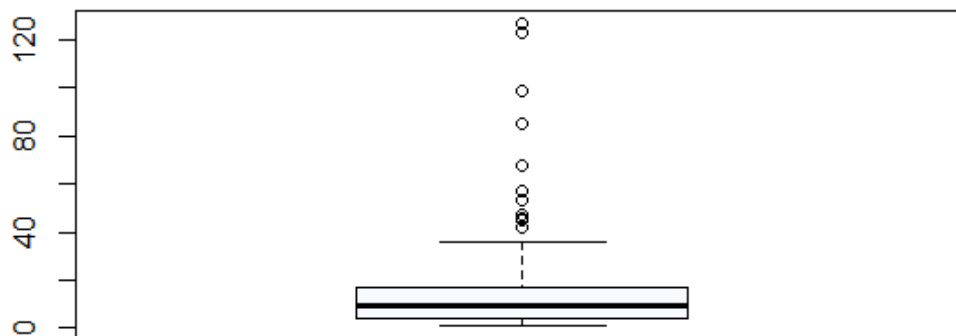


Figure 276

Furthermore, below the comparison between weighted degree and SJR is shown. It is evident that SJR do not have a relationship with weighted degree. There are a lot of journals that have really high weighted degree and really low SJR. That was also the case between degree and SJR. Now, from the SJR Quartiles it can be observed that Q2 and Q3 have the journals with the highest weighted degrees. After comes Q1 and in the bottom, is Q4.

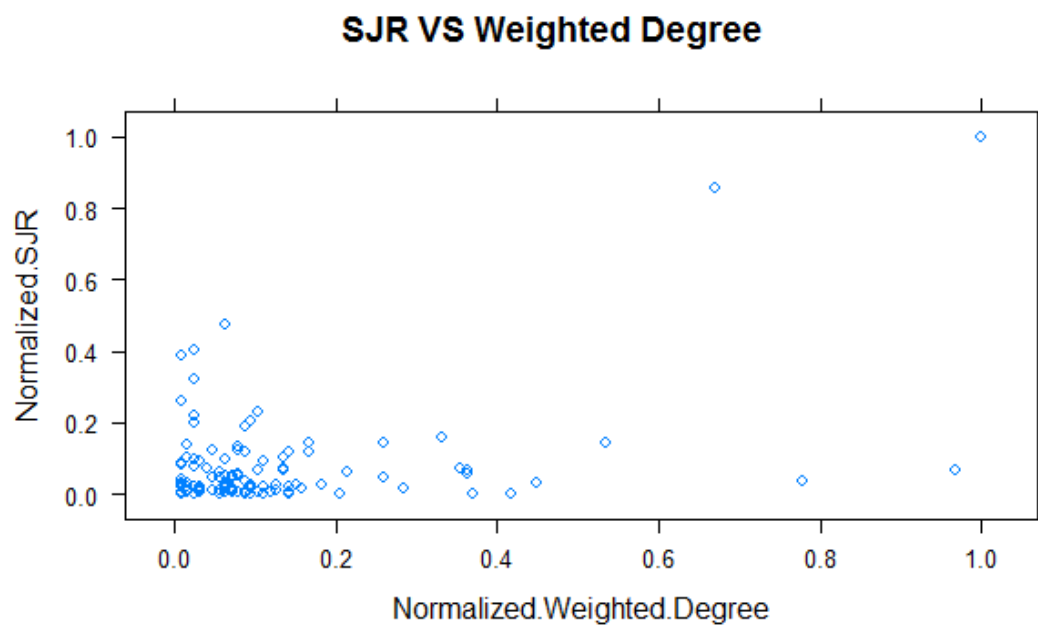


Figure 277

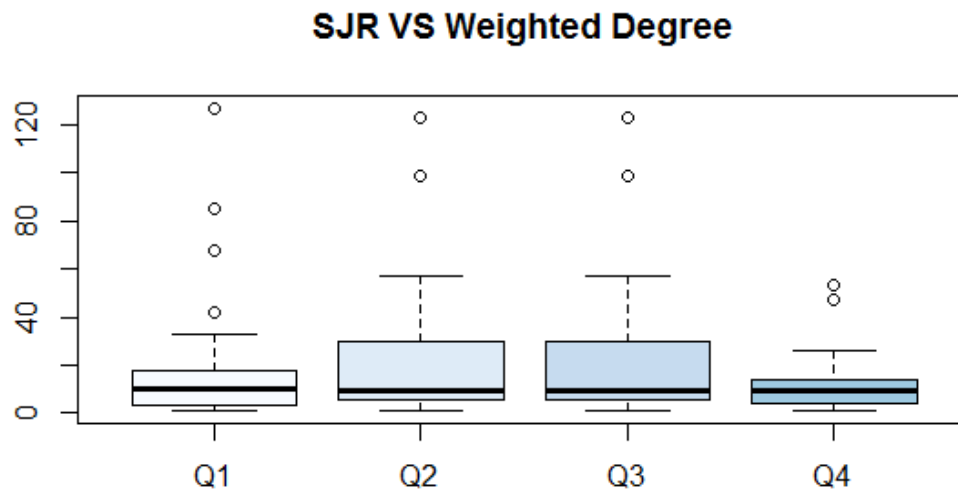


Figure 278

The same procedure was made for H-Index. H-Index does not have a linear relationship with weighted degree as well. Compared with the relationship that SJR with weighted degree had it is obvious that there is a better distribution in H-Index. Likewise, with above there are some journals that have really high weighted degree and H-Index equals to zero. That was expected because neither degree had a linear relationship with H-Index. Never the less, weighted degree may not have a linear relationship with H-Index but it has a better relationship that H-Index with degree had. Quartile wise, Q1 and Q2 have the journals with the highest weighted degree after comes Q4 and at the bottom is Q3.

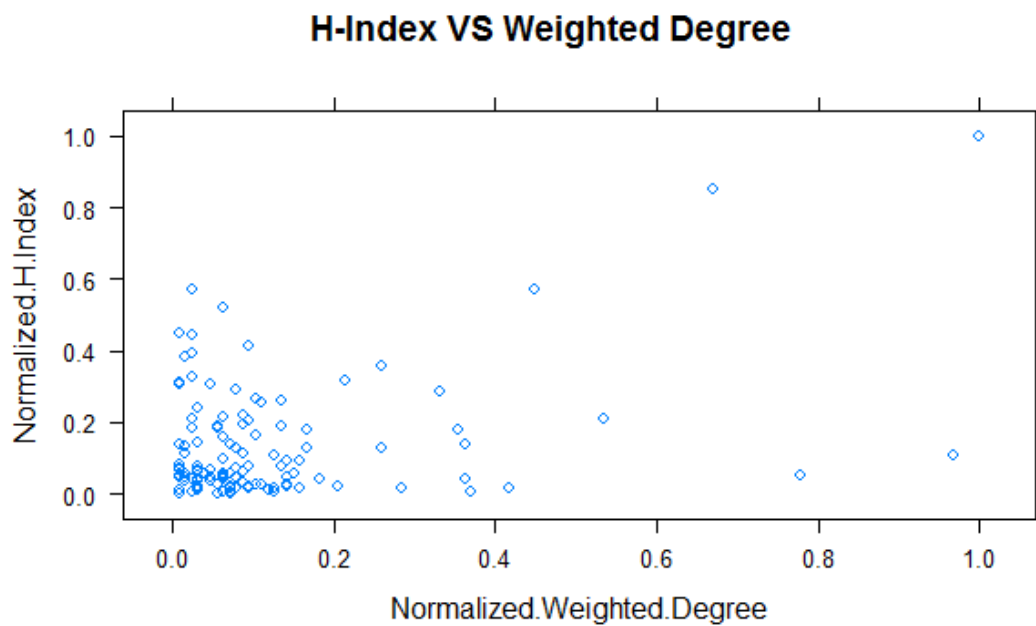


Figure 279

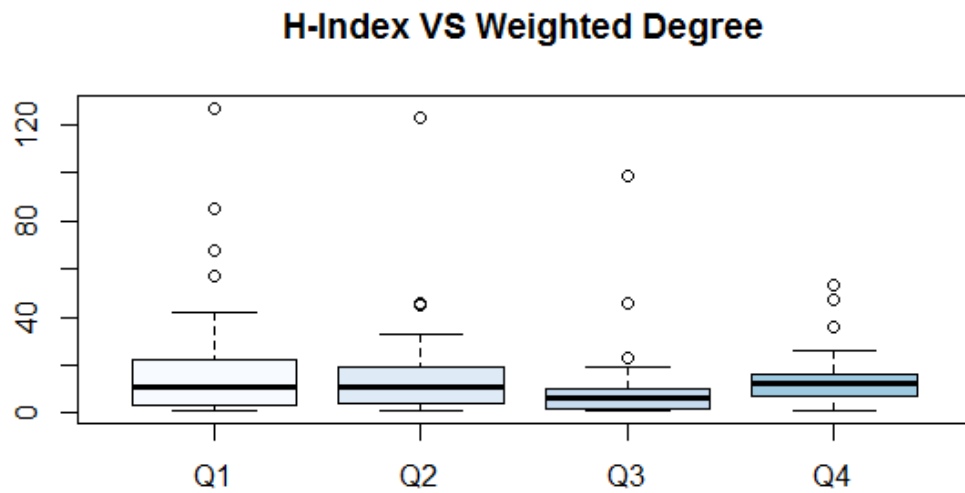


Figure 280

Since, degree was referred above what is the relationship between degree and weighted degree. The scatterplot below shows that they do not have a linear relationship. That is because there are a lot of journals that have low weighted degree and pretty high degree. Some other journals on the other hand follow a linear relationship.

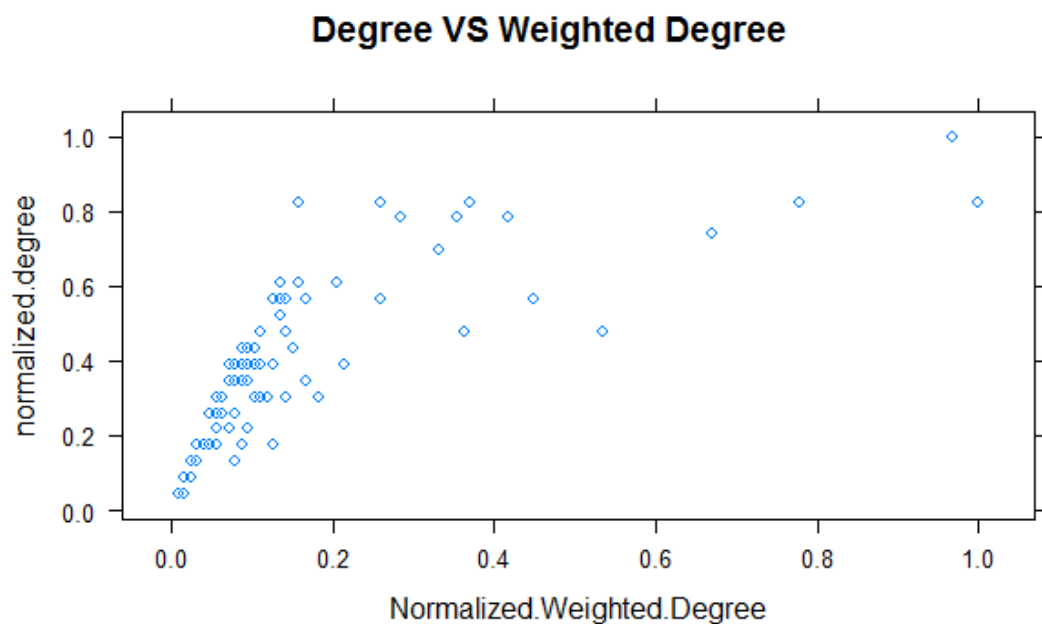


Figure 281

Following, the relationship between modularity and weighted degree was examined. Group 1 has the journals with the highest weighted degree on the contrary group 6 had the journals with the highest degree. Following, group 1 is group 4 and 5.

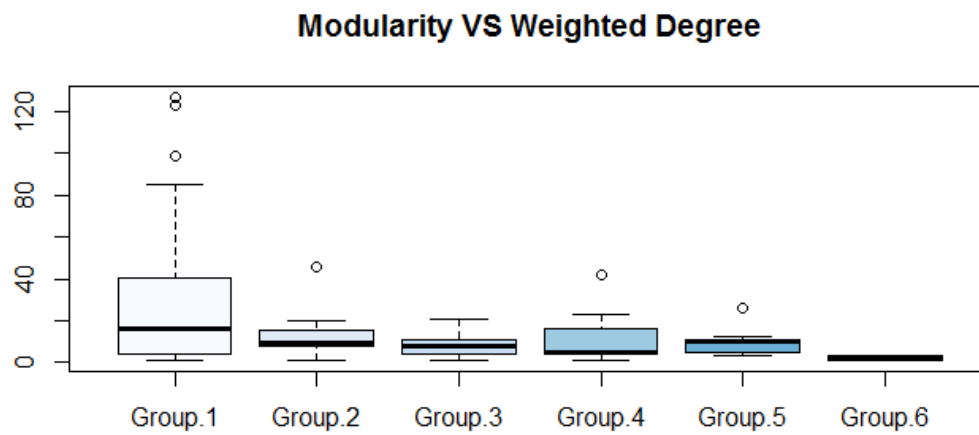


Figure 282

Additionally, the relationship between triangles and clustering was examined. In the scatterplot, it is evident that the majority of our data are gathered in the lower left side. So, the majority of our journals have really low number of triangles and really low weighted degree. Nevertheless, triangles and weighted degree do not have a linear relationship.

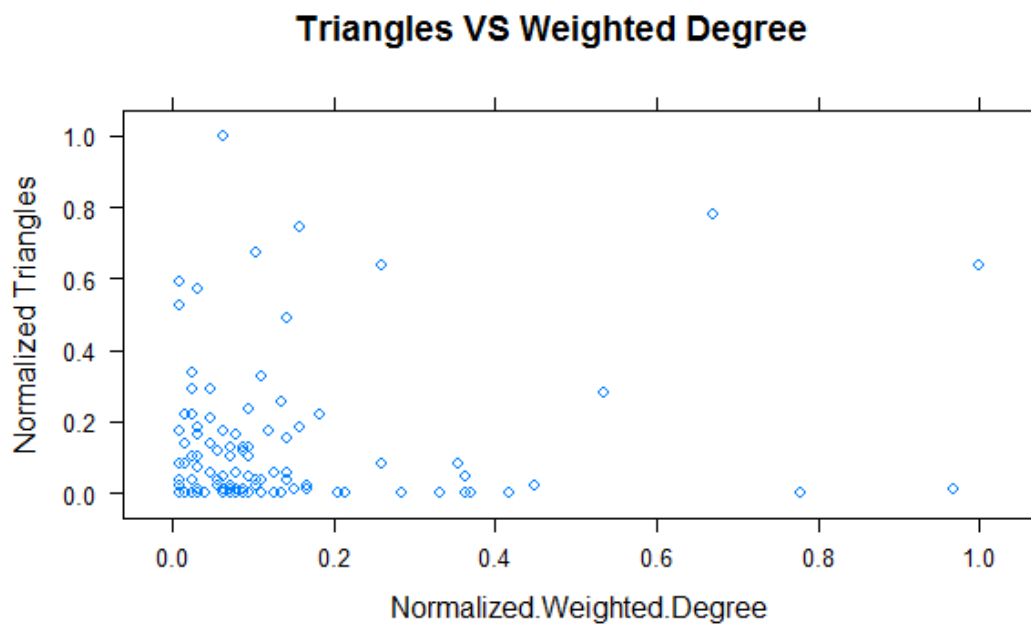


Figure 283

Furthermore, the relationship between clustering and weighted degree is shown in the scatterplot below. They do not have a linear relationship as well. There are a lot of journals that have really low clustering and really low weighted degree but there are also others that have really low weighted degree and really high clustering.

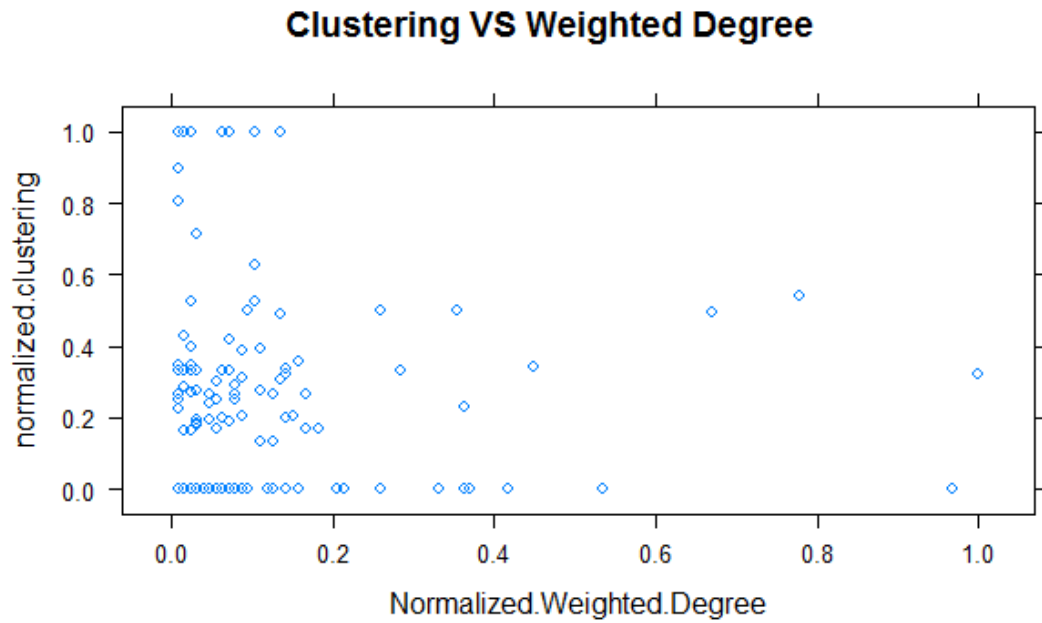


Figure 284

Finally, eccentricity was compared with weighted degree. As it was expected they do not have a linear relationship since eccentricity do not have a linear relationship with any of the measures that we have examined.

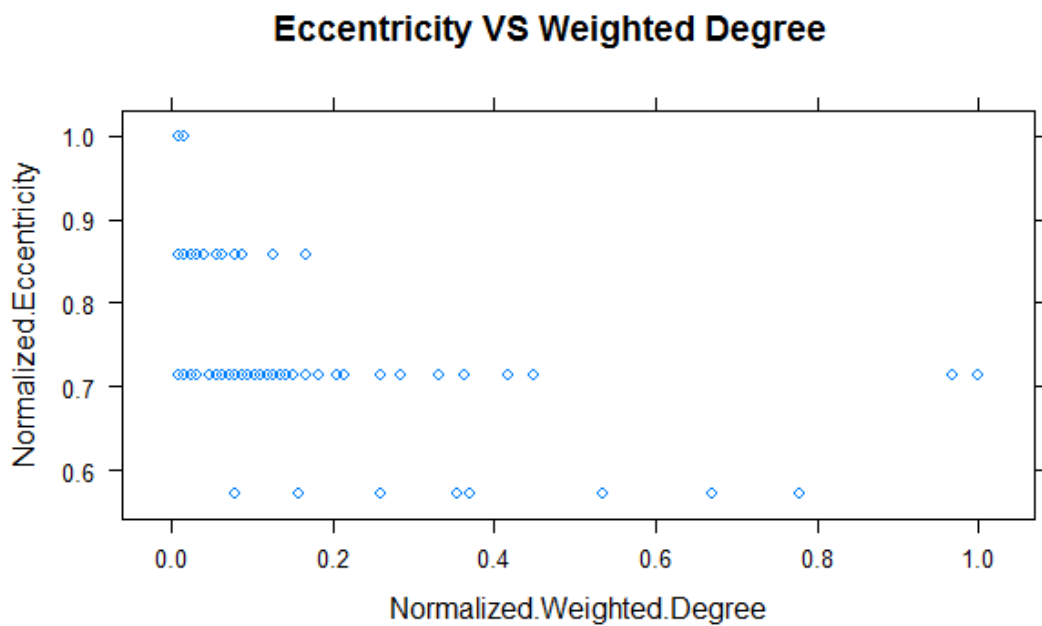


Figure 285

Moreover, weighted degree was compared with all the centralities as well. Firstly, betweenness centrality and weighted degree was examined. In the scatterplot, it is evident that they do not have a linear relationship. Still, there are a lot of journals that have really low betweenness centrality and really low weighted degree.

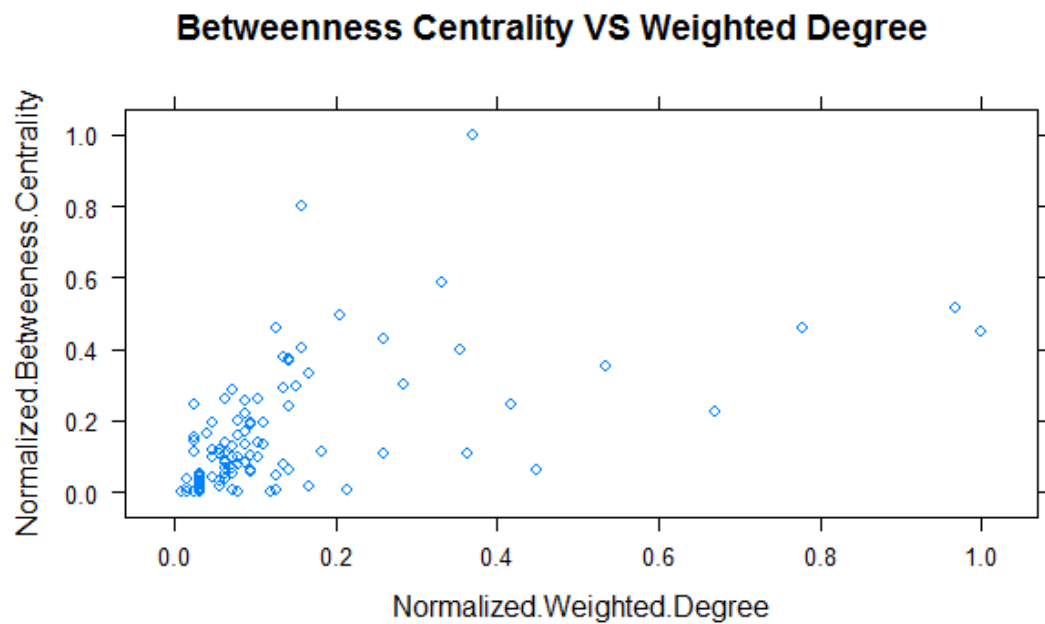


Figure 286

Secondly, closeness centrality and weighted degree was examined. They do not have a linear relationship either. In this case, the majority of our journals have high closeness centrality and really low almost zero weighted degree.

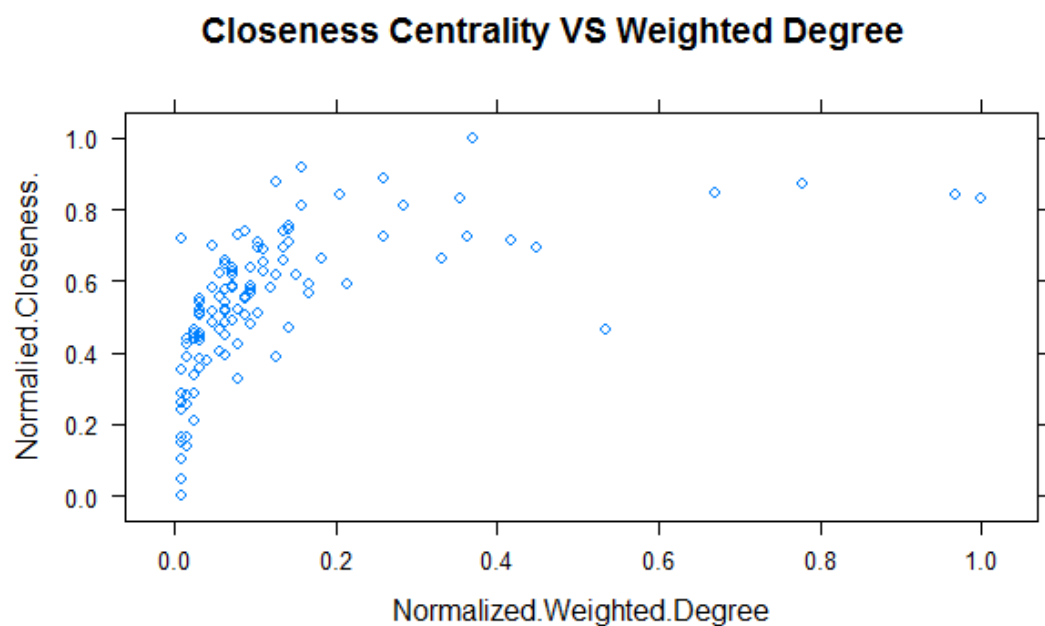


Figure 287

Thirdly, the relationship between harmonic closeness centrality and weighted degree is shown below. The scatterplot is almost identical with the one in the comparison with closeness centrality. From that it is obvious that they do not have a linear relationship.

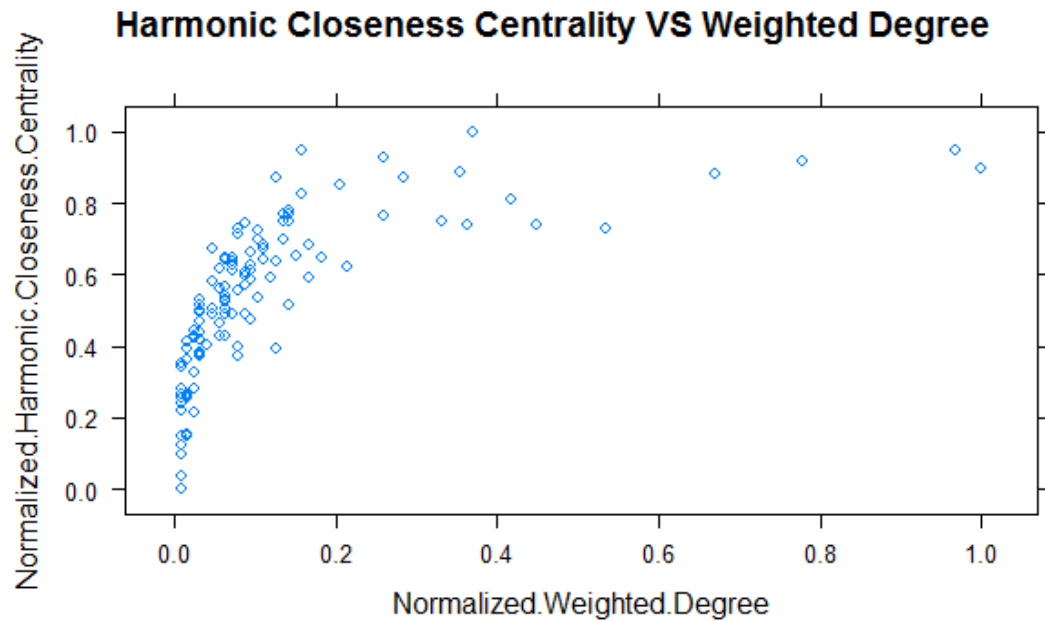


Figure 288

Furthermore, a scatterplot which shows the relation between eigenvector centrality and weighted degree was constructed. Again, as with betweenness centrality we have a lot of journals that have eigenvector centrality almost equal to zero and weighted degree really low as well. There is a tendency to a linear relationship but it is not quit.

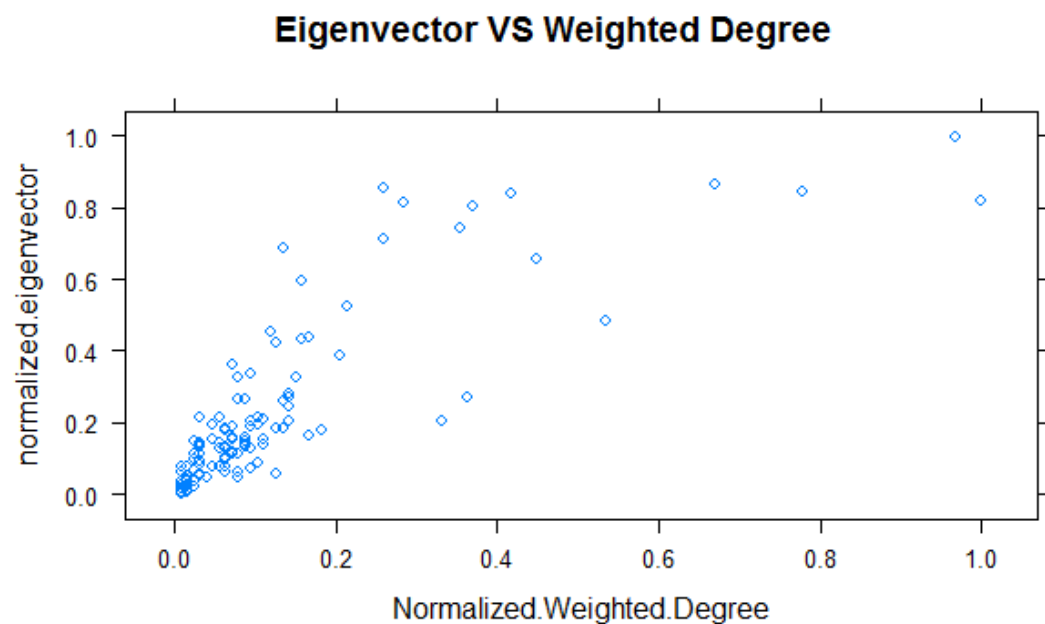


Figure 289

HITS and weighted degree on the other hand, do not any relationship. There are a lot of journals that have really high authority and weighted degree zero. For example, Journal of Product and Brand Management has the highest authority and weighted degree just 0.02.

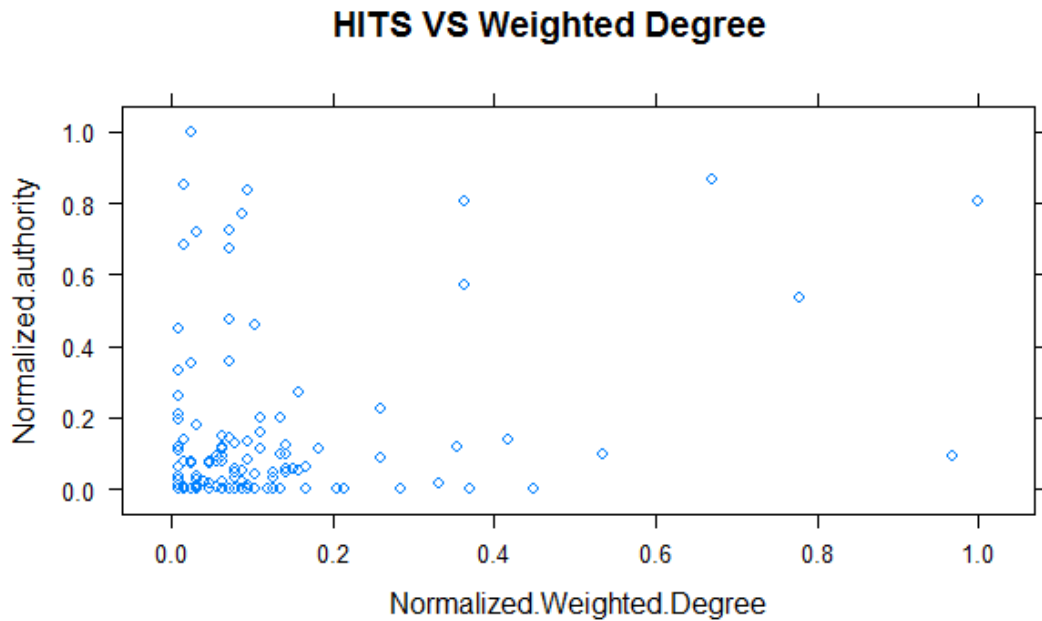


Figure 290

Finally, for the centralities, the relationship between PageRank and weighted degree was examined. There is a tendency for a linear relationship but it is not quit. That is because there a lot of journals in the middle that have high PageRank and low weighted degree. Also, there are a lot of journals that have weighted degree almost zero and PageRank equals to zero as well.

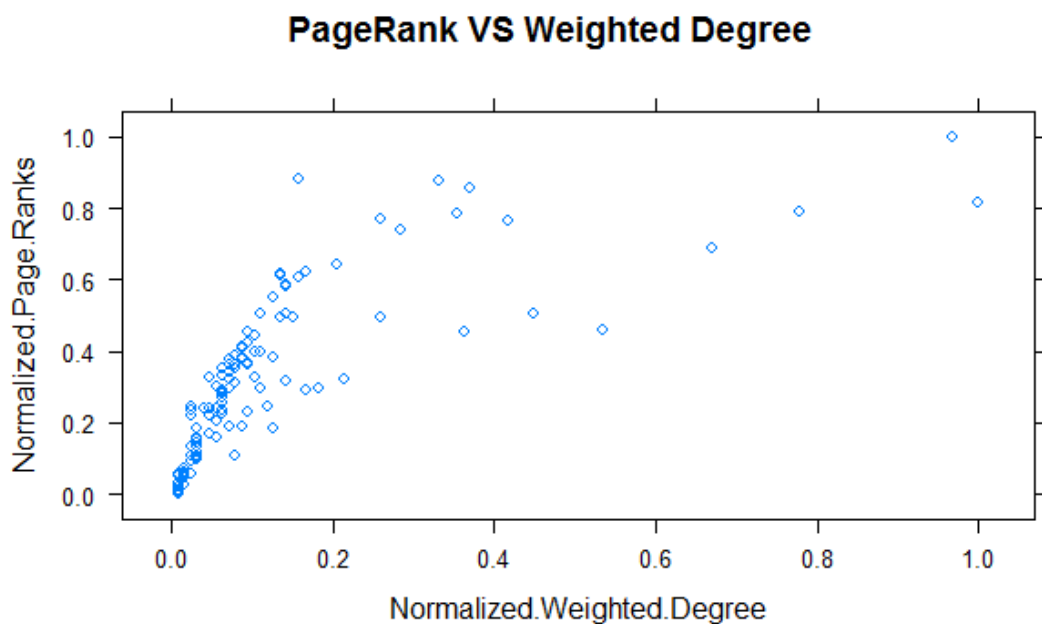


Figure 291

4.3.2 Modularity

The same procedures as in the unweighted network were made for the weighted. Modularity, in general, is how far away are our journals to be disconnected. If I start removing some edges how many journals would still be connected. The modularity of our diagram is 0,536 and the

number of communities are 38 which are more than in the unweighted case. In the weighted case also, there are 6 groups formed and another group of the two journals that were connected to each other.

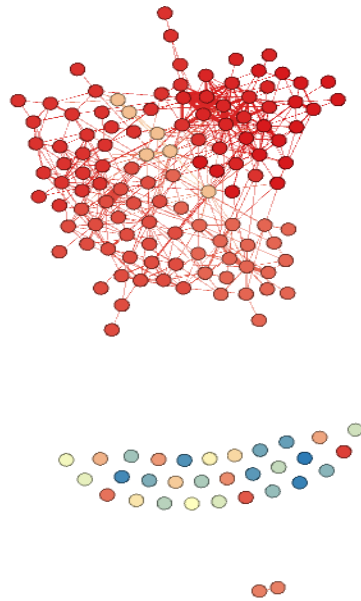


Image 17 (Weighted Modularity)

Below, the groups that have been formed are listed except from the group with the two journals.

Group 1	Creative Industries Journal
Academy of Management Journal	Creativity and Innovation Management
Academy of Management Review	Economics of Innovation and New Technology
Human Relations	Electricity Journal
International Journal of Conflict Management	Industry and Innovation
International Journal of Selection and Assessment	Innovation: Management, Policy and Practice
International Journal of Work Innovation	International Journal of Biotechnology
Journal of Management Inquiry	International Journal of Entrepreneurial Venturing
Journal of Management Studies	International Journal of Entrepreneurship and Innovation Management
Journal of Organizational Change Management	International Journal of Foresight and Innovation Policy
Management Learning	International Journal of Innovation Management
New Technology, Work and Employment	International Journal of Product Development
Organization	International Journal of Project Management
Organization Science	International Journal of Technological Learning, Innovation and Development
Organization Studies	International Journal of Technology Intelligence and Planning
Organizational Research Methods	International Journal of Technology Management and Sustainable Development
Group 2	Journal of Direct, Data and Digital Marketing Practice
British Journal of Industrial Relations	Journal of Economics and Management Strategy
British Journal of Management	Journal of High Technology Management Research
Economic and Industrial Democracy	Journal of International Business Studies
European Journal of Industrial Relations	Journal of Product and Brand Management
Human Resource Management	Journal of Product Innovation Management
Industrial and Labor Relations Review	Journal of Technology Management and Innovation
Industrial Relations	Managerial and Decision Economics
International Journal of Human Resource Management	Project Management Journal
International Journal of Management Reviews	Quality Technology and Quantitative Management
International Journal of Manpower	R and D Management
International Labour Review	Research Policy
Journal of Human Resources	Research Technology Management
Journal of Labor Research	Review of Industrial Organization
Journal of Personal Selling and Sales Management	Team Performance Management
Service Industries Journal	Technological Forecasting and Social Change
Group 3	Technovation
Asian Journal of Technology Innovation	Group 4
Canadian Journal of Administrative Sciences	Corporate Governance

Intangible Capital	International Journal of Accounting and Information Management
International Journal of Business Innovation and Research	International Journal of Business Information Systems
International Journal of Intelligent Enterprise	International Journal of Electronic Finance
International Journal of Knowledge Management	International Journal of Enterprise Network Management
International Journal of Knowledge Management Studies	International Journal of Human Capital and Information Technology Profession
International Journal of Knowledge-Based Development	International Journal of Information and Decision Sciences
Journal of Knowledge Management	International Journal of Information System Modeling and Design
Journal of Textile and Apparel, Technology and Management	International Journal of Innovation and Learning
Knowledge and Process Management	International Journal of Innovation and Sustainable Development
Knowledge Management	International Journal of Innovation and Technology Management
Knowledge Management and E-Learning	International Journal of Operations and Production Management
Knowledge Management Research and Practice	International Journal of Operations and Quantitative Management
Group 5	International Journal of Physical Distribution and Logistics Management
European Journal of Innovation Management	International Journal of Services and Operations Management
International Entrepreneurship and Management Journal	International Journal of Services and Standards
International Journal of Entrepreneurship and Innovation	International Journal of Shipping and Transport Logistics
Journal of Business Venturing	International Transactions in Operational Research
Journal of Business Venturing Insights	Journal of Information Systems
Journal of Small Business Management	Journal of Management Control
Public Management Review	Journal of Science and Technology Policy Management
Public Personnel Management	Operational Research
Group 6	Operations Management Research
Asian Journal of Shipping and Logistics	Production and Operations Management
Baltic Journal of Management	Supply Chain Forum
Decision Sciences	System Dynamics Review
Electronic Commerce Research and Applications	
Electronic Markets	
Group Decision and Negotiation	
Interfaces	

Table 15

Those journals represent the 78,67% of the SCImajor list as it was in the unweighted case. In weighted case, 78 journals changed group that represents the 65,55% of the journals that are in the central component. In the same group in both cases from group 1 stayed 14 journals which is the 100%, from group 2 all the journals in the unweighted case were in other groups, from group 3, 10 journals were in both cases in group 3 which is the 37.04%. Finally, from group 4 all the journals changed, from group 5, 6 journals were in both case which represent the 75% and from group 6, 2 journals were in group 6 in both cases that represents 6.25% of group 6. From the 14 journals which are in group 2 in the weighted case in the unweighted case 12 were in group 1 and 2 were in group 4. From 27 journals in group 3, 8 were in group 5 and 2 in group 6 in the unweighted network. From 22 journals in group 4, 3 were in group 1, 13 were in group 2 and 6 were in group 3. From 8 journals that are in group 5, 1 were in group 3 and 1 were in group 4 in the unweighted network. Finally, from group 6, 10 journals were in group 2, 1 in group 3 and 19 were in group 4 in the unweighted network.

In addition, we examine by scatter plots the relationship between modularity class and SJR. It is obvious that the journals that are in the group 1 have higher SJR. Group 6 is second but with really low median that is happening because group 6 has the most journals.

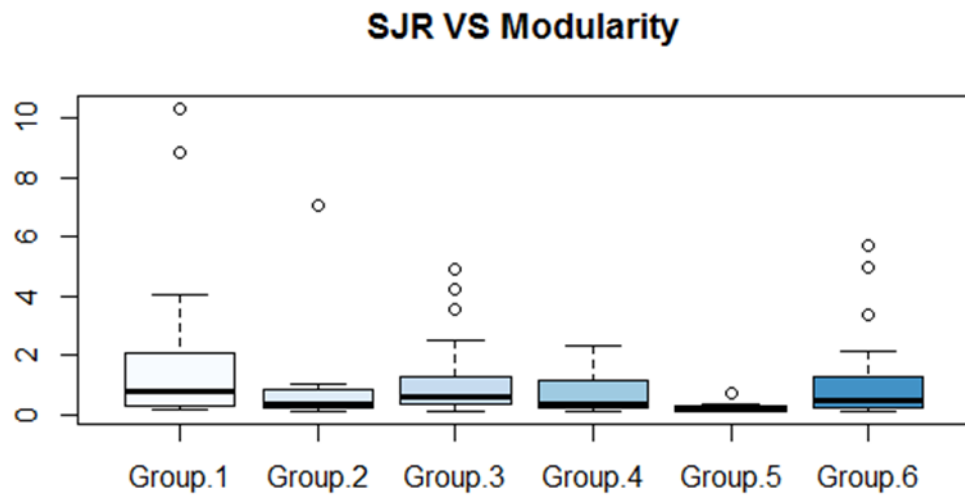


Figure 292

Furthermore, the diagrams below show the relationship that they have with SJR by group. Those line diagram shows for example, in group 1 that 12.82% of all the journals are in the Q1 and in group 1. In comparison with unweighted case group 1 has less journals and Q4 is really low. Group 2 has Q4 higher on the contrary with the unweighted network were Q2 is higher. Group 3 has almost in all the quartiles 25% except from Q2, the same happened in the unweighted network as well. In group 4 Q2 has the highest percentage on the other hand in unweighted network Q3 has it. Group 5 in the weighted network is the smallest it contains only 8 journals that is why all the percentages are relatively low the same was happening in the unweighted network. Finally, group 6 in the weighted is not small it has 32 journals on the contrary in the weighted network it was really small.

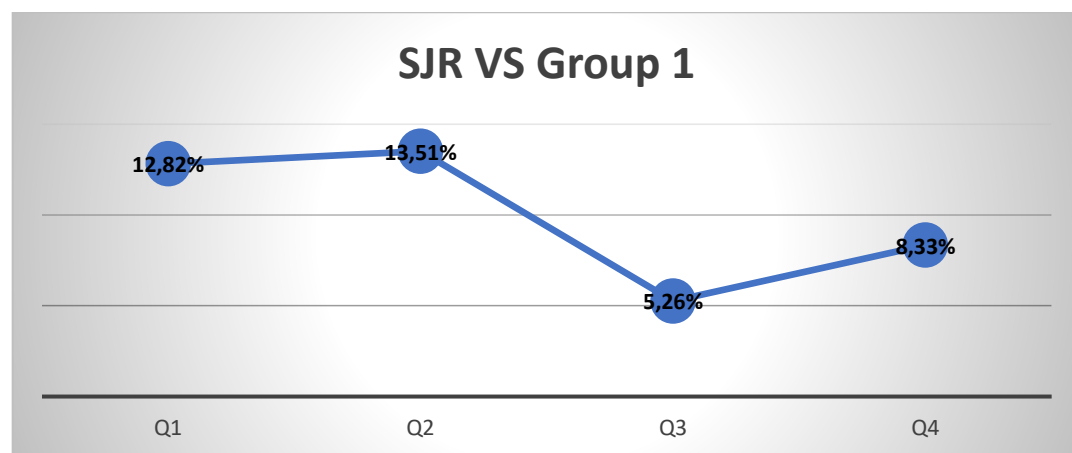


Figure 293

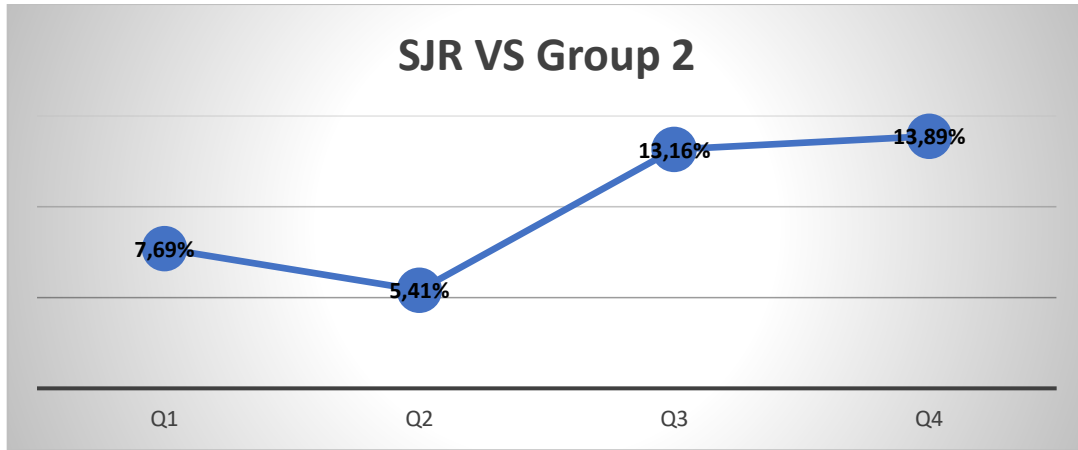


Figure 294

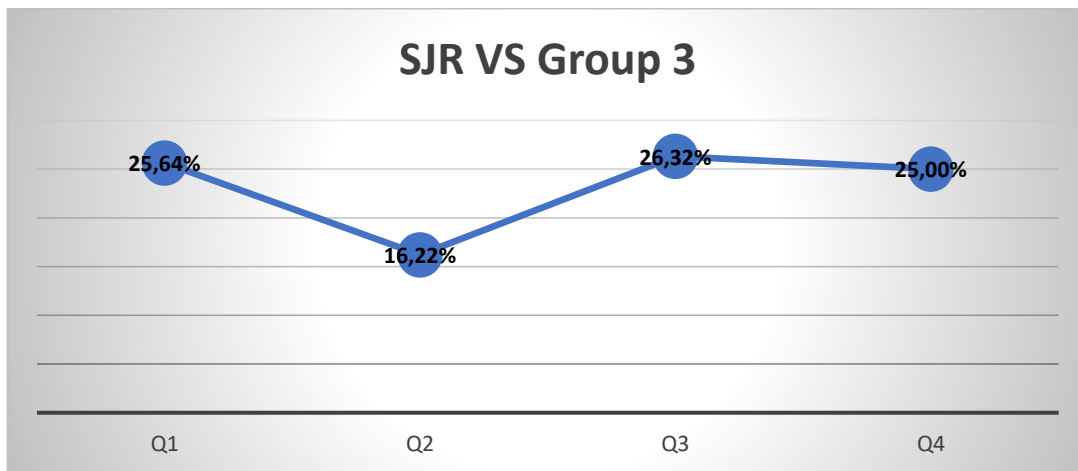


Figure 295

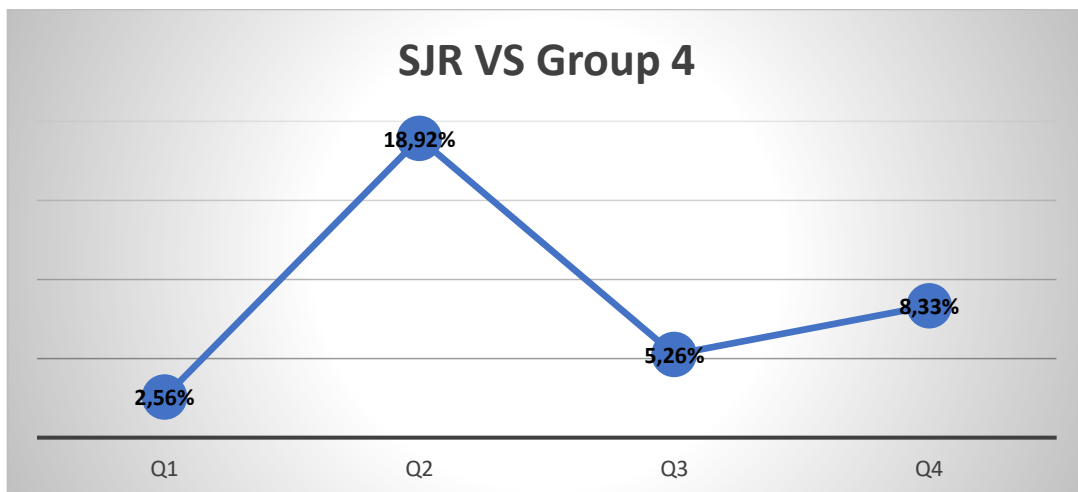


Figure 296

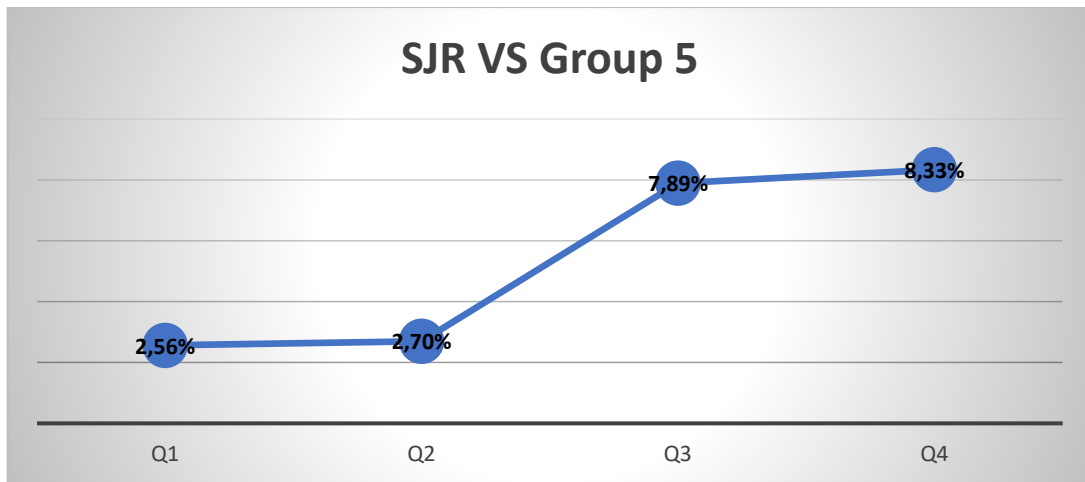


Figure 297

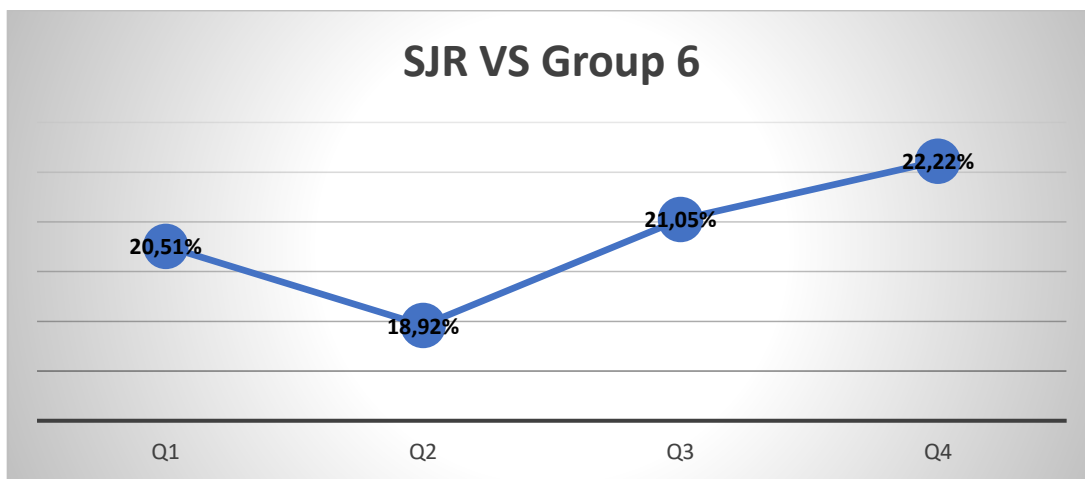


Figure 298

Moreover, the same procedure was made for H-Index. Group 1 has the journals with the highest H-Index and after comes group 6. Group 1 has 17.95% of all the journals in Q1 that is almost the same as in the unweighted network but all the other quartiles are pretty low compared with the unweighted network. Generally, as in SJR there a lot of differenced compared with the modularity of the unweighted network.

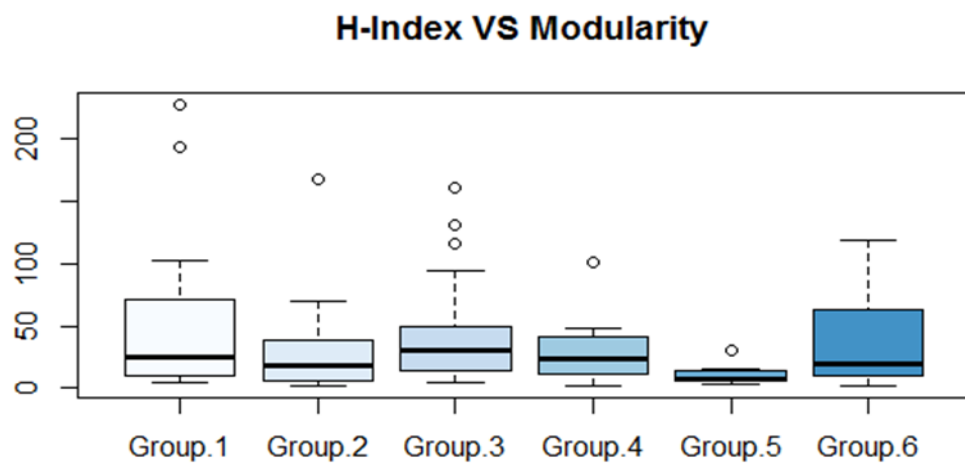


Figure 299

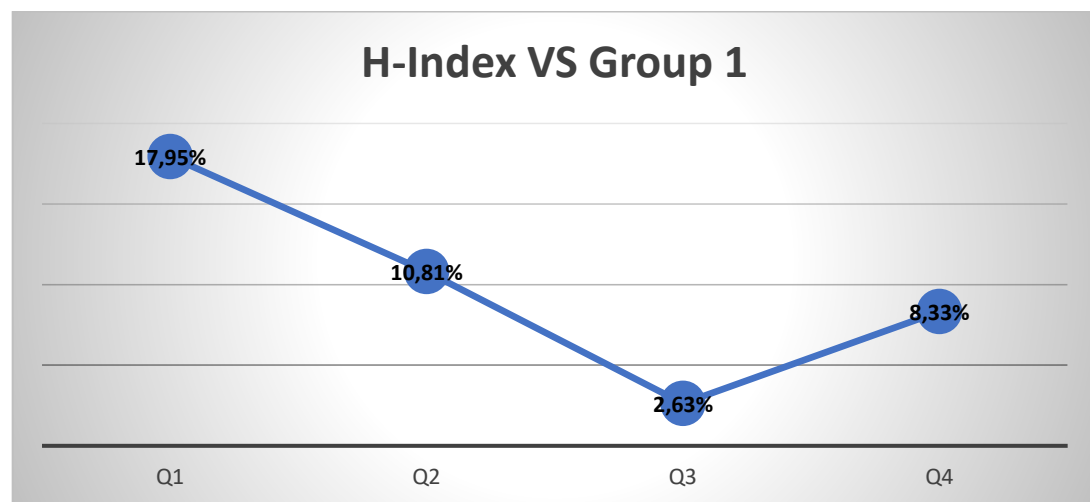


Figure 300

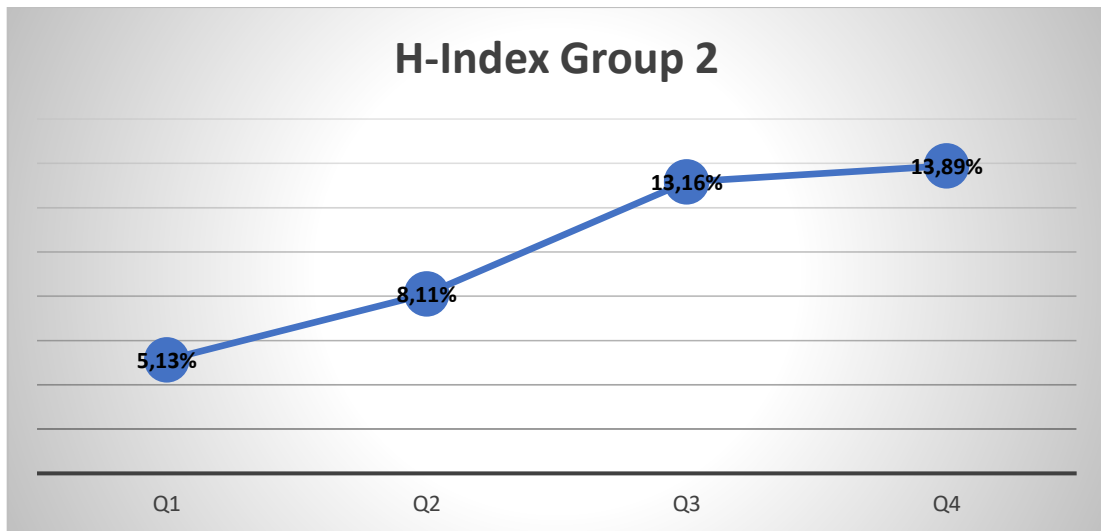


Figure 301

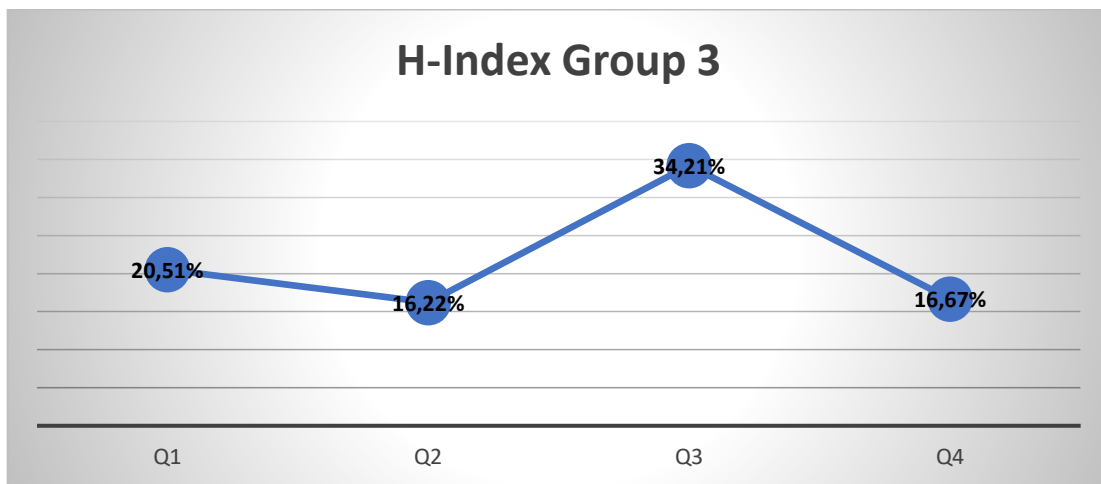


Figure 302

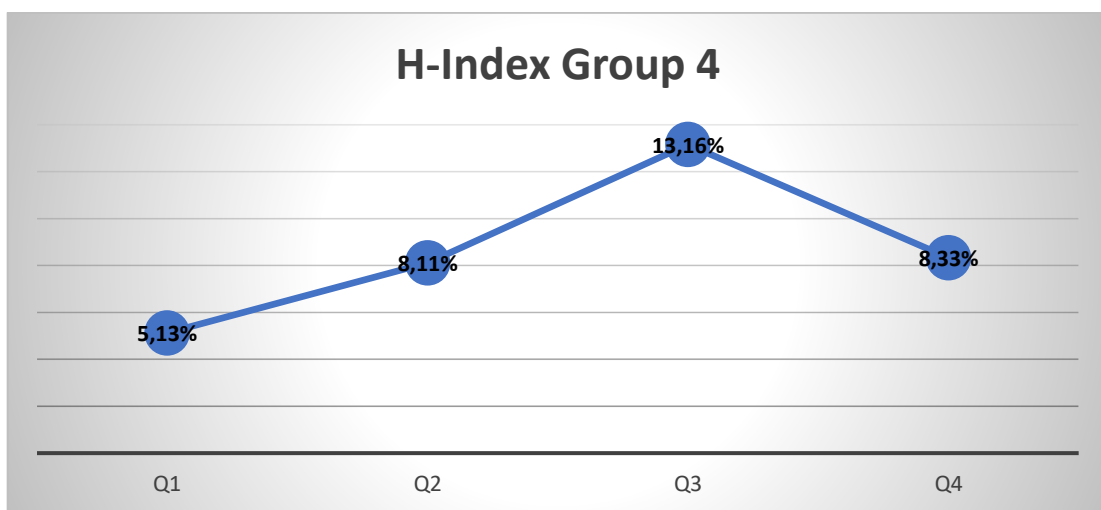


Figure 303

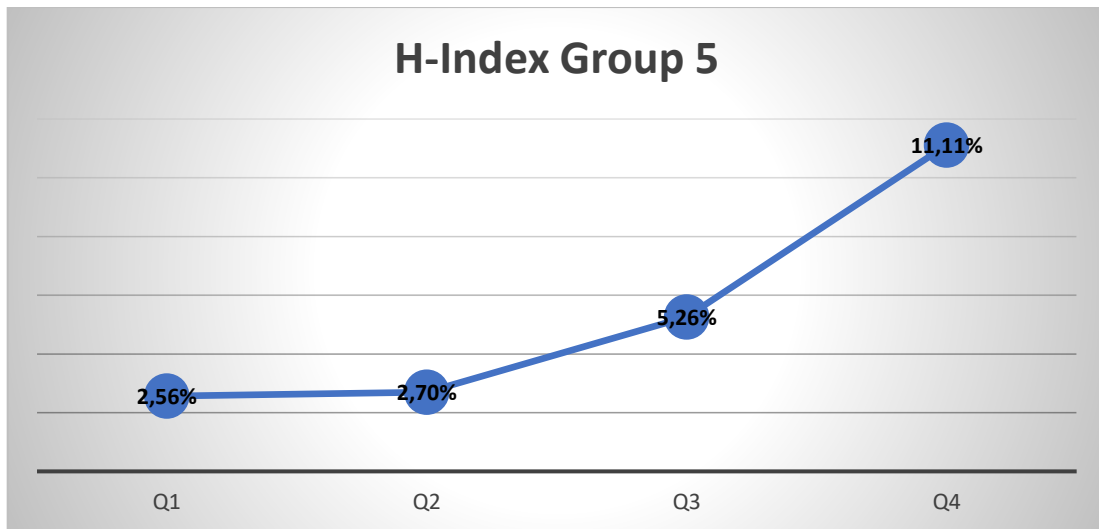


Figure 304

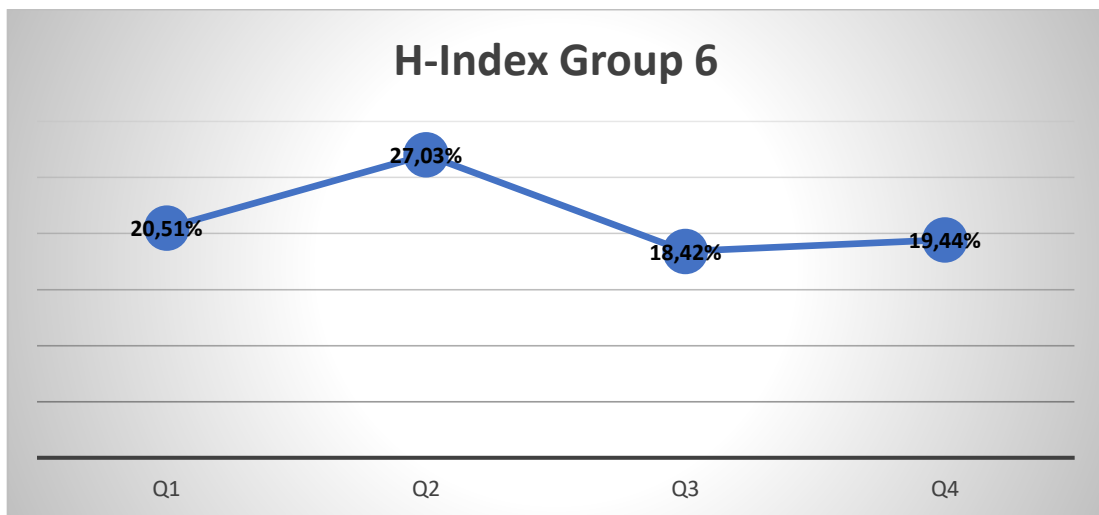


Figure 305

Furthermore, degree and modularity was compared. Again, group 1 is first, so the journals with the highest degree are in group 1. In boxplot, our data are spread out and there is a wide range of degree. That is a completely different outcome of the one we had with the unweighted network. In the unweighted network, again group 1 was the first but all the other data was not well distributed. On the other hand, the weighted degree with modularity have a different outcome.

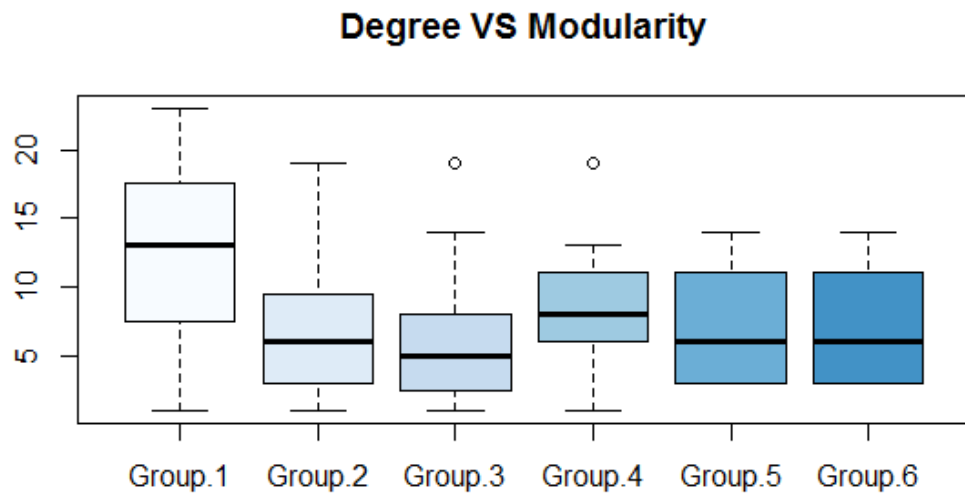


Figure 306

Again, group 1 has the majority of journals with the highest weighted degree. As with degree group 1 is really high compared with the other groups. From the comparison of the two boxplots it is obvious that weighted degree is even better distributed. The conclusion to be drawn is that weighted degree is a better measure that degree and modularity of a weighted network is probably the best measure of a social network.

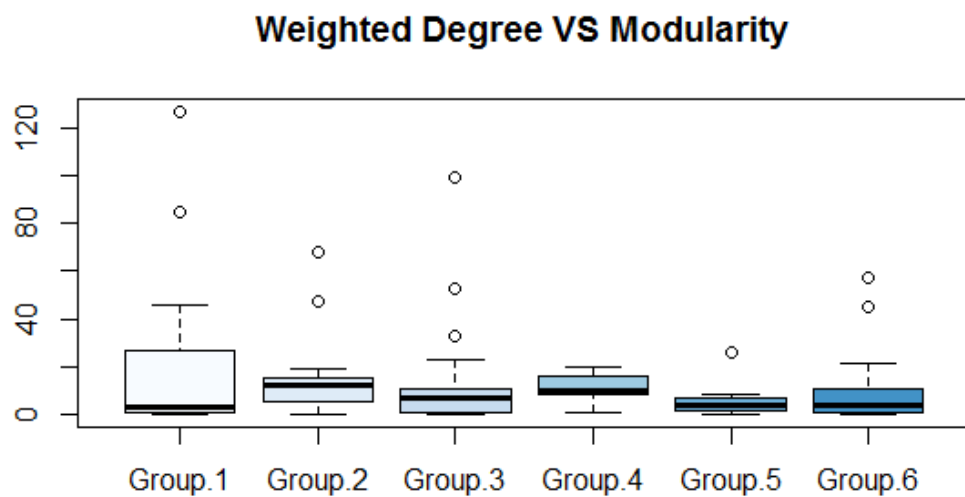


Figure 307

In this connection, modularity of the weighted network was compared with triangles and clustering, eccentricity and with all the centralities. Firstly, in boxplot below the relationship between triangles and modularity is shown. As in the unweighted case group 1 is the higher but

all the other groups are better distributed especially group 6 which in the unweighted case was almost zero.

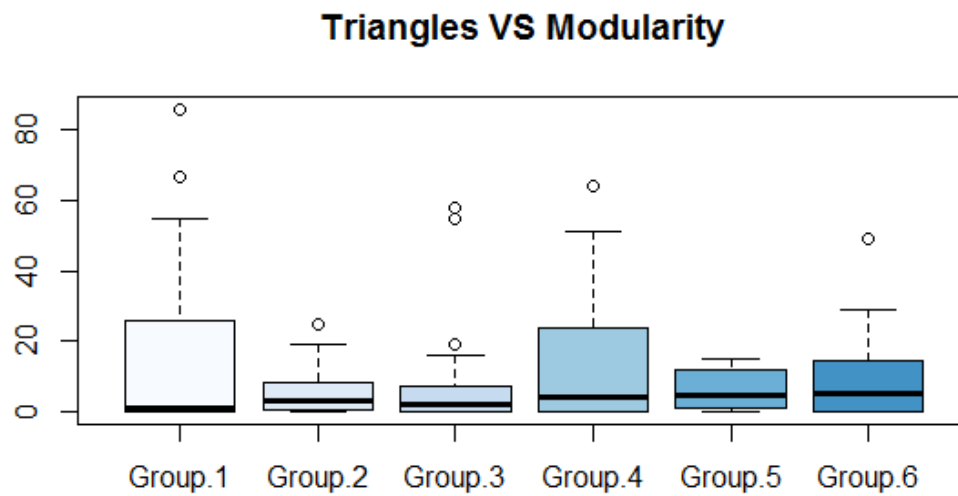


Figure 308

However, in clustering and modularity group 1 is not the higher group as it was in the unweighted network. Group 6 is the higher group which in the unweighted network was zero. Again, in all the other groups the data are better distributed.

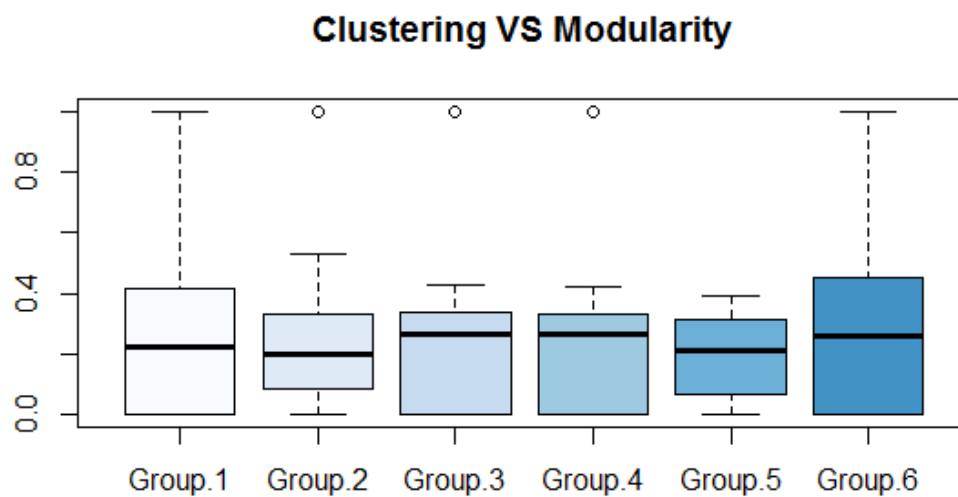


Figure 309

Eccentricity and modularity is completely different compared to the unweighted network. In the unweighted network for example group 1 and 2 had journals with eccentricity equals to 5

and now they have a range of eccentricities. On the other hand, group 6 had a range of 5 to 6 eccentricity and now it has only 5.

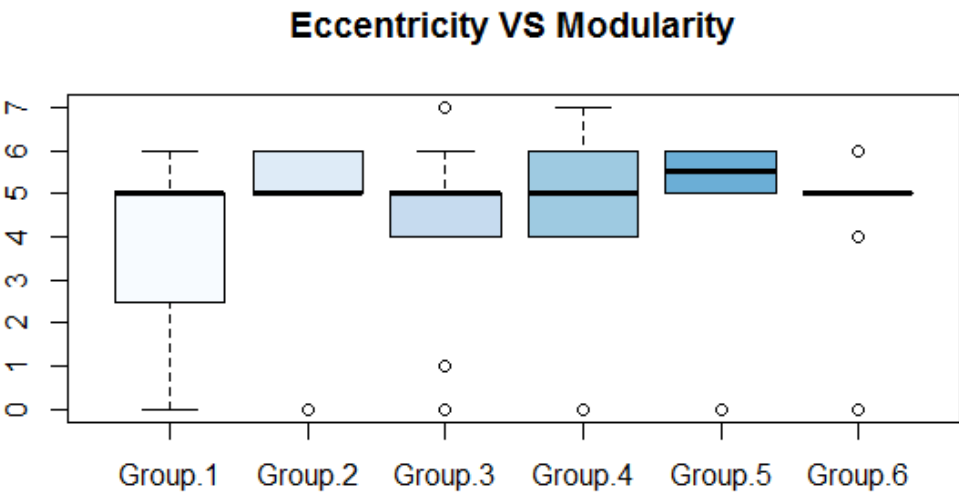


Figure 310

The relationship between betweenness centrality and modularity was examined as well. In the weighted network group 5 is higher as it is shown below. In the unweighted network group 3 was the highest group. In both cases the data are distributed well.

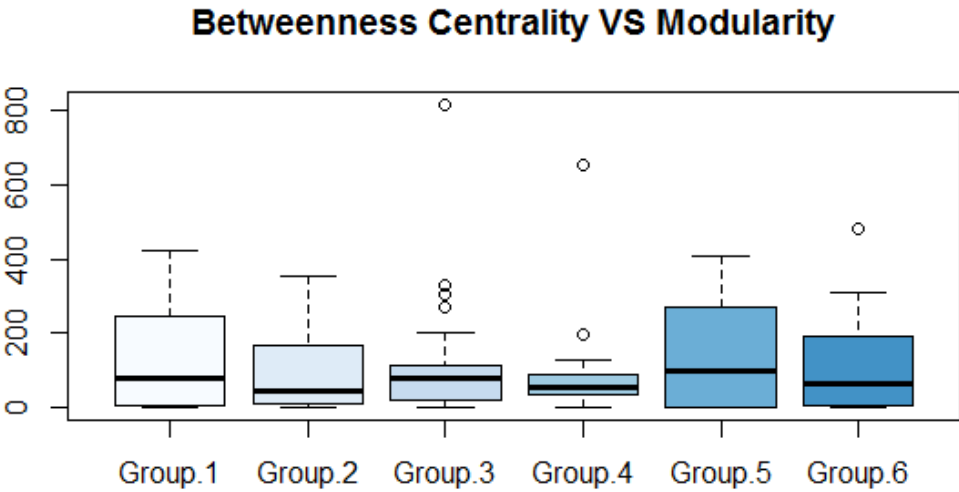


Figure 311

The same happened with the closeness centrality and modularity. In this centrality group 4 has the journals with the highest closeness centrality but group 5 is really close.

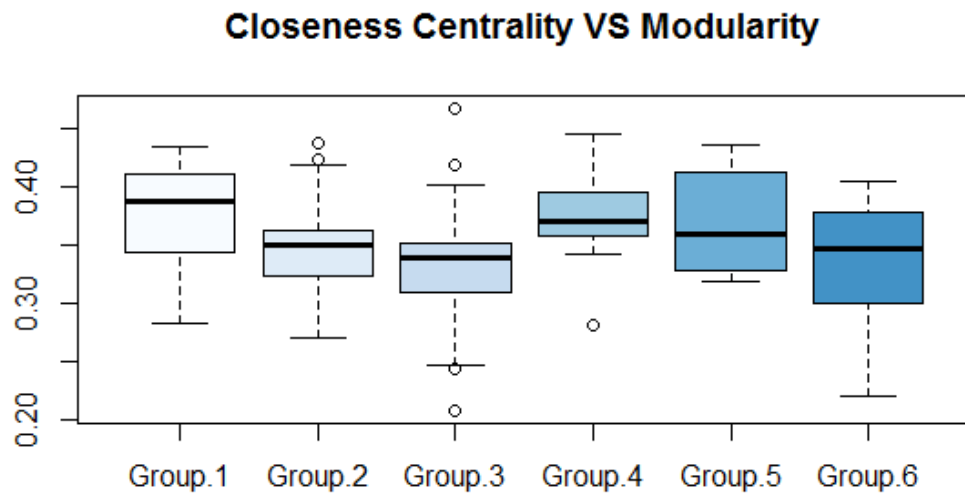


Figure 312

In harmonic closeness centrality group 1 is equal with group 4 and they have the journals with the highest harmonic closeness centrality. In the unweighted network, group 1 was first and second came group 3 and 4.

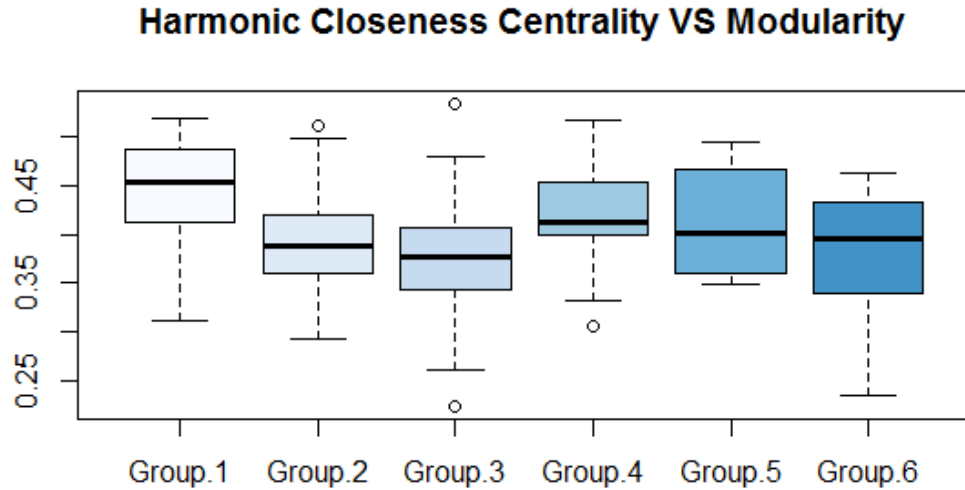


Figure 313

More, eigenvector centrality and modularity was examined. Group 1 has the journals with the highest eigenvector centrality. In the unweighted network group 3 and 4 were equal and had the highest eigenvector centrality.

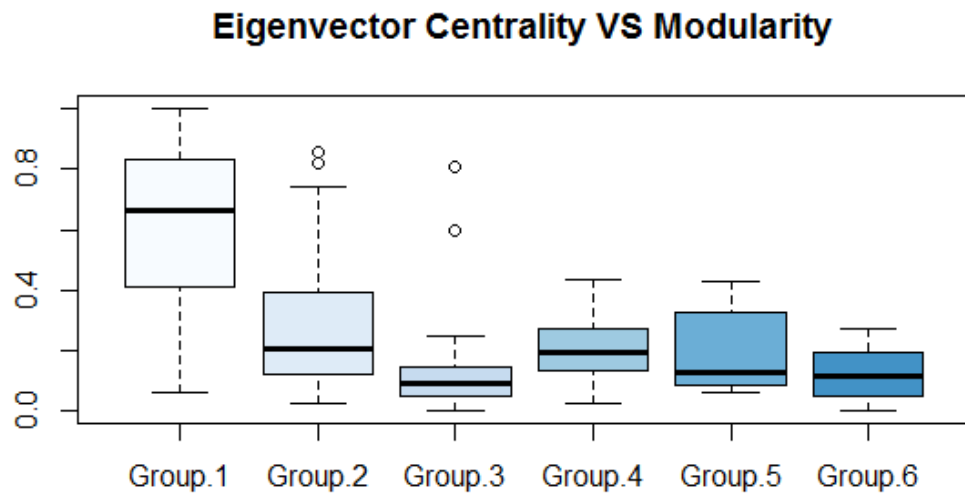


Figure 314

Authority or hub was examined as well. It is obvious that group 4 has the journals with the highest authority or hub after comes group 1. In the unweighted network group 2 was the highest and it has as in this case a great difference from the other groups. Group 1 was almost zero.

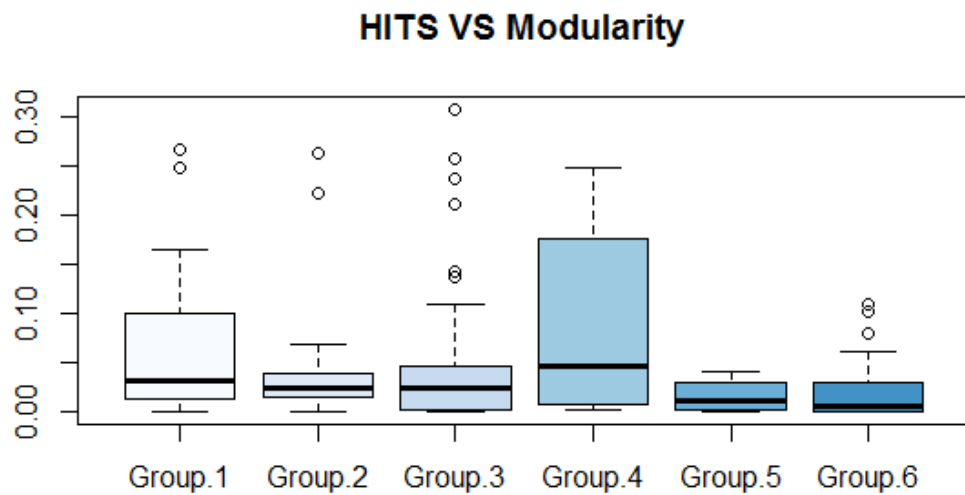


Figure 315

Moreover, the relationship between PageRank and modularity was examined. Group 1 again has the journals with the highest PageRank. In the unweighted case group 3 had the journals with the highest PageRank.

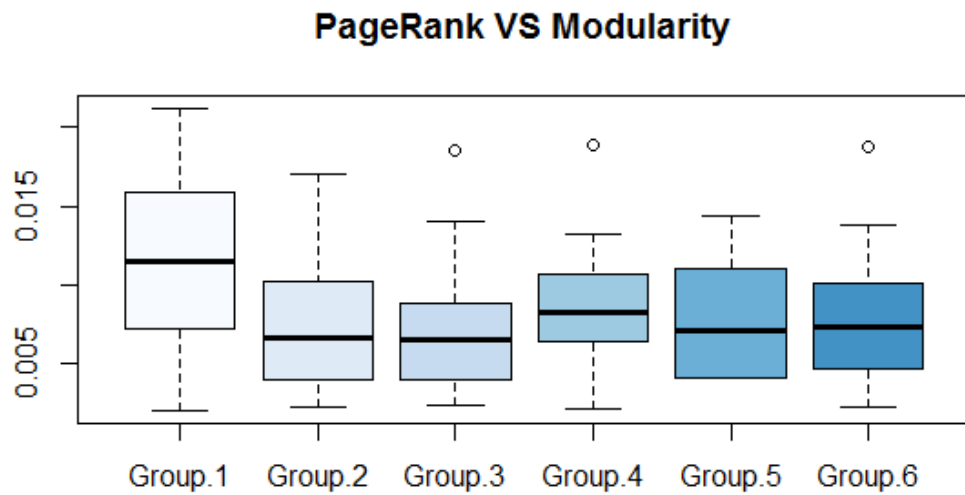


Figure 316

Finally, in the scatterplot below modularity class of the unweighted network is compared with the modularity class of the weighted network. There are some journals that have the same modularity class in the weighted and in the unweighted network as well. On the other hand, there are a lot of journals that have different modularity in the two networks.

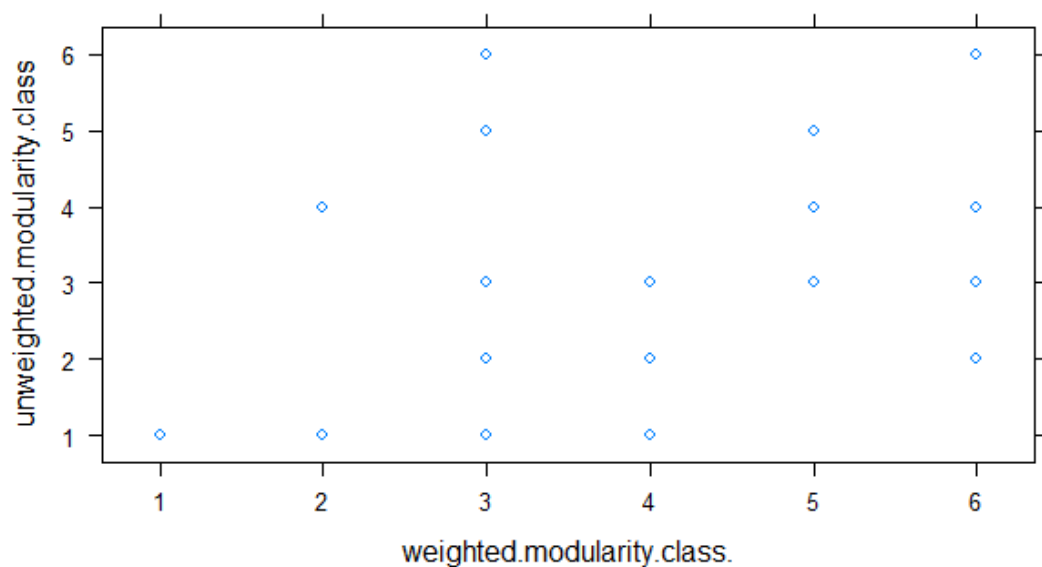


Figure 317

4.4 Conclusion

Overall, our network has three groups the first one contains all the journals that are connected to each other the second contains all the journals that do not connect with anyone and lastly there is a group of two journals that connect to each other only. The only important group is

the first group from that group we can into some conclusions. The conclusion to be drawn is that based only different measures different journals are at the top. Generally, the journals that have high degree, high eigenvector centrality and high Page Rank are the top journals on the field of management of technology and innovation. That is because degree measures the number of connections a journal has, eigenvector measures if these connections are with important- top journals and Page Rank measure the importance of a journal. So, Journal of Management Studies is the top journal in all this measure. It has degree equals to 23, eigenvector equals to 0,95 and Page Rank equals to 0.02 which is the highest. It belongs in the Q2 in refer to SJR and in Q1 in refer to H-Index. Also, it is in the group 1 in modularity of the weighted and of the unweighted network. It is in the first rank in triangles, in the 30 ranks in clustering, in 34 ranks in eccentricity, in 4 ranks in betweenness centrality, in 7 ranks in closeness centrality, in the 2 ranks in harmonic closeness centrality, in 46 ranks in HITS and finally in the 2 ranks of weighted degree. There are other important journals as Journal of International Business Studies which has degree equals to 0, 1 in the rank of eigenvector centrality and 1 in the rank of Page Rank. Quartile- wise it belongs in the Q4 in both SJR and H-Index. In the diagram below the top 10 journals of 2015 in field of management of technology and innovation are listed with their normalized important measures.



Figure 318

Appendix Tables

Degree

Title	degree	normalized degree	Rank
Journal of Management Studies	23	1,00	1
Academy of Management Journal	19	0,83	2
International Journal of Business Innovation and Research	19	0,83	2
International Journal of Management Reviews	19	0,83	2
Journal of International Business Studies	19	0,83	2
Organization Studies	19	0,83	2
British Journal of Management	18	0,78	7
Human Relations	18	0,78	7
International Journal of Human Resource Management	18	0,78	7
Academy of Management Review	17	0,74	10
Production and Operations Management	16	0,70	11
Canadian Journal of Administrative Sciences	14	0,61	12
International Journal of Innovation and Learning	14	0,61	12
Journal of Small Business Management	14	0,61	12
European Journal of Innovation Management	13	0,57	15
International Journal of Entrepreneurship and Innovation Management	13	0,57	15
International Journal of Technological Learning, Innovation and Development	13	0,57	15
Journal of Management Inquiry	13	0,57	15
Journal of Organizational Change Management	13	0,57	15
Knowledge Management Research and Practice	13	0,57	15
Organization	13	0,57	15
International Journal of Physical Distribution and Logistics Management	12	0,52	22
International Journal of Shipping and Transport Logistics	11	0,48	23
Journal of Knowledge Management	11	0,48	23
Knowledge Management	11	0,48	23
Organization Science	11	0,48	23
Supply Chain Forum	11	0,48	23
Baltic Journal of Management	10	0,43	28
Industrial and Labor Relations Review	10	0,43	28
International Journal of Business Information Systems	10	0,43	28
International Journal of Enterprise Network Management	10	0,43	28
International Journal of Operations and Production Management	10	0,43	28
Creativity and Innovation Management	9	0,39	33
Industrial Relations	9	0,39	33
Intangible Capital	9	0,39	33
International Entrepreneurship and Management Journal	9	0,39	33
International Journal of Foresight and Innovation Policy	9	0,39	33
International Journal of Innovation Management	9	0,39	33
International Journal of Knowledge-Based Development	9	0,39	33
International Journal of Services and Standards	9	0,39	33
Management Learning	9	0,39	33
Operations Management Research	9	0,39	33
Human Resource Management	8	0,35	43
International Journal of Accounting and Information Management	8	0,35	43
International Journal of Innovation and Technology Management	8	0,35	43

International Journal of Product Development	8	0,35	43
International Journal of Technology Intelligence and Planning	8	0,35	43
Knowledge and Process Management	8	0,35	43
New Technology, Work and Employment	8	0,35	43
Research Policy	8	0,35	43
British Journal of Industrial Relations	7	0,30	51
Decision Sciences	7	0,30	51
International Journal of Entrepreneurship and Innovation	7	0,30	51
International Journal of Innovation and Sustainable Development	7	0,30	51
International Journal of Intelligent Enterprise	7	0,30	51
International Journal of Services and Operations Management	7	0,30	51
Journal of Product Innovation Management	7	0,30	51
Organizational Research Methods	7	0,30	51
R and D Management	7	0,30	51
Corporate Governance	6	0,26	60
Electronic Markets	6	0,26	60
International Journal of Biotechnology	6	0,26	60
International Journal of Entrepreneurial Venturing	6	0,26	60
International Journal of Information and Decision Sciences	6	0,26	60
International Journal of Knowledge Management	6	0,26	60
International Journal of Knowledge Management Studies	6	0,26	60
International Journal of Project Management	6	0,26	60
Service Industries Journal	6	0,26	60
Technological Forecasting and Social Change	6	0,26	60
Technovation	6	0,26	60
Asian Journal of Technology Innovation	5	0,22	71
International Journal of Electronic Finance	5	0,22	71
Journal of Business Venturing	5	0,22	71
Creative Industries Journal	4	0,17	74
Electronic Commerce Research and Applications	4	0,17	74
European Journal of Industrial Relations	4	0,17	74
Industry and Innovation	4	0,17	74
Innovation: Management, Policy and Practice	4	0,17	74
Interfaces	4	0,17	74
International Journal of Conflict Management	4	0,17	74
International Journal of Manpower	4	0,17	74
International Journal of Technology Management and Sustainable Development	4	0,17	74
Journal of Science and Technology Policy Management	4	0,17	74
Operational Research	4	0,17	74
Team Performance Management	4	0,17	74
Economic and Industrial Democracy	3	0,13	86
International Journal of Operations and Quantitative Management	3	0,13	86
International Transactions in Operational Research	3	0,13	86
Journal of Business Venturing Insights	3	0,13	86
Journal of Economics and Management Strategy	3	0,13	86
Journal of Human Resources	3	0,13	86
Journal of Information Systems	3	0,13	86

Journal.of.Product.and.Brand.Management	3	0,13	86
Journal.of.Business.Venturing.Insights	3	0,13	86
Managerial.and.Decision.Economics	3	0,13	86
International.Journal.of.Operations.and.Quantitative.Management	3	0,13	86
Journal.of.Personal.Selling.and.Sales.Management	3	0,13	86
Public.Personnel.Management	3	0,13	86
Economic.and.Industrial.Democracy	3	0,13	86
Public.Management.Review	3	0,13	86
Asian.Journal.of.Shipping.and.Logistics	2	0,09	98
Economics.of.Innovation.and.New.Technology	2	0,09	98
Journal.of.High.Technology.Management.Research	2	0,09	98
Journal.of.Technology.Management.and.Innovation	2	0,09	98
Project.Management.Journal	2	0,09	98
International.Labour.Review	2	0,09	98
Quality.Technology.and.Quantitative.Management	2	0,09	98
Research.Technology.Management	2	0,09	98
International.Journal.of.Work.Innovation	1	0,04	106
Journal.of.Labor.Research	1	0,04	106
International.Journal.of.Mining..Reclamation.and.Environment	1	0,04	106
Knowledge.Management.and.E.Learning	1	0,04	106
International.Journal.of.Information.System.Modeling.and.Design	1	0,04	106
International.Journal.of.Selection.and.Assessment	1	0,04	106
Journal.of.Management.Control	1	0,04	106
Eurasian.Mining	1	0,04	106
Electricity.Journal	1	0,04	106
Journal.of.Textile.and.Apparel..Technology.and.Management	1	0,04	106
Review.of.Industrial.Organization	1	0,04	106
Group.Decision.and.Negotiation	1	0,04	106
International.Journal.of.Human.Capital.and.Information.Technology.Professionals	1	0,04	106
Journal.of.Direct..Data.and.Digital.Marketing.Practice	1	0,04	106
System.Dynamics.Review	1	0,04	106
Harvard.Business.Review	0	0,00	121
International.Journal.of.Innovation.Science	0	0,00	121
International.Journal.of.Sustainable.Manufacturing	0	0,00	121
International.Journal.of.Technology	0	0,00	121
Journal.of.Commercial.Biotechnology	0	0,00	121
MIT.Sloan.Management.Review	0	0,00	121
Science.and.Engineering.Ethics	0	0,00	121
Systemic.Practice.and.Action.Research	0	0,00	121
AutoTechnology	0	0,00	121
Monthly.Labor.Review	0	0,00	121
Cartography.and.Geographic.Information.Science	0	0,00	121
International.Journal.of.Precision.Engineering.and.Manufacturing...Green.Technology	0	0,00	121
NanoEthics	0	0,00	121

Printed.Circuit.Design.and.Fab	0	0,00	121
Publishing.Research.Quarterly	0	0,00	121
Espacios	0	0,00	121
International.Journal.of.IT.Standards.and.Standardization.Research	0	0,00	121
Journal.of.Internet.Banking.and.Commerce	0	0,00	121
Negotiation.Journal	0	0,00	121
Quality.Innovation.Prosperty	0	0,00	121
Research.Journal.of.Business.Management	0	0,00	121
Innovation	0	0,00	121
International.Journal.of.Construction.Management	0	0,00	121
Information.and.Organization	0	0,00	121
Journal.of.Internet.Commerce	0	0,00	121
Journal.of.Social.Marketing	0	0,00	121
Journal.of.Organizational.Behavior.Management	0	0,00	121
Genetic.Engineering.and.Biotechnology.News	0	0,00	121
Memoirs.of.the.Faculty.of.Engineering..Kyushu.University	0	0,00	121
Zhongbei.Daxue.Xuebao..Ziran.Kexue.Ban..Journal.of.North.University.of.China..Natural.Science.Edition.	0	0,00	121

Table 16 (Degree)

Triangles

Title	triangles	normalized triangles	Rank
Journal of Management Studies	86	1,00	1
Academy of Management Review	67	0,78	2
Human Relations	64	0,74	3
International Journal of Management Reviews	58	0,67	4
Academy of Management Journal	55	0,64	5
British Journal of Management	55	0,64	5
International Journal of Human Resource Management	51	0,59	7
Journal of Management Inquiry	49	0,57	8
Journal of International Business Studies	45	0,52	9
Journal of Organizational Change Management	42	0,49	10
Management Learning	29	0,34	11
International Journal of Business Innovation and Research	28	0,33	12
International Journal of Innovation and Learning	25	0,29	13
Knowledge Management Research and Practice	25	0,29	13
Canadian Journal of Administrative Sciences	24	0,28	15
International Journal of Enterprise Network Management	22	0,26	16
Human Resource Management	20	0,23	17
Knowledge Management	19	0,22	18
Journal of Knowledge Management	19	0,22	18
International Journal of Services and Standards	19	0,22	18
International Journal of Technological Learning, Innovation and Development	18	0,21	21
International Journal of Entrepreneurship and Innovation Management	16	0,19	22
European Journal of Innovation Management	16	0,19	22
International Journal of Shipping and Transport Logistics	15	0,17	24
Intangible Capital	15	0,17	24
Journal of Small Business Management	15	0,17	24
International Journal of Business Information Systems	14	0,16	27
Industrial Relations	14	0,16	27
Industrial and Labor Relations Review	13	0,15	28
International Journal of Physical Distribution and Logistics Management	12	0,14	29
Knowledge and Process Management	12	0,14	29
International Journal of Innovation and Sustainable Development	11	0,13	32
International Journal of Accounting and Information Management	11	0,13	32
International Journal of Innovation Management	11	0,13	32
International Journal of Knowledge-Based Development	10	0,12	35
International Journal of Operations and Production Management	10	0,12	35
International Journal of Foresight and Innovation Policy	9	0,10	37
Baltic Journal of Management	9	0,10	37
International Journal of Electronic Finance	9	0,10	37
International Journal of Services and Operations Management	9	0,10	37
International Entrepreneurship and Management Journal	7	0,08	41
International Journal of Technology Intelligence and Planning	7	0,08	41
Decision Sciences	7	0,08	41
Creativity and Innovation Management	7	0,08	41

British Journal of Industrial Relations	7	0,08	41
International Journal of Product Development	7	0,08	41
Journal of Product Innovation Management	6	0,07	47
International Journal of Intelligent Enterprise	5	0,06	48
International Journal of Project Management	5	0,06	48
International Journal of Knowledge Management	5	0,06	48
International Journal of Innovation and Technology Management	5	0,06	48
International Journal of Biotechnology	4	0,05	52
Journal of Business Venturing	4	0,05	52
International Journal of Information and Decision Sciences	4	0,05	52
International Journal of Knowledge Management Studies	4	0,05	52
International Journal of Entrepreneurship and Innovation	4	0,05	52
Journal of Human Resources	3	0,03	57
Journal of Business Venturing Insights	3	0,03	57
Asian Journal of Technology Innovation	3	0,03	57
International Journal of Conflict Management	3	0,03	57
International Journal of Operations and Quantitative Management	3	0,03	57
International Journal of Entrepreneurial Venturing	3	0,03	57
International Journal of Technology Management and Sustainable Development	3	0,03	57
Interfaces	3	0,03	57
Industry and Innovation	2	0,02	65
Innovation: Management, Policy and Practice	2	0,02	65
International Journal of Manpower	2	0,02	65
Corporate Governance	2	0,02	65
Electronic Markets	2	0,02	65
Journal of Science and Technology Policy Management	2	0,02	65
Asian Journal of Shipping and Logistics	1	0,01	71
International Transactions in Operational Research	1	0,01	71
Journal of High Technology Management Research	1	0,01	71
Journal of Technology Management and Innovation	1	0,01	71
Electronic Commerce Research and Applications	1	0,01	71
Economic and Industrial Democracy	1	0,01	71
International Labour Review	1	0,01	71
Creative Industries Journal	1	0,01	71
European Journal of Industrial Relations	1	0,01	71
International Journal of Work Innovation	0	0,00	80
Journal of Economics and Management Strategy	0	0,00	80
Journal of Labor Research	0	0,00	80
Economics of Innovation and New Technology	0	0,00	80
International Journal of Mining, Reclamation and Environment	0	0,00	80
Harvard Business Review	0	0,00	80
International Journal of Innovation Science	0	0,00	80
International Journal of Sustainable Manufacturing	0	0,00	80
International Journal of Technology	0	0,00	80
Journal of Commercial Biotechnology	0	0,00	80
Journal of Information Systems	0	0,00	80

Journal of Product and Brand Management	0	0,00	80
MIT Sloan Management Review	0	0,00	80
AutoTechnology	0	0,00	80
Knowledge Management and E-Learning	0	0,00	80
Managerial and Decision Economics	0	0,00	80
Cartography and Geographic Information Science	0	0,00	80
International Journal of Precision Engineering and Manufacturing - Green Technology	0	0,00	80
International Journal of Information System Modeling and Design	0	0,00	80
International Journal of Selection and Assessment	0	0,00	80
Journal of Management Control	0	0,00	80
Espacios	0	0,00	80
International Journal of IT Standards and Standardization Research	0	0,00	80
Journal of Internet Banking and Commerce	0	0,00	80
Eurasian Mining	0	0,00	80
Journal of Textile and Apparel, Technology and Management	0	0,00	80
Electricity Journal	0	0,00	80
Group Decision and Negotiation	0	0,00	80
Journal of Personal Selling and Sales Management	0	0,00	80
Innovation	0	0,00	80
International Journal of Construction Management	0	0,00	80
International Journal of Human Capital and Information Technology Professionals	0	0,00	80
Information and Organization	0	0,00	80
Journal of Internet Commerce	0	0,00	80
Journal of Social Marketing	0	0,00	80
Journal of Organizational Behavior Management	0	0,00	80
Genetic Engineering and Biotechnology News	0	0,00	80
Journal of Direct, Data and Digital Marketing Practice	0	0,00	80
Memoirs of the Faculty of Engineering, Kyushu University	0	0,00	80
Organization Science	0	0,00	80
Production and Operations Management	0	0,00	80
Science and Engineering Ethics	0	0,00	80
Systemic Practice and Action Research	0	0,00	80
Organization	0	0,00	80
Monthly Labor Review	0	0,00	80
NanoEthics	0	0,00	80
Printed Circuit Design and Fab	0	0,00	80
Publishing Research Quarterly	0	0,00	80
R and D Management	0	0,00	80
Operational Research	0	0,00	80
Negotiation Journal	0	0,00	80
Quality Innovation Prosperity	0	0,00	80
Organization Studies	0	0,00	80
Review of Industrial Organization	0	0,00	80
Technovation	0	0,00	80
Research Journal of Business Management	0	0,00	80
Team Performance Management	0	0,00	80

Technological Forecasting and Social Change	0	0,00	80
Project Management Journal	0	0,00	80
Public Personnel Management	0	0,00	80
Research Technology Management	0	0,00	80
Quality Technology and Quantitative Management	0	0,00	80
Supply Chain Forum	0	0,00	80
Organizational Research Methods	0	0,00	80
New Technology, Work and Employment	0	0,00	80
Service Industries Journal	0	0,00	80
Research Policy	0	0,00	80
Operations Management Research	0	0,00	80
System Dynamics Review	0	0,00	80
Public Management Review	0	0,00	80
Zhongbei Daxue Xuebao (Ziran Kexue Ban)/Journal of North University of China (Natural Science E	0	0,00	80

Table 17 (Triangles)

Clustering

	clustering	Rank
Journal of Human Resources		
Journal of Business Venturing Insights	1,00	1
International Journal of Operations and Quantitative Management	1,00	1
Asian Journal of Shipping and Logistics	1,00	1
Journal of High Technology Management Research	1,00	1
Journal of Technology Management and Innovation	1,00	1
International Labour Review	1,00	1
International Journal of Electronic Finance	1,00	1
Management Learning	0,90	8
Human Resource Management	0,81	9
Journal of Management Inquiry	0,71	10
Journal of Organizational Change Management	0,63	11
International Journal of Services and Standards	0,54	12
International Journal of Innovation and Sustainable Development	0,53	13
International Journal of Conflict Management	0,52	14
International Journal of Technology Management and Sustainable Development	0,50	15
Interfaces	0,50	15
Academy of Management Review	0,50	15
International Journal of Enterprise Network Management	0,49	18
Knowledge and Process Management	0,49	18
International Journal of Services and Operations Management	0,43	20
Human Relations	0,43	20
Intangible Capital	0,42	22
Journal of Business Venturing	0,42	22
International Journal of Accounting and Information Management	0,40	24
Industrial Relations	0,39	25
British Journal of Management	0,39	25
Knowledge Management	0,36	27
Journal of Knowledge Management	0,35	28
Journal of Management Studies	0,35	28
International Journal of Management Reviews	0,34	30
International Journal of Human Resource Management	0,34	30
Decision Sciences	0,33	32
British Journal of Industrial Relations	0,33	32
International Journal of Project Management	0,33	32
International Journal of Knowledge Management	0,33	32
Industry and Innovation	0,33	32
Innovation: Management, Policy and Practice	0,33	32
International Journal of Manpower	0,33	32
Journal of Science and Technology Policy Management	0,33	32
International Transactions in Operational Research	0,33	32
Economic and Industrial Democracy	0,33	32
Academy of Management Journal	0,33	32
Knowledge Management Research and Practice	0,32	43
International Journal of Business Information Systems	0,32	43
International Journal of Innovation Management	0,31	45

Asian Journal of Technology Innovation	0,30	47
Industrial and Labor Relations Review	0,29	48
Journal of Product Innovation Management	0,29	48
International Journal of Knowledge-Based Development	0,28	50
International Journal of Innovation and Learning	0,27	51
International Journal of Shipping and Transport Logistics	0,27	51
International Journal of Biotechnology	0,27	51
International Journal of Information and Decision Sciences	0,27	51
International Journal of Knowledge Management Studies	0,27	51
Canadian Journal of Administrative Sciences	0,26	56
Journal of International Business Studies	0,26	56
International Journal of Foresight and Innovation Policy	0,25	58
International Journal of Technology Intelligence and Planning	0,25	58
International Journal of Product Development	0,25	58
International Journal of Intelligent Enterprise	0,24	61
International Journal of Technological Learning, Innovation and Development	0,23	62
International Journal of Operations and Production Management	0,22	63
International Journal of Entrepreneurship and Innovation Management	0,21	64
European Journal of Innovation Management	0,21	64
Baltic Journal of Management	0,20	66
International Journal of Entrepreneurial Venturing	0,20	66
International Entrepreneurship and Management Journal	0,19	68
Creativity and Innovation Management	0,19	68
International Journal of Entrepreneurship and Innovation	0,19	68
International Journal of Physical Distribution and Logistics Management	0,18	71
International Journal of Innovation and Technology Management	0,18	71
Electronic Commerce Research and Applications	0,17	73
Creative Industries Journal	0,17	73
European Journal of Industrial Relations	0,17	73
Journal of Small Business Management	0,16	76
International Journal of Business Innovation and Research	0,16	76
Corporate Governance	0,13	78
Electronic Markets	0,13	78
International Journal of Work Innovation	0,00	80
Journal of Economics and Management Strategy	0,00	80
Journal of Labor Research	0,00	80
Economics of Innovation and New Technology	0,00	80
International Journal of Mining, Reclamation and Environment	0,00	80
Harvard Business Review	0,00	80
International Journal of Innovation Science	0,00	80
International Journal of Sustainable Manufacturing	0,00	80
International Journal of Technology	0,00	80
Journal of Commercial Biotechnology	0,00	80
Journal of Information Systems	0,00	80
Journal of Product and Brand Management	0,00	80
MIT Sloan Management Review	0,00	80

AutoTechnology	0,00	80
Knowledge Management and E-Learning	0,00	80
Managerial and Decision Economics	0,00	80
Cartography and Geographic Information Science	0,00	80
International Journal of Precision Engineering and Manufacturing - Green Technology	0,00	80
International Journal of Information System Modeling and Design	0,00	80
International Journal of Selection and Assessment	0,00	80
Journal of Management Control	0,00	80
Espacios	0,00	80
International Journal of IT Standards and Standardization Research	0,00	80
Journal of Internet Banking and Commerce	0,00	80
Eurasian Mining	0,00	80
Journal of Textile and Apparel, Technology and Management	0,00	80
Electricity Journal	0,00	80
Group Decision and Negotiation	0,00	80
Journal of Personal Selling and Sales Management	0,00	80
Innovation	0,00	80
International Journal of Construction Management	0,00	80
International Journal of Human Capital and Information Technology Professionals	0,00	80
Information and Organization	0,00	80
Journal of Internet Commerce	0,00	80
Journal of Social Marketing	0,00	80
Journal of Organizational Behavior Management	0,00	80
Genetic Engineering and Biotechnology News	0,00	80
Journal of Direct, Data and Digital Marketing Practice	0,00	80
Memoirs of the Faculty of Engineering, Kyushu University	0,00	80
Organization Science	0,00	80
Production and Operations Management	0,00	80
Science and Engineering Ethics	0,00	80
Systemic Practice and Action Research	0,00	80
Organization	0,00	80
Monthly Labor Review	0,00	80
NanoEthics	0,00	80
Printed Circuit Design and Fab	0,00	80
Publishing Research Quarterly	0,00	80
R and D Management	0,00	80
Operational Research	0,00	80
Negotiation Journal	0,00	80
Quality Innovation Prosperity	0,00	80
Organization Studies	0,00	80
Review of Industrial Organization	0,00	80
Technovation	0,00	80
Research Journal of Business Management	0,00	80
Team Performance Management	0,00	80
Technological Forecasting and Social Change	0,00	80
Project Management Journal	0,00	80
Public Personnel Management	0,00	80

Research Technology Management	0,00	80
Quality Technology and Quantitative Management	0,00	80
Supply Chain Forum	0,00	80
Organizational Research Methods	0,00	80
New Technology, Work and Employment	0,00	80
Service Industries Journal	0,00	80
Research Policy	0,00	80
Operations Management Research	0,00	80
System Dynamics Review	0,00	80
Public Management Review	0,00	80
Zhongbei Daxue Xuebao (Ziran Kexue Ban)/Journal of North University of China (Natural Science Edition)	0,00	80

Table 18 (Clustering)

Eccentricity

Title	eccentricity	Rank
Group Decision and Negotiation	7	1
International Journal of Human Capital and Information Technology Professionals	7	1
Journal of High Technology Management Research	7	1
Review of Industrial Organization	7	1
Asian Journal of Shipping and Logistics	6	5
Electricity Journal	6	5
Electronic Commerce Research and Applications	6	5
Electronic Markets	6	5
European Journal of Industrial Relations	6	5
Interfaces	6	5
International Journal of Accounting and Information Management	6	5
International Journal of Conflict Management	6	5
International Journal of Entrepreneurship and Innovation Management	6	5
International Journal of Foresight and Innovation Policy	6	5
International Journal of Information and Decision Sciences	6	5
International Journal of Information System Modeling and Design	6	5
International Journal of Operations and Quantitative Management	6	5
International Journal of Selection and Assessment	6	5
International Journal of Work Innovation	6	5
International Labour Review	6	5
International Transactions in Operational Research	6	5
Journal of Direct, Data and Digital Marketing Practice	6	5
Journal of Economics and Management Strategy	6	5
Journal of Labor Research	6	5
Journal of Management Control	6	5
Journal of Science and Technology Policy Management	6	5
Journal of Technology Management and Innovation	6	5
Knowledge Management and E-Learning	6	5
Operational Research	6	5
Research Technology Management	6	5
System Dynamics Review	6	5
Technological Forecasting and Social Change	6	5
Technovation	6	5
Academy of Management Journal	5	34
Asian Journal of Technology Innovation	5	34
Baltic Journal of Management	5	34
British Journal of Industrial Relations	5	34
British Journal of Management	5	34
Corporate Governance	5	34
Creative Industries Journal	5	34
Creativity and Innovation Management	5	34
Decision Sciences	5	34
Economic and Industrial Democracy	5	34
Economics of Innovation and New Technology	5	34
European Journal of Innovation Management	5	34

Human Relations	5	34
Human Resource Management	5	34
Industrial and Labor Relations Review	5	34
Industrial Relations	5	34
Industry and Innovation	5	34
Innovation: Management, Policy and Practice	5	34
Intangible Capital	5	34
International Journal of Biotechnology	5	34
International Journal of Business Information Systems	5	34
International Journal of Electronic Finance	5	34
International Journal of Enterprise Network Management	5	34
International Journal of Entrepreneurial Venturing	5	34
International Journal of Entrepreneurship and Innovation	5	34
International Journal of Innovation and Learning	5	34
International Journal of Innovation and Sustainable Development	5	34
International Journal of Innovation and Technology Management	5	34
International Journal of Innovation Management	5	34
International Journal of Intelligent Enterprise	5	34
International Journal of Knowledge Management	5	34
International Journal of Knowledge Management Studies	5	34
International Journal of Knowledge-Based Development	5	34
International Journal of Manpower	5	34
International Journal of Operations and Production Management	5	34
International Journal of Physical Distribution and Logistics Management	5	34
International Journal of Product Development	5	34
International Journal of Project Management	5	34
International Journal of Services and Operations Management	5	34
International Journal of Services and Standards	5	34
International Journal of Shipping and Transport Logistics	5	34
International Journal of Technological Learning, Innovation and Development	5	34
International Journal of Technology Intelligence and Planning	5	34
International Journal of Technology Management and Sustainable Development	5	34
Journal of Business Venturing	5	34
Journal of Business Venturing Insights	5	34
Journal of Human Resources	5	34
Journal of Information Systems	5	34
Journal of Knowledge Management	5	34
Journal of Management Inquiry	5	34
Journal of Management Studies	5	34
Journal of Organizational Change Management	5	34
Journal of Personal Selling and Sales Management	5	34
Journal of Product and Brand Management	5	34
Journal of Product Innovation Management	5	34
Journal of Small Business Management	5	34
Journal of Textile and Apparel, Technology and Management	5	34
Knowledge and Process Management	5	34

Knowledge Management	5	34
Knowledge Management Research and Practice	5	34
Management Learning	5	34
Managerial and Decision Economics	5	34
New Technology, Work and Employment	5	34
Operations Management Research	5	34
Organization	5	34
Organizational Research Methods	5	34
Production and Operations Management	5	34
Project Management Journal	5	34
Public Management Review	5	34
Public Personnel Management	5	34
Quality Technology and Quantitative Management	5	34
R and D Management	5	34
Research Policy	5	34
Service Industries Journal	5	34
Supply Chain Forum	5	34
Team Performance Management	5	34
Academy of Management Review	4	110
Canadian Journal of Administrative Sciences	4	110
International Entrepreneurship and Management Journal	4	110
International Journal of Business Innovation and Research	4	110
International Journal of Human Resource Management	4	110
International Journal of Management Reviews	4	110
Journal of International Business Studies	4	110
Organization Science	4	110
Organization Studies	4	110
Eurasian Mining	1	119
International Journal of Mining, Reclamation and Environment	1	119
AutoTechnology	0	121
Cartography and Geographic Information Science	0	121
Espacios	0	121
Genetic Engineering and Biotechnology News	0	121
Harvard Business Review	0	121
Information and Organization	0	121
Innovation	0	121
International Journal of Construction Management	0	121
International Journal of Innovation Science	0	121
International Journal of IT Standards and Standardization Research	0	121
International Journal of Precision Engineering and Manufacturing - Green Technology	0	121
International Journal of Sustainable Manufacturing	0	121
International Journal of Technology	0	121
Journal of Commercial Biotechnology	0	121
Journal of Internet Banking and Commerce	0	121
Journal of Internet Commerce	0	121
Journal of Organizational Behavior Management	0	121

Journal of Organizational Behavior Management	0	121
Journal of Social Marketing	0	121
Memoirs of the Faculty of Engineering, Kyushu University	0	121
MIT Sloan Management Review	0	121
Monthly Labor Review	0	121
NanoEthics	0	121
Negotiation Journal	0	121
Printed Circuit Design and Fab	0	121
Publishing Research Quarterly	0	121
Quality Innovation Prosperity	0	121
Research Journal of Business Management	0	121
Science and Engineering Ethics	0	121
Systemic Practice and Action Research	0	121
Zhongbei Daxue Xuebao (Ziran Kexue Ban)/Journal of North University of China (Natural Science Edition)	0	121

Table 19 (Eccentricity)

Betweenness Centrality

Title	betweenness centrality	Normalized Betweenness Centrality	Rank
Journal of International Business Studies	818	1,00	1
International Journal of Business Innovation and Research	654	0,80	2
Production and Operations Management	482	0,59	3
Journal of Management Studies	423	0,52	4
Journal of Small Business Management	407	0,50	5
Organization Studies	376	0,46	6
European Journal of Innovation Management	375	0,46	6
Academy of Management Journal	365	1,00	8
International Journal of Management Reviews	352	0,43	9
Canadian Journal of Administrative Sciences	329	0,40	10
International Journal of Human Resource Management	327	0,40	10
International Journal of Physical Distribution and Logistics Management	309	0,38	12
International Journal of Technological Learning, Innovation and Development	306	0,37	13
Supply Chain Forum	302	0,37	13
Organization Science	286	0,35	15
International Journal of Entrepreneurship and Innovation Management	270	0,33	16
British Journal of Management	246	0,75	17
Industrial and Labor Relations Review	241	0,29	18
International Journal of Innovation and Learning	240	0,29	18
International Journal of Innovation and Technology Management	234	0,29	18
Electronic Markets	212	0,26	21
International Journal of Operations and Production Management	211	0,26	21
Baltic Journal of Management	208	0,86	23
Journal of Product and Brand Management	202	0,25	23
Human Relations	202	0,25	23
Knowledge Management Research and Practice	197	0,24	26
Academy of Management Review	183	0,93	27
International Journal of Accounting and Information Management	178	0,22	27
International Entrepreneurship and Management Journal	163	0,20	28
International Journal of Project Management	159	0,19	29
International Journal of Shipping and Transport Logistics	158	0,19	29
International Journal of Business Information Systems	158	0,19	29
Research Policy	155	0,19	29
Industry and Innovation	139	0,17	34
Electronic Commerce Research and Applications	134	0,16	35
International Journal of Knowledge-Based Development	129	0,16	35
Journal of Information Systems	126	0,15	37
Journal of Economics and Management Strategy	117	0,14	38
International Journal of Biotechnology	114	0,14	38
Operations Management Research	113	0,14	38
International Journal of Foresight and Innovation Policy	108	0,13	41
International Journal of Entrepreneurship and Innovation	108	0,13	41
Creativity and Innovation Management	108	0,13	41
International Journal of Technology Intelligence and Planning	106	0,13	41

International Journal of Entrepreneurial Venturing	98	1,00	45
Service Industries Journal	98	1,00	45
Decision Sciences	94	0,95	47
Managerial and Decision Economics	92	0,93	47
International Journal of Intelligent Enterprise	90	0,91	47
Technological Forecasting and Social Change	89	0,91	47
Journal of Management Inquiry	89	0,91	47
Journal of Knowledge Management	89	0,91	47
Knowledge Management	89	0,91	47
Journal of Business Venturing	83	0,85	54
Innovation: Management, Policy and Practice	79	0,81	54
New Technology, Work and Employment	79	0,81	54
Journal of Product Innovation Management	79	0,80	54
Technovation	78	0,80	54
R and D Management	72	0,74	59
International Journal of Innovation Management	68	0,70	60
International Journal of Services and Operations Management	66	0,68	60
International Journal of Innovation and Sustainable Development	66	0,67	60
International Journal of Product Development	64	0,65	60
Journal of Organizational Change Management	62	0,64	60
International Journal of Information and Decision Sciences	56	0,57	65
Intangible Capital	54	0,55	65
International Journal of Enterprise Network Management	51	0,52	67
British Journal of Industrial Relations	50	0,76	67
Organization	50	0,50	67
Industrial Relations	46	0,47	67
Knowledge and Process Management	44	0,45	71
International Journal of Knowledge Management	43	0,44	71
Journal of Personal Selling and Sales Management	42	0,43	71
International Journal of Manpower	38	0,39	71
International Journal of Services and Standards	36	0,37	75
Team Performance Management	34	0,35	75
Corporate Governance	34	0,34	75
International Journal of Knowledge Management Studies	30	0,30	75
Quality Technology and Quantitative Management	29	0,30	75
Creative Industries Journal	26	0,27	80
Asian Journal of Technology Innovation	25	0,82	80
Journal of Science and Technology Policy Management	22	0,22	80
International Journal of Technology Management and Sustainable Development	17	0,18	83
Human Resource Management	12	0,12	84
European Journal of Industrial Relations	11	0,11	84
Economic and Industrial Democracy	9	0,09	84
Project Management Journal	7	0,08	84
International Journal of Conflict Management	7	0,07	84
International Journal of Electronic Finance	5	0,05	84
Interfaces	4	0,05	84

Operational Research	3,83	0,00	91
Management Learning	3,72	0,00	91
Economics of Innovation and New Technology	2,33	0,00	91
International Transactions in Operational Research	2,08	0,00	91
Organizational Research Methods	0,84	0,00	91
Asian Journal of Shipping and Logistics	0,00	0,00	91
Electricity Journal	0,00	0,00	91
Group Decision and Negotiation	0,00	0,00	91
International Journal of Human Capital and Information Technology Professionals	0,00	0,00	91
International Journal of Information System Modeling and Design	0,00	0,00	91
International Journal of Operations and Quantitative Management	0,00	0,00	91
International Journal of Selection and Assessment	0,00	0,00	91
International Journal of Work Innovation	0,00	0,00	91
International Labour Review	0,00	0,00	91
Journal of Business Venturing Insights	0,00	0,00	91
Journal of Direct, Data and Digital Marketing Practice	0,00	0,00	91
Journal of High Technology Management Research	0,00	0,00	91
Journal of Human Resources	0,00	0,00	91
Journal of Labor Research	0,00	0,00	91
Journal of Management Control	0,00	0,00	91
Journal of Technology Management and Innovation	0,00	0,00	91
Journal of Textile and Apparel, Technology and Management	0,00	0,00	91
Knowledge Management and E-Learning	0,00	0,00	91
Public Management Review	0,00	0,00	91
Public Personnel Management	0,00	0,00	91
Research Technology Management	0,00	0,00	91
Review of Industrial Organization	0,00	0,00	91
System Dynamics Review	0,00	0,00	91

Table 20 (Betweenness Centrality)

Closeness Centrality

Title	closeness centrality	Normalied Closeness	Rank
Journal of International Business Studies	0,47	1,00	1
International Journal of Business Innovation and Research	0,45	0,92	2
International Journal of Management Reviews	0,44	0,89	3
European Journal of Innovation Management	0,44	0,88	4
Organization Studies	0,43	0,87	5
Academy of Management Review	0,43	0,85	6
Journal of Small Business Management	0,43	0,84	7
Journal of Management Studies	0,43	0,84	7
International Journal of Human Resource Management	0,42	0,83	9
Academy of Management Journal	0,42	0,83	9
British Journal of Management	0,42	0,81	11
Canadian Journal of Administrative Sciences	0,42	0,81	11
Supply Chain Forum	0,40	0,76	13
International Journal of Technological Learning, Innovation and Develc	0,40	0,75	14
Baltic Journal of Management	0,40	0,74	15
Journal of Organizational Change Management	0,40	0,74	15
International Journal of Knowledge-Based Development	0,40	0,73	17
International Entrepreneurship and Management Journal	0,40	0,73	17
Knowledge Management	0,40	0,72	19
Journal of Management Inquiry	0,40	0,72	19
Journal of Knowledge Management	0,40	0,72	19
Journal of Textile and Apparel, Technology and Management	0,40	0,72	19
Human Relations	0,39	0,71	23
Knowledge Management Research and Practice	0,39	0,71	23
International Journal of Operations and Production Management	0,39	0,71	23
International Journal of Entrepreneurial Venturing	0,39	0,70	26
International Journal of Innovation and Learning	0,39	0,69	27
Operations Management Research	0,39	0,69	27
Organization	0,39	0,69	27
International Journal of Entrepreneurship and Innovation	0,39	0,69	27
Production and Operations Management	0,38	0,67	31
Decision Sciences	0,38	0,67	31
International Journal of Physical Distribution and Logistics Managemer	0,38	0,66	33
International Journal of Innovation and Sustainable Development	0,38	0,66	33
International Journal of Shipping and Transport Logistics	0,38	0,65	33
International Journal of Services and Operations Management	0,38	0,65	33
New Technology, Work and Employment	0,37	0,64	37
International Journal of Enterprise Network Management	0,37	0,64	37
Creativity and Innovation Management	0,37	0,63	39
International Journal of Technology Intelligence and Planning	0,37	0,63	39
International Journal of Intelligent Enterprise	0,37	0,62	41
International Journal of Services and Standards	0,37	0,62	41
International Journal of Innovation and Technology Management	0,37	0,62	41
Industrial and Labor Relations Review	0,37	0,62	41
Management Learning	0,36	0,59	45
International Journal of Entrepreneurship and Innovation Managemen	0,36	0,59	45

International Journal of Business Information Systems	0,36	0,59	45
Knowledge and Process Management	0,36	0,59	45
Organizational Research Methods	0,36	0,58	49
Corporate Governance	0,36	0,58	49
Intangible Capital	0,36	0,58	49
Industrial Relations	0,36	0,58	49
International Journal of Knowledge Management	0,36	0,58	49
Research Policy	0,36	0,57	54
Human Resource Management	0,36	0,57	54
Service Industries Journal	0,35	0,56	56
International Journal of Accounting and Information Management	0,35	0,55	57
International Journal of Innovation Management	0,35	0,55	57
International Journal of Foresight and Innovation Policy	0,35	0,55	57
International Journal of Manpower	0,35	0,55	57
Journal of Personal Selling and Sales Management	0,35	0,54	61
International Journal of Biotechnology	0,35	0,54	61
International Journal of Product Development	0,34	0,52	63
Creative Industries Journal	0,34	0,52	63
International Journal of Knowledge Management Studies	0,34	0,52	63
Innovation: Management, Policy and Practice	0,34	0,51	66
International Journal of Information and Decision Sciences	0,34	0,51	66
Team Performance Management	0,34	0,51	66
Journal of Product Innovation Management	0,34	0,51	66
International Journal of Technology Management and Sustainable Development	0,34	0,51	66
Industry and Innovation	0,34	0,51	66
International Journal of Electronic Finance	0,34	0,49	72
Electronic Markets	0,33	0,48	73
International Journal of Project Management	0,33	0,48	73
Journal of Business Venturing	0,33	0,48	73
British Journal of Industrial Relations	0,33	0,47	76
Organization Science	0,33	0,47	76
Public Management Review	0,33	0,46	78
Asian Journal of Technology Innovation	0,33	0,46	78
Public Personnel Management	0,33	0,46	78
International Journal of Conflict Management	0,33	0,46	78
Journal of Product and Brand Management	0,33	0,46	78
Journal of Human Resources	0,33	0,45	83
R and D Management	0,33	0,45	83
Journal of Science and Technology Policy Management	0,32	0,44	85
Project Management Journal	0,32	0,44	85
Managerial and Decision Economics	0,32	0,44	85
Economic and Industrial Democracy	0,32	0,44	85
Quality Technology and Quantitative Management	0,32	0,42	89
Journal of Business Venturing Insights	0,32	0,42	89
European Journal of Industrial Relations	0,31	0,40	91

Technological Forecasting and Social Change	0,31	0,39	92
Operational Research	0,31	0,39	92
Economics of Innovation and New Technology	0,31	0,39	92
International Journal of Operations and Quantitative Management	0,31	0,38	95
Electronic Commerce Research and Applications	0,31	0,38	95
International Transactions in Operational Research	0,30	0,36	97
Interfaces	0,30	0,36	97
International Journal of Work Innovation	0,30	0,35	99
Asian Journal of Shipping and Logistics	0,30	0,33	100
Technovation	0,29	0,33	100
International Journal of Selection and Assessment	0,28	0,29	102
Journal of Information Systems	0,28	0,29	102
Knowledge Management and E-Learning	0,28	0,29	102
Journal of Technology Management and Innovation	0,28	0,28	105
System Dynamics Review	0,28	0,26	106
Journal of Management Control	0,28	0,26	106
International Labour Review	0,28	0,26	106
Research Technology Management	0,27	0,25	109
Journal of Labor Research	0,27	0,24	110
Journal of Economics and Management Strategy	0,26	0,21	111
Electricity Journal	0,25	0,16	112
International Journal of Human Capital and Information Technology Professionals	0,25	0,16	112
Journal of Direct, Data and Digital Marketing Practice	0,25	0,15	114
Journal of High Technology Management Research	0,24	0,14	115
Group Decision and Negotiation	0,23	0,10	116
International Journal of Information System Modeling and Design	0,22	0,05	117
Review of Industrial Organization	0,21	0,00	118

Table 21 (Closeness Centrality)

Harmonic Closeness Centrality

Title	harmonicclosenesscentrality	Normalized Har Rank	
Journal of International Business Studies	0,53	1,00	1
Journal of Management Studies	0,52	0,95	2
International Journal of Business Innovation and Research	0,52	0,95	2
International Journal of Management Reviews	0,51	0,93	4
Organization Studies	0,51	0,92	5
Academy of Management Journal	0,50	0,90	6
International Journal of Human Resource Management	0,50	0,89	7
Academy of Management Review	0,50	0,88	8
European Journal of Innovation Management	0,49	0,87	9
British Journal of Management	0,49	0,87	9
Journal of Small Business Management	0,49	0,85	11
Canadian Journal of Administrative Sciences	0,48	0,83	12
Human Relations	0,48	0,81	13
International Journal of Technological Learning, Innovation and Development	0,47	0,78	14
Journal of Organizational Change Management	0,46	0,77	15
Supply Chain Forum	0,46	0,77	15
Journal of Management Inquiry	0,46	0,77	15
International Journal of Innovation and Learning	0,46	0,75	18
Knowledge Management Research and Practice	0,46	0,75	18
Production and Operations Management	0,46	0,75	18
Baltic Journal of Management	0,45	0,74	21
Knowledge Management	0,45	0,74	21
Journal of Knowledge Management	0,45	0,74	21
Organization	0,45	0,74	21
Organization Science	0,45	0,73	25
International Journal of Knowledge-Based Development	0,45	0,73	25
International Journal of Operations and Production Management	0,45	0,72	27
International Entrepreneurship and Management Journal	0,45	0,71	28
International Journal of Physical Distribution and Logistics Management	0,44	0,70	29
Operations Management Research	0,44	0,70	29
International Journal of Shipping and Transport Logistics	0,44	0,68	31
International Journal of Entrepreneurship and Innovation Management	0,44	0,68	31
International Journal of Entrepreneurship and Innovation	0,43	0,67	32
International Journal of Entrepreneurial Venturing	0,43	0,67	32
International Journal of Enterprise Network Management	0,43	0,66	35
Industrial and Labor Relations Review	0,43	0,65	36
International Journal of Innovation and Sustainable Development	0,42	0,65	36
Decision Sciences	0,42	0,65	36
New Technology, Work and Employment	0,42	0,65	36
International Journal of Services and Operations Management	0,42	0,64	39
Creativity and Innovation Management	0,42	0,64	39
International Journal of Technology Intelligence and Planning	0,42	0,64	39
International Journal of Services and Standards	0,42	0,64	39
International Journal of Business Information Systems	0,42	0,63	44
International Journal of Innovation and Technology Management	0,42	0,63	44

Management Learning	0,42	0,62	46
International Journal of Intelligent Enterprise	0,42	0,62	46
Industrial Relations	0,41	0,61	48
Intangible Capital	0,41	0,61	48
Knowledge and Process Management	0,41	0,61	48
International Journal of Foresight and Innovation Policy	0,41	0,61	48
International Journal of Innovation Management	0,41	0,59	52
Organizational Research Methods	0,41	0,59	52
Human Resource Management	0,41	0,59	52
Research Policy	0,41	0,58	55
Corporate Governance	0,40	0,58	55
International Journal of Accounting and Information Management	0,40	0,57	57
International Journal of Knowledge Management	0,40	0,57	57
Service Industries Journal	0,40	0,56	59
International Journal of Product Development	0,40	0,55	60
International Journal of Biotechnology	0,39	0,54	61
Journal of Product Innovation Management	0,39	0,53	62
International Journal of Manpower	0,39	0,53	62
International Journal of Information and Decision Sciences	0,39	0,53	62
International Journal of Knowledge Management Studies	0,39	0,52	65
Journal of Personal Selling and Sales Management	0,38	0,51	66
British Journal of Industrial Relations	0,38	0,51	66
Electronic Markets	0,38	0,51	66
Innovation: Management, Policy and Practice	0,38	0,50	69
Team Performance Management	0,38	0,50	69
International Journal of Technology Management and Sustainable Development	0,38	0,50	69
Creative Industries Journal	0,38	0,49	72
International Journal of Electronic Finance	0,38	0,49	72
R and D Management	0,38	0,49	72
Industry and Innovation	0,38	0,49	72
International Journal of Project Management	0,38	0,49	72
Journal of Business Venturing	0,37	0,47	77
International Journal of Conflict Management	0,37	0,47	77
Asian Journal of Technology Innovation	0,37	0,47	77
Journal of Human Resources	0,36	0,45	80
Public Management Review	0,36	0,44	81
Public Personnel Management	0,36	0,44	81
Journal of Science and Technology Policy Management	0,36	0,44	81
Technological Forecasting and Social Change	0,36	0,43	84
European Journal of Industrial Relations	0,36	0,43	84
Journal of Product and Brand Management	0,36	0,43	84
Managerial and Decision Economics	0,36	0,42	87
Economic and Industrial Democracy	0,35	0,42	87
Project Management Journal	0,35	0,41	89
Electronic Commerce Research and Applications	0,35	0,40	90
Journal of Business Venturing Insights	0,35	0,40	90
Operational Research	0,35	0,39	92

Quality Technology and Quantitative Management	0,34	0,39	92
International Journal of Operations and Quantitative Management	0,34	0,38	94
International Transactions in Operational Research	0,34	0,38	94
Technovation	0,34	0,37	96
Interfaces	0,34	0,37	96
Economics of Innovation and New Technology	0,34	0,36	98
Journal of Textile and Apparel, Technology and Management	0,33	0,35	99
International Journal of Work Innovation	0,33	0,34	100
Asian Journal of Shipping and Logistics	0,32	0,33	101
International Journal of Selection and Assessment	0,31	0,28	102
Journal of Information Systems	0,31	0,28	102
Research Technology Management	0,31	0,26	104
Knowledge Management and E-Learning	0,31	0,26	104
Journal of Technology Management and Innovation	0,30	0,26	104
System Dynamics Review	0,30	0,26	104
International Labour Review	0,30	0,25	108
Journal of Management Control	0,30	0,24	109
Journal of Labor Research	0,29	0,22	110
Journal of Economics and Management Strategy	0,29	0,22	110
International Journal of Human Capital and Information Technology Professionals	0,27	0,15	112
Journal of High Technology Management Research	0,27	0,15	112
Electricity Journal	0,27	0,15	112
Journal of Direct, Data and Digital Marketing Practice	0,26	0,12	115
Group Decision and Negotiation	0,25	0,10	116
International Journal of Information System Modeling and Design	0,24	0,04	117
Review of Industrial Organization	0,22	0,00	118

Table 22 (Harmonic Closeness Centrality)

HITS

Title	authority or hub	Normalized author Rank	
Journal of Product and Brand Management	0,31	1,00	1
Academy of Management Review	0,27	0,87	2
International Labour Review	0,26	0,85	3
Research Policy	0,26	0,84	4
Journal of Knowledge Management	0,25	0,81	5
Academy of Management Journal	0,25	0,80	6
Industry and Innovation	0,24	0,77	7
Intangible Capital	0,22	0,73	8
Journal of Personal Selling and Sales Management	0,22	0,72	9
Journal of High Technology Management Research	0,21	0,68	10
Knowledge and Process Management	0,21	0,67	10
Knowledge Management	0,18	0,57	12
Organization Studies	0,17	0,54	13
New Technology, Work and Employment	0,15	0,48	14
Journal of Product Innovation Management	0,14	0,46	15
Electricity Journal	0,14	0,45	15
International Journal of Innovation and Technology Management	0,11	0,36	17
Journal of Economics and Management Strategy	0,11	0,35	17
Group Decision and Negotiation	0,10	0,33	19
International Journal of Business Innovation and Research	0,08	0,27	20
International Journal of Information System Modeling and Design	0,08	0,26	20
International Journal of Management Reviews	0,07	0,22	21
Knowledge Management and E-Learning	0,06	0,21	22
International Journal of Shipping and Transport Logistics	0,06	0,20	22
International Journal of Physical Distribution and Logistics Management	0,06	0,20	22
Review of Industrial Organization	0,06	0,20	22
International Journal of Conflict Management	0,05	0,18	27
Creativity and Innovation Management	0,05	0,16	27
International Journal of Knowledge Management Studies	0,05	0,15	27
International Journal of Technology Intelligence and Planning	0,04	0,14	30
Human Relations	0,04	0,14	30
International Journal of Human Capital and Information Technology Professionals	0,04	0,14	30
Industrial Relations	0,04	0,13	33
Journal of Business Venturing Insights	0,04	0,13	33
British Journal of Industrial Relations	0,04	0,12	35
International Journal of Selection and Assessment	0,04	0,12	35
International Journal of Technology Intelligence and Planning	0,04	0,14	35
Human Relations	0,04	0,14	35
International Journal of Human Capital and Information Technology Professionals	0,04	0,14	39
Research Journal of Business Management	0,04	0,14	39
Industrial Relations	0,04	0,13	39
Journal of Business Venturing Insights	0,04	0,13	39
British Journal of Industrial Relations	0,04	0,12	43
International Journal of Selection and Assessment	0,04	0,12	43

Electronic Markets	0,04	0,12	35
International Journal of Human Resource Management	0,04	0,12	35
Decision Sciences	0,04	0,11	39
International Journal of Entrepreneurship and Innovation	0,03	0,11	39
R and D Management	0,03	0,11	39
Journal of Direct, Data and Digital Marketing Practice	0,03	0,11	39
Organization Science	0,03	0,10	43
Journal of Organizational Change Management	0,03	0,10	43
International Journal of Technological Learning, Innovation and Development	0,03	0,10	43
Journal of Management Studies	0,03	0,09	46
Service Industries Journal	0,03	0,09	46
Technological Forecasting and Social Change	0,03	0,09	46
Journal of Management Inquiry	0,03	0,09	46
International Journal of Enterprise Network Management	0,02	0,08	50
Asian Journal of Technology Innovation	0,02	0,08	50
European Journal of Industrial Relations	0,02	0,08	50
Public Personnel Management	0,02	0,08	50
International Journal of Biotechnology	0,02	0,08	50
Journal of Technology Management and Innovation	0,02	0,08	50
International Journal of Entrepreneurial Venturing	0,02	0,08	50
International Journal of Project Management	0,02	0,07	57
Journal of Information Systems	0,02	0,07	57
Journal of Labor Research	0,02	0,06	59
Human Resource Management	0,02	0,06	59
Supply Chain Forum	0,02	0,06	59
Industrial and Labor Relations Review	0,02	0,05	62
International Journal of Knowledge-Based Development	0,02	0,05	62
Canadian Journal of Administrative Sciences	0,02	0,05	62
International Journal of Accounting and Information Management	0,02	0,05	62
Knowledge Management Research and Practice	0,01	0,05	62
Operational Research	0,01	0,05	62
International Entrepreneurship and Management Journal	0,01	0,05	62
International Journal of Operations and Production Management	0,01	0,04	69
Journal of Management Control	0,01	0,04	69
Economic and Industrial Democracy	0,01	0,04	69
European Journal of Innovation Management	0,01	0,03	72
International Journal of Product Development	0,01	0,03	72
Team Performance Management	0,01	0,03	72
Journal of Textile and Apparel, Technology and Management	0,01	0,03	72
International Journal of Manpower	0,01	0,03	72
International Journal of Innovation Management	0,01	0,02	77
International Journal of Services and Operations Management	0,01	0,02	77
Electronic Commerce Research and Applications	0,01	0,02	77
Production and Operations Management	0,01	0,02	77
Corporate Governance	0,01	0,02	77
Journal of Business Venturing	0,00	0,01	82

International Journal of Technology Management and Sustainable Development	0,00	0,01	82
System Dynamics Review	0,00	0,01	82
Project Management Journal	0,00	0,01	82
International Journal of Intelligent Enterprise	0,00	0,00	86
Creative Industries Journal	0,00	0,00	86
International Journal of Knowledge Management	0,00	0,00	86
International Journal of Business Information Systems	0,00	0,00	86
Quality Technology and Quantitative Management	0,00	0,00	86
Asian Journal of Shipping and Logistics	0,00	0,00	86
International Journal of Foresight and Innovation Policy	0,00	0,00	86
Baltic Journal of Management	0,00	0,00	86
British Journal of Management	0,00	0,00	86
Economics of Innovation and New Technology	0,00	0,00	86
Innovation: Management, Policy and Practice	0,00	0,00	86
Interfaces	0,00	0,00	86
International Journal of Electronic Finance	0,00	0,00	86
International Journal of Entrepreneurship and Innovation Management	0,00	0,00	86
International Journal of Information and Decision Sciences	0,00	0,00	86
International Journal of Innovation and Learning	0,00	0,00	86
International Journal of Innovation and Sustainable Development	0,00	0,00	86
International Journal of Operations and Quantitative Management	0,00	0,00	86
International Journal of Services and Standards	0,00	0,00	86
International Journal of Work Innovation	0,00	0,00	86
International Transactions in Operational Research	0,00	0,00	86
Journal of Human Resources	0,00	0,00	86
Journal of International Business Studies	0,00	0,00	86
Journal of Science and Technology Policy Management	0,00	0,00	86
Journal of Small Business Management	0,00	0,00	86
Management Learning	0,00	0,00	86
Managerial and Decision Economics	0,00	0,00	86
Operations Management Research	0,00	0,00	86
Organization	0,00	0,00	86
Organizational Research Methods	0,00	0,00	86
Public Management Review	0,00	0,00	86
Research Technology Management	0,00	0,00	86
Technovation	0,00	0,00	86

Table 23 (HITS)

Eigenvector Centrality

Title	eigencentality	Rank
Journal of Management Studies	1,00	1
Academy of Management Review	0,87	2
International Journal of Management Reviews	0,86	3
Organization Studies	0,85	4
Human Relations	0,84	5
Academy of Management Journal	0,82	6
British Journal of Management	0,82	7
Journal of International Business Studies	0,81	8
International Journal of Human Resource Management	0,74	9
Journal of Management Inquiry	0,71	10
Journal of Organizational Change Management	0,69	11
Organization	0,66	12
Canadian Journal of Administrative Sciences	0,60	13
Management Learning	0,53	14
Organization Science	0,49	15
Organizational Research Methods	0,45	16
Human Resource Management	0,44	17
International Journal of Business Innovation and Research	0,44	17
European Journal of Innovation Management	0,43	19
Journal of Small Business Management	0,39	20
New Technology, Work and Employment	0,36	21
Industrial Relations	0,34	22
Industrial and Labor Relations Review	0,33	23
International Journal of Knowledge-Based Development	0,33	23
Knowledge Management Research and Practice	0,28	25
Supply Chain Forum	0,27	26
Journal of Knowledge Management	0,27	26
Knowledge Management	0,27	26
Baltic Journal of Management	0,27	26
International Entrepreneurship and Management Journal	0,27	26
International Journal of Innovation and Learning	0,26	31
International Journal of Technological Learning, Innovation and Development	0,25	32
International Journal of Conflict Management	0,22	33
Service Industries Journal	0,22	33
Operations Management Research	0,22	33
International Journal of Shipping and Transport Logistics	0,21	36
Production and Operations Management	0,21	36
International Journal of Enterprise Network Management	0,21	36

British Journal of Industrial Relations	0,20	39
International Journal of Operations and Production Management	0,20	39
Corporate Governance	0,20	39
Intangible Capital	0,19	42
International Journal of Business Information Systems	0,19	42
International Journal of Physical Distribution and Logistics Management	0,19	42
International Journal of Innovation and Sustainable Development	0,19	42
International Journal of Services and Standards	0,18	46
Decision Sciences	0,18	46
International Journal of Services and Operations Management	0,18	46
International Journal of Entrepreneurship and Innovation Management	0,17	49
International Journal of Innovation Management	0,16	50
Knowledge and Process Management	0,16	50
International Journal of Technology Intelligence and Planning	0,16	50
International Journal of Entrepreneurship and Innovation	0,16	50
International Journal of Entrepreneurial Venturing	0,16	50
Innovation: Management, Policy and Practice	0,15	55
International Journal of Accounting and Information Management	0,15	55
Journal of Human Resources	0,15	55
Team Performance Management	0,15	55
International Journal of Intelligent Enterprise	0,14	59
Industry and Innovation	0,14	59
Creative Industries Journal	0,14	59
Creativity and Innovation Management	0,14	59
International Journal of Manpower	0,13	63
International Journal of Foresight and Innovation Policy	0,13	63
International Journal of Knowledge Management Studies	0,13	63
European Journal of Industrial Relations	0,13	63
International Journal of Knowledge Management	0,13	63
Research Policy	0,13	63
International Journal of Innovation and Technology Management	0,12	69
International Journal of Electronic Finance	0,12	69
Managerial and Decision Economics	0,12	69
International Journal of Product Development	0,12	69
Economic and Industrial Democracy	0,12	69
International Journal of Information and Decision Sciences	0,11	74
Public Management Review	0,10	75
Public Personnel Management	0,10	75
International Journal of Biotechnology	0,10	75
Journal of Personal Selling and Sales Management	0,09	78
Journal of Product Innovation Management	0,09	78
International Journal of Technology Management and Sustainable Development	0,09	78
R and D Management	0,08	81
International Journal of Project Management	0,08	81
Project Management Journal	0,08	81
Asian Journal of Technology Innovation	0,08	81

International Journal of Work Innovation	0,08	81
Journal of Business Venturing	0,08	87
Journal of Product and Brand Management	0,07	87
Electronic Markets	0,07	89
International Journal of Selection and Assessment	0,06	89
Journal of Business Venturing Insights	0,06	89
Technological Forecasting and Social Change	0,06	89
Journal of Science and Technology Policy Management	0,06	89
Operational Research	0,06	89
Quality Technology and Quantitative Management	0,06	89
Interfaces	0,06	96
International Transactions in Operational Research	0,05	96
International Journal of Operations and Quantitative Management	0,05	96
Technovation	0,05	96
Electronic Commerce Research and Applications	0,05	100
International Labour Review	0,04	100
Journal of Textile and Apparel, Technology and Management	0,04	100
Asian Journal of Shipping and Logistics	0,04	100
Economics of Innovation and New Technology	0,04	104
Research Technology Management	0,03	104
Journal of Labor Research	0,03	104
Knowledge Management and E-Learning	0,03	107
Journal of Technology Management and Innovation	0,02	107
Journal of Economics and Management Strategy	0,02	107
Journal of Information Systems	0,02	107
System Dynamics Review	0,02	107
Journal of Management Control	0,02	112
Journal of High Technology Management Research	0,01	112
Electricity Journal	0,01	112
International Journal of Human Capital and Information Technology Professionals	0,01	112
Journal of Direct, Data and Digital Marketing Practice	0,01	112
Group Decision and Negotiation	0,01	117
International Journal of Information System Modeling and Design	0,00	117

Table 24 (Eigenvector Centrality)

PageRank

Title	pageranks	Normalized Pag Rank	
Journal of Management Studies	0,02	1,00	1
International Journal of Business Innovation and Research	0,02	0,88	2
Production and Operations Management	0,02	0,88	2
Journal of International Business Studies	0,02	0,86	4
Academy of Management Journal	0,02	0,82	5
Organization Studies	0,02	0,79	6
International Journal of Human Resource Management	0,02	0,78	7
International Journal of Management Reviews	0,02	0,77	8
Human Relations	0,02	0,76	9
British Journal of Management	0,02	0,74	10
Academy of Management Review	0,02	0,69	11
Journal of Small Business Management	0,01	0,64	12
International Journal of Entrepreneurship and Innovation Management	0,01	0,62	13
International Journal of Physical Distribution and Logistics Management	0,01	0,62	13
International Journal of Innovation and Learning	0,01	0,61	15
Canadian Journal of Administrative Sciences	0,01	0,61	15
International Journal of Technological Learning, Innovation and Development	0,01	0,59	17
Knowledge Management Research and Practice	0,01	0,58	18
European Journal of Innovation Management	0,01	0,55	19
International Journal of Shipping and Transport Logistics	0,01	0,51	20
Organization	0,01	0,50	21
Supply Chain Forum	0,01	0,50	21
Industrial and Labor Relations Review	0,01	0,50	21
Journal of Organizational Change Management	0,01	0,49	24
Journal of Management Inquiry	0,01	0,49	24
Organization Science	0,01	0,46	26
Knowledge Management	0,01	0,45	27
Journal of Knowledge Management	0,01	0,45	27
International Journal of Business Information Systems	0,01	0,45	27
International Journal of Operations and Production Management	0,01	0,44	30
International Journal of Enterprise Network Management	0,01	0,43	31
Baltic Journal of Management	0,01	0,41	32
International Journal of Foresight and Innovation Policy	0,01	0,41	32
Operations Management Research	0,01	0,40	34
Creativity and Innovation Management	0,01	0,40	34
International Entrepreneurship and Management Journal	0,01	0,39	36
International Journal of Innovation Management	0,01	0,38	37
International Journal of Services and Standards	0,01	0,38	37
International Journal of Innovation and Technology Management	0,01	0,38	37
International Journal of Accounting and Information Management	0,01	0,38	37
Research Policy	0,01	0,37	41
International Journal of Product Development	0,01	0,36	42
Intangible Capital	0,01	0,36	42
Industrial Relations	0,01	0,36	42
Electronic Markets	0,01	0,35	45
International Journal of Knowledge-Based Development	0,01	0,35	45

International Journal of Technology Intelligence and Planning	0,01	0,34	47
R and D Management	0,01	0,33	48
Journal of Product Innovation Management	0,01	0,33	48
International Journal of Project Management	0,01	0,32	50
Knowledge and Process Management	0,01	0,32	50
Management Learning	0,01	0,32	50
British Journal of Industrial Relations	0,01	0,32	50
Technovation	0,01	0,31	54
International Journal of Intelligent Enterprise	0,01	0,30	55
New Technology, Work and Employment	0,01	0,30	55
International Journal of Entrepreneurship and Innovation	0,01	0,29	57
Decision Sciences	0,01	0,29	57
Human Resource Management	0,01	0,29	57
Technological Forecasting and Social Change	0,01	0,29	57
International Journal of Services and Operations Management	0,01	0,29	57
International Journal of Biotechnology	0,01	0,28	62
International Journal of Innovation and Sustainable Development	0,01	0,27	63
International Journal of Information and Decision Sciences	0,01	0,25	64
Organizational Research Methods	0,01	0,24	65
Journal of Information Systems	0,01	0,24	66
Electronic Commerce Research and Applications	0,01	0,24	66
International Journal of Entrepreneurial Venturing	0,01	0,24	66
Service Industries Journal	0,01	0,24	66
Journal of Product and Brand Management	0,01	0,24	66
International Journal of Knowledge Management	0,01	0,23	71
Journal of Business Venturing	0,01	0,23	71
International Journal of Knowledge Management Studies	0,01	0,23	71
Journal of Economics and Management Strategy	0,01	0,22	74
Corporate Governance	0,01	0,22	71
Asian Journal of Technology Innovation	0,01	0,20	76
Industry and Innovation	0,01	0,19	77
International Journal of Electronic Finance	0,01	0,19	77
Interfaces	0,01	0,18	79
Operational Research	0,01	0,18	79
Innovation: Management, Policy and Practice	0,01	0,17	81
Journal of Science and Technology Policy Management	0,01	0,16	82
European Journal of Industrial Relations	0,01	0,16	82
Creative Industries Journal	0,00	0,15	84
International Journal of Manpower	0,00	0,14	85
Team Performance Management	0,00	0,14	85
International Journal of Technology Management and Sustainable Development	0,00	0,14	85
International Journal of Conflict Management	0,00	0,13	88
Managerial and Decision Economics	0,00	0,13	88
International Journal of Operations and Quantitative Management	0,00	0,12	90
International Transactions in Operational Research	0,00	0,11	91
Journal of Business Venturing Insights	0,00	0,11	91
Public Management Review	0,00	0,11	91

Public Personnel Management	0,00	0,11	91
Journal of Personal Selling and Sales Management	0,00	0,10	95
Economic and Industrial Democracy	0,00	0,10	95
Journal of Human Resources	0,00	0,09	97
Journal of High Technology Management Research	0,00	0,07	98
Journal of Technology Management and Innovation	0,00	0,07	98
International Labour Review	0,00	0,06	100
Research Technology Management	0,00	0,06	100
International Journal of Information System Modeling and Design	0,00	0,06	100
Asian Journal of Shipping and Logistics	0,00	0,06	100
Journal of Direct, Data and Digital Marketing Practice	0,00	0,06	100
Quality Technology and Quantitative Management	0,00	0,05	105
Economics of Innovation and New Technology	0,00	0,05	105
Review of Industrial Organization	0,00	0,05	105
Project Management Journal	0,00	0,05	105
Group Decision and Negotiation	0,00	0,03	109
International Journal of Human Capital and Information Technology Professionals	0,00	0,02	110
Electricity Journal	0,00	0,02	110
System Dynamics Review	0,00	0,01	112
Journal of Labor Research	0,00	0,01	112
Journal of Management Control	0,00	0,01	112
Knowledge Management and E-Learning	0,00	0,00	115
Journal of Textile and Apparel, Technology and Management	0,00	0,00	115
International Journal of Selection and Assessment	0,00	0,00	115
International Journal of Work Innovation	0,00	0,00	115

Table 25 (Page Rank)

WeightedDegree

Title	weighted de Normalized Weighte Rank		
Academy of Management Journal	127	1.00	1
Journal of Management Studies	123	0.97	2
Organization Studies	99	0.78	3
Academy of Management Review	85	0.67	4
Organization Science	68	0.54	5
Organization	57	0.45	6
Human Relations	53	0.42	7
Journal of International Business Studies	47	0.37	8
Knowledge Management	46	0.36	9
Journal of Knowledge Management	46	0.36	9
International Journal of Human Resource Management	45	0.35	11
Production and Operations Management	42	0.33	12
British Journal of Management	36	0.28	13
Journal of Management Inquiry	33	0.26	14
International Journal of Management Reviews	33	0.26	14
Management Learning	27	0.21	16
Journal of Small Business Management	26	0.20	17
Decision Sciences	23	0.18	18
Human Resource Management	21	0.17	19
International Journal of Entrepreneurship and Innovation Management	21	0.17	19
Canadian Journal of Administrative Sciences	20	0.16	21
International Journal of Business Innovation and Research	20	0.16	21
Industrial and Labor Relations Review	19	0.15	23
British Journal of Industrial Relations	18	0.14	24
Knowledge Management Research and Practice	18	0.14	24
International Journal of Technological Learning, Innovation and Development	18	0.14	24
Supply Chain Forum	18	0.14	24
Journal of Organizational Change Management	17	0.13	28
International Journal of Innovation and Learning	17	0.13	28
International Journal of Physical Distribution and Logistics Management	17	0.13	28
International Journal of Services and Standards	16	0.13	28
Operational Research	16	0.13	28
European Journal of Innovation Management	16	0.13	28
Organizational Research Methods	15	0.12	34
International Journal of Shipping and Transport Logistics	14	0.11	35
Creativity and Innovation Management	14	0.11	35
International Journal of Entrepreneurship and Innovation	14	0.11	35
Journal of Product Innovation Management	13	0.10	38
International Journal of Operations and Production Management	13	0.10	38
Operations Management Research	13	0.10	38
Industrial Relations	12	0.09	41
International Journal of Business Information Systems	12	0.09	41
International Journal of Enterprise Network Management	12	0.09	41
Research Policy	12	0.09	41
Journal of Business Venturing	12	0.09	41
Industry and Innovation	11	0.09	41
Baltic Journal of Management	11	0.09	41

International Journal of Accounting and Information Management	11	0,09	41
International Journal of Foresight and Innovation Policy	11	0,09	41
International Journal of Innovation Management	11	0,09	41
International Journal of Knowledge-Based Development	10	0,08	51
Technovation	10	0,08	51
International Journal of Product Development	10	0,08	51
Journal of Business Venturing Insights	10	0,08	51
International Entrepreneurship and Management Journal	10	0,08	51
New Technology, Work and Employment	9	0,07	56
International Journal of Electronic Finance	9	0,07	56
Intangible Capital	9	0,07	56
Knowledge and Process Management	9	0,07	56
International Journal of Technology Intelligence and Planning	9	0,07	56
International Journal of Innovation and Technology Management	9	0,07	56
International Journal of Innovation and Sustainable Development	8	0,06	62
International Journal of Knowledge Management Studies	8	0,06	62
International Journal of Services and Operations Management	8	0,06	62
International Journal of Knowledge Management	8	0,06	62
International Journal of Biotechnology	8	0,06	62
R and D Management	8	0,06	62
Technological Forecasting and Social Change	8	0,06	62
International Journal of Information and Decision Sciences	8	0,06	62
Electronic Markets	8	0,06	62
European Journal of Industrial Relations	7	0,06	62
Service Industries Journal	7	0,06	62
International Journal of Intelligent Enterprise	7	0,06	62
Asian Journal of Technology Innovation	7	0,06	62
Corporate Governance	6	0,05	75
Innovation: Management, Policy and Practice	6	0,05	75
International Journal of Project Management	6	0,05	75
International Journal of Entrepreneurial Venturing	6	0,05	75
Electronic Commerce Research and Applications	5	0,04	79
International Journal of Conflict Management	4	0,03	80
Team Performance Management	4	0,03	80
Economic and Industrial Democracy	4	0,03	80
Creative Industries Journal	4	0,03	80
International Journal of Technology Management and Sustainable Development	4	0,03	80
International Transactions in Operational Research	4	0,03	80
International Journal of Operations and Quantitative Management	4	0,03	80
International Journal of Manpower	4	0,03	80
Journal of Personal Selling and Sales Management	4	0,03	80
Journal of Science and Technology Policy Management	4	0,03	80
Interfaces	4	0,03	80
Journal of Economics and Management Strategy	3	0,02	91
Journal of Human Resources	3	0,02	91
Managerial and Decision Economics	3	0,02	91
Asian Journal of Shipping and Logistics	3	0,02	91

Public Personnel Management	3	0,02	91
Public Management Review	3	0,02	91
Journal of Information Systems	3	0,02	91
Journal of Product and Brand Management	3	0,02	91
International Labour Review	2	0,02	91
Economics of Innovation and New Technology	2	0,02	91
Journal of High Technology Management Research	2	0,02	91
Journal of Technology Management and Innovation	2	0,02	91
Project Management Journal	2	0,02	91
Quality Technology and Quantitative Management	2	0,02	91
Research Technology Management	2	0,02	91
International Journal of Human Capital and Information Technology Professionals	2	0,02	91
International Journal of Work Innovation	1	0,01	107
Journal of Labor Research	1	0,01	107
International Journal of Selection and Assessment	1	0,01	107
Review of Industrial Organization	1	0,01	107
Knowledge Management and E-Learning	1	0,01	107
Journal of Textile and Apparel, Technology and Management	1	0,01	107
Electricity Journal	1	0,01	107
Journal of Management Control	1	0,01	107
Group Decision and Negotiation	1	0,01	107
System Dynamics Review	1	0,01	107
International Journal of Information System Modeling and Design	1	0,01	107
Journal of Direct, Data and Digital Marketing Practice	1	0,01	107

Table 26 (Weighted Degree)

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