"ANALYSING CORE THEMES AND CO-AUTHOR PATTERNS ON THE CONNECTION BETWEEN INTELLECTUAL PROPERTY RIGHTS AND SOCIAL ENTERPRISES"

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ABSTRACT:
This study focuses on deriving key issues relating to social enterprises and intellectual property rights using text mining methods, and analysing the co-author patterns of researchers working in these fields. For this purpose, the Netminer program was used to analyse journal papers published by Springer Publishing. As a result of the analysis, the research topics relating to social enterprises and intellectual property rights were, by way of a theoretical framework, classified according to nine issues: the management model of social enterprises; social enterprises and NGOs; the supply chain of social enterprises; the impact of social enterprises; environmental changes in social enterprises; social entrepreneurship; social enterprise and education; the social enterprise ecosystem; and social enterprises and NGOs.. These nine key issues represent areas of great importance in terms of business activities that link social enterprises and intellectual property rights. Contrastingly, examination of the co-author patterns of authors discussing social enterprises and intellectual property rights suggests that those employing multi-disciplinary approaches should engage more actively in joint research activities. Though such authors have achieved notable results to date, their engaging more actively in joint research activities should enhance the success of policies linking social enterprises and intellectual property rights.

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1 INTRODUCTION

Today, social enterprise is an institution that a ddresses the weaknesses of the capitalist mark et economy, and academic studies exploring th is are being conducted in numerous countries. In addition, public officials in charge of soci al enterprises have been expending a great de al of effort on the enactment and revision of various laws, and the incentives and support s ystems for spreading these laws. In particular, in developing countries which are receiving a id from developed countries, technology to pro duce and sell is needed to start up social ente rprises and to operate them sustainably: in oth er words, practical skills are required for starti ng a business. In order to solve the problems attendant on this, it is necessary actively to provide technology for starting a business usin g the social enterprise support system. The tec hnologies that are required for developing cou ntries with low development levels are those a ppropriate to the specific case, not high-tech o nes. Appropriate technologies, as they are call ed, are not very powerful in terms of technol ogy, but involve vital real-life skills.

In order to provide such technology stably, it is necessary to utilize a great many intellectua l property rights, such as patents whose rights protection period has expired. For example, in a country that produces a lot of intellectual pr operty rights such as Korea, around 100,000 p atents are registered every year. As in many f oreign countries, patents can be used by anyo ne after twenty years' registration. In other w ords, then, the exclusive right of the patent o wner is extinguished. For example, a technolo gy registered as a patent in 2000 becomes a t echnology that anyone can use in 2020, twent y years later. Even technology registered in 2 000 in Korea can work in developing countrie s. This is because, for instance, in 2000, Kore a's per capita GDP was 1,400 dollars, while

Vietnam's per capita GDP in 2020 was around 2,500 dollars. In view of this logic, efforts to link intellectual property rights that can be used by anyone after a certain period of time of being registered in patent-developed countries, including Korea, are of great importance (Choi & Kim, 2018; Corbett & Fikkert, 2012; Cornish et al., 2010; Hurt & Schuman, 1996).

Against this background, this study examines, first, what issues are involved in linking social enterprises and intellectual property rights. Second, following the assumption that strong efforts to link social enterprises and intellectual property rights need to be made in academia, research trends to date are reviewed. Third, the study analyses which researchers have worked extensively on social enterprises and intellectual property rights, and what kind of patterns their writing shows. These research objectives have numerous implications for strengthening the linkage of intellectual property rights with social enterprises in the future.

2 RESEARCH PROBLEMS AND SURVEY DESIGN

2.1 Research problem

A social enterprise is a company that provides a certain service to the socially underprivileged, employs numerous socially underprivileged workers, and at the same time strives to achieve a social purpose rather than a profit purpose. Since social enterprises are different from enterprises operating in the general market economy, most countries provide a certain amount of support for them. These, for example, may include a plan whereby government pays the labour costs of workers employed by social enterprises. In addition, the government or government companies purchase goods or services produced by social enterprises, and they also provide administrative and financial incentives.

Government, then, provides support for social enterprises in various different ways (Mazzurco & Jesiek, 2017). But in reality, the biggest problem facing social enterprises is the lack of technology helping them to produce. In order to compensate for this, it is necessary for both central and local government to provide assistance. Appropriate technology can be a good alternative means of doing this. In other words, if the intellectual property rights of developed countries are provided to the developing countries, and residents are supported to start social enterprises using these technologies, this can be a very good alternative means of improving the lives of the citizens of developing countries (Hynes & Scott, 2013;.

Nevertheless, very little research has been conducted on social enterprises and intellectual property rights (Polak & Warwick, 2013). As a consequence, when social enterprises and intellectual property rights are linked and utilized it is impossible to grasp what is at issue, which weakens the sustainability of social enterprises. In addition, given that efforts to link social enterprises and intellectual property rights should be further strengthened in the future, it is important to establish which researchers have been conducting research in this field, and what patterns have been shown when joint research has been conducted. Against this need for problem recognition, this study has selected the following research questions:

1. What keywords can be discerned in the field of social enterprise and intellectual property rights?
2. In the field of social enterprises and intellectual property rights, how can important research topics be classified?
3. Which authors study the fields of social enterprise and intellectual property rights, and what patterns of joint research do they show?

2.2 Research design

In order to solve the above-mentioned research problem, this study analyses academic papers published in 145 journals in the social science field managed by Springer Publishing. Of these papers, only those that deal with social enterprise and intellectual property rights in the same content are extracted and analysed. For keywords, we use *social enterprise* and *intellectual property*. In other words, only papers containing these terms are selected and analysed. The analysis method chosen is text mining. Since this enables keyword analysis and topic analysis targeting of unstructured documents, it is the method best-suited to achieving the aim of this study (Blei, 2012; Markus, 2018; Son, 2005; Turner et al.,2013). In this study, three research objectives were put forward, and a combination of word cloud analysis, in-degree centrality, co-author pattern analysis and topic analysis methods was used to achieve them.

3 ANALYSIS RESULT

3.1 Topic analysis

The papers dealing with intellectual property and social enterprise totalled 425. The keywords included in these papers totalled 5,440 and the number of authors 777. The 30 words that occurred most frequently are presented in Table 1, in order of frequency. The word appearing most frequently was *business* (326 occurrences), followed by *innovation* (305 occurrences).

Table 1: Frequency of occurrence of keywords

		1	2	3	4	5
		rt of Speech(PC	Frequency	Word length	Name Type	Author Keyword
1	business	Common Noun"	326.0	8.0	"-"	"False"
2	innovation	Common Noun"	305.0	10.0	"-"	"False"
3	development	Common Noun"	238.0	11.0	"-"	"False"
4	entrepreneurship	Common Noun"	198.0	16.0	"-"	"False"
5	model	Common Noun"	158.0	5.0	"-"	"False"
6	technology	Common Noun"	139.0	10.0	"-"	"False"
7	process	Common Noun"	132.0	7.0	"-"	"False"
8	market	Common Noun"	128.0	6.0	"-"	"False"
9	approach	Common Noun"	124.0	8.0	"-"	"False"
10	knowledge	Common Noun"	123.0	9.0	"-"	"False"
11	education	Common Noun"	116.0	9.0	"-"	"False"
12	framework	Common Noun"	114.0	9.0	"-"	"False"
13	service	Common Noun"	112.0	7.0	"-"	"False"
14	challenge	Common Noun"	111.0	9.0	"-"	"False"
15	country	Common Noun"	109.0	7.0	"-"	"False"
16	policy	Common Noun"	108.0	6.0	"-"	"False"
17	system	Common Noun"	102.0	6.0	"-"	"False"
18	enterprise	Common Noun"	101.0	10.0	"-"	"False"
19	strategy	Common Noun"	100.0	8.0	"-"	"False"
20	value	Common Noun"	98.0	5.0	"-"	"False"
21	role	Common Noun"	98.0	4.0	"-"	"False"
22	organization	Common Noun"	98.0	12.0	"-"	"False"
23	university	Common Noun"	95.0	10.0	"-"	"False"
24	community	Common Noun"	93.0	9.0	"-"	"False"
25	sector	Common Noun"	92.0	6.0	"-"	"False"
26	management	Common Noun"	92.0	10.0	"-"	"False"
27	entrepreneur	Common Noun"	92.0	12.0	"-"	"False"
28	impact	Common Noun"	90.0	6.0	"-"	"False"
29	change	Common Noun"	89.0	6.0	"-"	"False"
30	resource	Common Noun"	85.0	8.0	"-"	"False"
31	issue	Common Noun"	85.0	5.0	"-"	"False"

Figure 1 represents a word cloud analysis of the words that appeared. The greater the frequency of occurrence of the word the larger its illustration will be, and the lower the frequency of occurrence of the word the smaller its illustration will be.

Figure 1: Word cloud analysis result

As a result of conducting thematic analysis us ing the words that appeared and the paper co ntaining the words, a total of ten topics were found. Figure 2 shows the results of this topi c analysis.

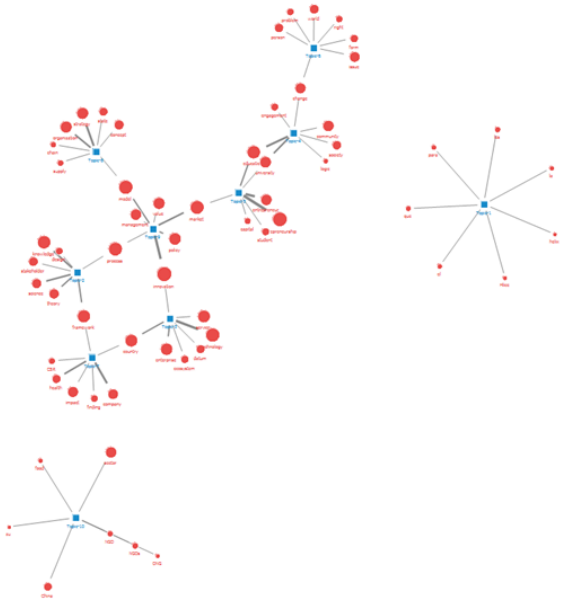

Figure 2 Results of topic analysis

The ten topics that appeared as a result of th e topic analysis will be explained individually. First, the Topic 1 is made up entirely of pre positions, which have very little thematic mea ning. Thus Topic 1 can be safely ignored, an d so will be excluded from this study, and it was deleted here..

Figure 3 shows Topic 2. Topic 2 consists of *knowledge*, *framework*, *process*, *theory*, *stakeho lder*, *science* and *design*. This may be said to be the 'theoretical framework for social enterp rise' topic. As social enterprises develop, theor ies relating to them emerge and continue to s pread.

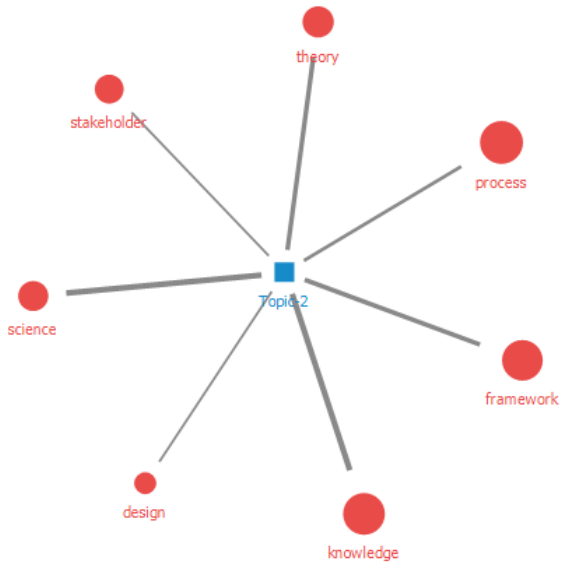

Figure 3:Topic 2: Theoretical framework for s ocial enterprise

Figure 4 shows Topic 3. Topic 3 consists of *innovation*, *enterprise*, *ecosystem*, *service*, *coun try*, *datum* and *technology*. This topic may be said to concern the ecosystem of social enter prises. It highlights the fact that in order for social enterprises to develop sustainably, such an ecosystem must be established.

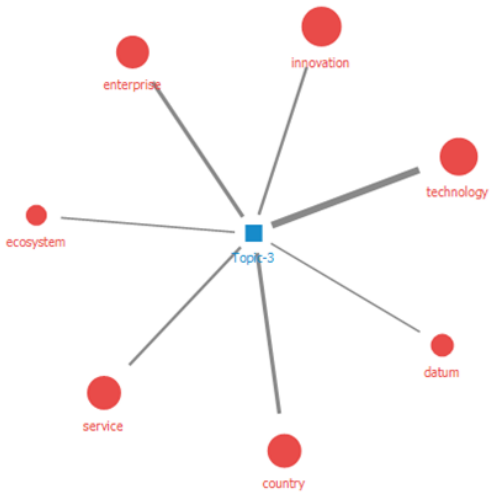

Figure 4: Topic 3: Social enterprise ecosystem

Figure 5 shows the components of Topic 4. T opic 4 consists of *education*, *university*, *engag ement*, *change*, *logic*, *society* and *community*. This may be said to be a topic relating to ed ucation and social enterprises.

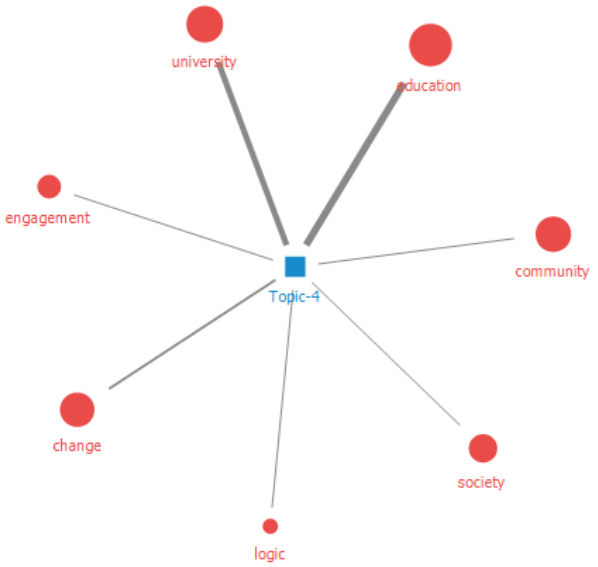

Figure 5 Topic 4: Education and social enter prise

Figure 6 shows the components of Topic 5. T opic 5 consists of *market*, *capital*, *entrepreneu rship*, *entrepreneur*, *student* and *education*. Thi s may be said to be a topic relating to social entrepreneurship.

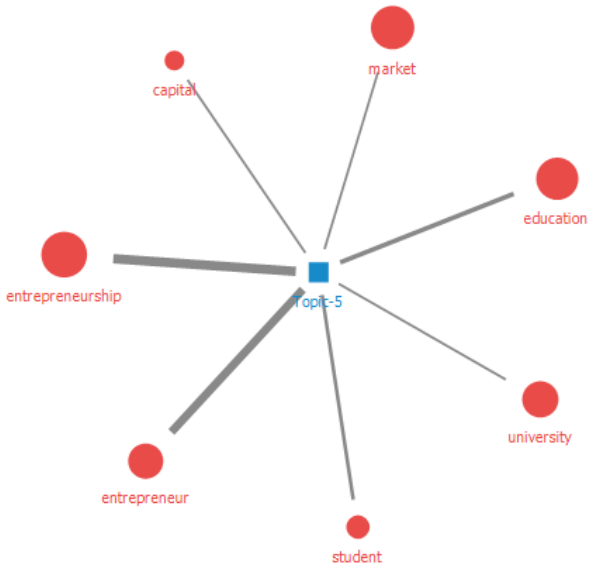

Figure 6: Topic 5: Social entrepreneurship

Figure 7 shows the components of Topic 6. T opic 6 consists of *change*, *person*, *problem*, *w orld*, *form*, *issue* and *right*. This may be said to be a topic relating to environmental change s in social enterprise.

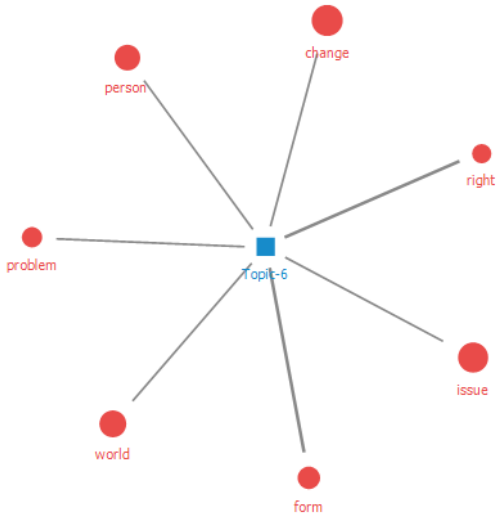

Figure 7: Topic 6: Environmental changes in social enterprise

Figure 8 shows the components of Topic 7. T opic 7 includes the words *impact*, *health*, *com pany*, *CSR* and *framework*. This may be said to be a topic relating to the impact of social enterprises.

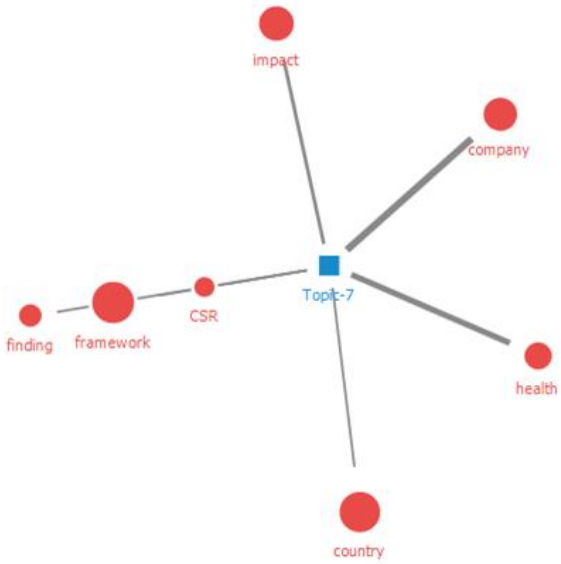

Figure 8: Topic 7: Impact of social enterprises

Figure 9 shows the components of Topic 8. T opic 8 consists of *strategy*, *chain*, *supply*, *mod el*, *concept*, *organization* and *state*. This topic concerns the supply chain of social enterprise, and relates to the intellectual property rights t o be addressed in this study.

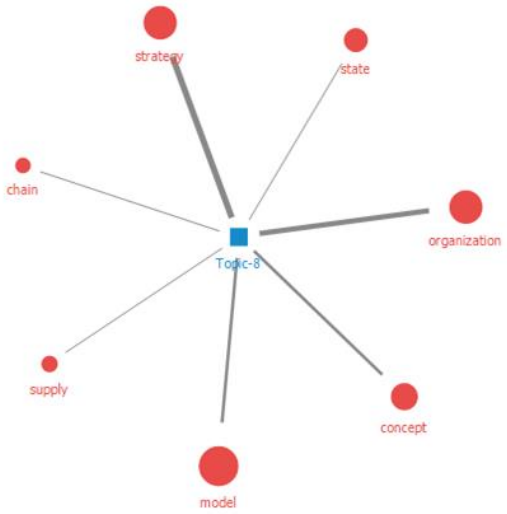

Figure 9 Topic 8: Supply chain of social ent erprises

Figure 10 shows the components of Topic 9. Topic 9 is made up of *model*, *process*, *policy*, *market*, *value*, *innovation* and *management*. T his may be called the 'social enterprise manag ement model'.

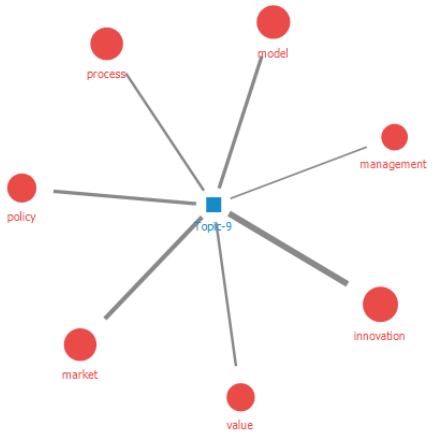

Figure 10 Topic 9: Management model of so cial enterprise

Figure 11 shows Topic 10. Topic 10 contains words such as *sector*, *ONG*, *NGO*, *China* an d *food*. This topic relates to the role of NGO s, etc., that are necessary for the functioning of social enterprises. Therefore, we can call T opic 10 a topic relating to 'social enterprises and NGOs'.

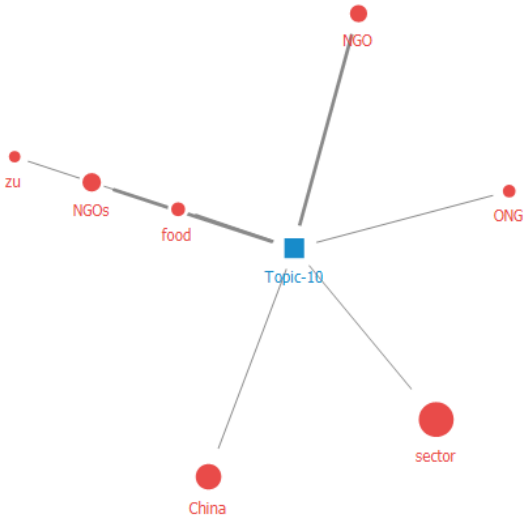

Figure 11 Topic 10: Social enterprises and N GOs

Figure 12 shows the results of a concentric ci rcle analysis of keywords relating to social en terprises and intellectual property rights. It ind icates that the words located at the centre of the concentric circles play an important role i n the network.

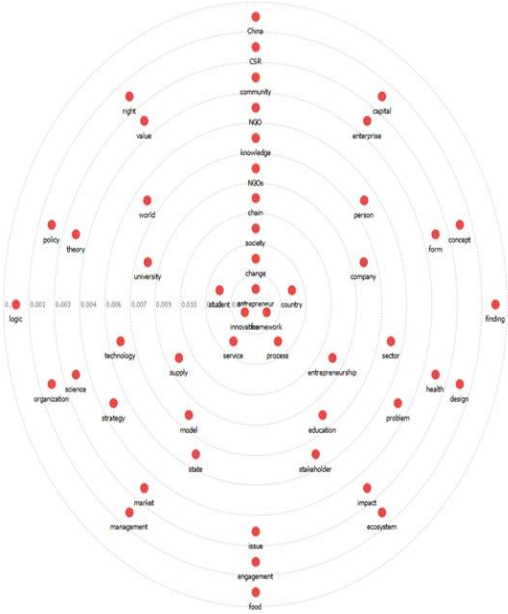

Figure 12 Concentric circle analysis result

Figure 13 shows how important keywords active in social enterprises and intellectual property networks are interrelated. This network is a simplified network, with features that show key relationships.

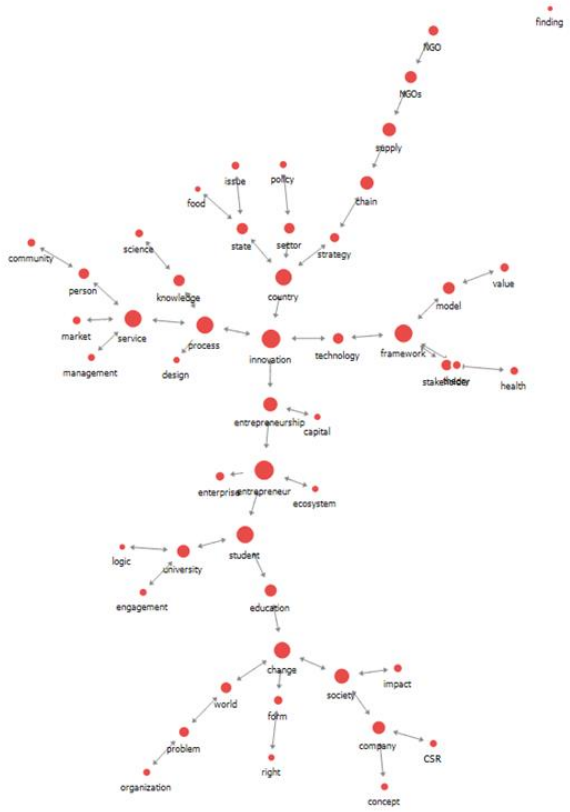

Figure 13 Simplified network

The results obtained from analysis of which words play an influential role in social enterprises and intellectual property networks are shown in Table 2. The most influential keyword in the network is *entrepreneur*, followed by *innovation*. In other words, it may be said that entrepreneurs and innovation play an important role within social enterprises and intellectual property networks.

Table 2 Degree centrality of keywords

		1	2
		In-Degree Centrality	Out-Degree Centrality
1	entrepreneur	0.014715	0.014715
2	innovation	0.014032	0.014032
3	framework	0.013467	0.013467
4	process	0.013104	0.013104
5	student	0.013065	0.013065
6	service	0.012733	0.012733
7	change	0.012254	0.012254
8	country	0.012171	0.012171
9	society	0.010596	0.010596
10	entrepreneurship	0.009763	0.009763
11	chain	0.009500	0.009500
12	supply	0.009405	0.009405
13	company	0.008772	0.008772
14	university	0.008693	0.008693
15	education	0.008043	0.008043
16	model	0.007682	0.007682
17	NGOs	0.007359	0.007359
18	state	0.007281	0.007281
19	knowledge	0.006732	0.006732
20	technology	0.006539	0.006539
21	person	0.006443	0.006443
22	world	0.006339	0.006339
23	stakeholder	0.006240	0.006240
24	sector	0.006066	0.006066
25	problem	0.005855	0.005855
26	NGO	0.005455	0.005455
27	strategy	0.005000	0.005000
28	enterprise	0.004390	0.004390
29	form	0.004299	0.004299
30	value	0.003866	0.003866

3.2 Co-author pattern analysis

The total number of authors of the 425 papers is 777. As Table 3 indicates, Efrain Turban and Marian Eabrasu are the authors who have written the most papers relating to social enterprises and intellectual property rights.

Table 3 Number of articles by authors

		1	2
		# of article	Affiliation
1	Efraim Turban	6.0	"University of Hawaii"
2	Marian Eabrasu	6.0	"South Champagne Business School"
3	ic Michael Laviole	4.0	"Toulouse Business School"
4	Nagy K. Hanna	4.0	"University of Maryland"
5	litt Nowshade Kab	4.0	""
6	ristian Timmerman	4.0	"University of Chile"
7	Jonatan Jelen	3.0	"Parsons The New School for Design"
8	Linda Lai	3.0	"Macao Polytechnic Institute"
9	Judy Strauss	3.0	"University of Nevada"
10	Deborrah C. Turba	3.0	"Turban Company Inc."
11	Ting-Peng Liang	3.0	"National Sun Yat-sen University"
12	Jae Kyu Lee	3.0	"Yonsei University"
13	David King	3.0	"JDA Software"
14	Henk van den Belt	3.0	"Wageningen University"
15	Michiel Korthals	3.0	"Wageningen University"
16	Ellie Okada	3.0	"Boston Cancer Policy Institute"
17	orah Hickling Gor	3.0	"The University of the West Indies"
18	Barry D. Friedman	3.0	"University of North Georgia"
19	Aihua Yan	2.0	of Hong Kong, Tat Chee Ave, Hong Kong"
20	Matt Katzer	2.0	""
21	Andrzej Klimczuk	2.0	"Warsaw School of Economics"
22	uart James Richar	2.0	"University of Melbourne"
23	Mary C. Lacity	2.0	"University of Missouri"
24	Ananya Rajagopal	2.0	"Universidad Anáhuac México Sur"
25	Jerzy Cieślik	2.0	"Kozminski University"
26	Sandra K. Kauanu	2.0	"Florida Gulf Coast University"
27	Eric Arseneau	2.0	"Florida Gulf Coast University"
28	ynthia L. Sherma	2.0	California State University Channel Islands"
29	Jing-Jyi Wu	2.0	"National Chengchi University"
30	Ming-Jen Yu	2.0	"National Chengchi University"

Figure 14 shows the result of word cloud analysis based on authors' names.

Figure 14 Results of word cloud analysis of authors

Figure 15 shows the activity patterns for these authors. As it indicates, some active writing activities relating to social enterprises and intellectual property rights come from co-author groups, and some authors appear to be writing articles individually. Papers relating to social enterprises and intellectual property rights characteristically span several disciplines by their nature, and so it can be said that multi-disciplinary efforts are required. Nevertheless, the co-author pattern appears to be rather basic, and so it can be said that more convergent and multi-disciplinary writing efforts are required.

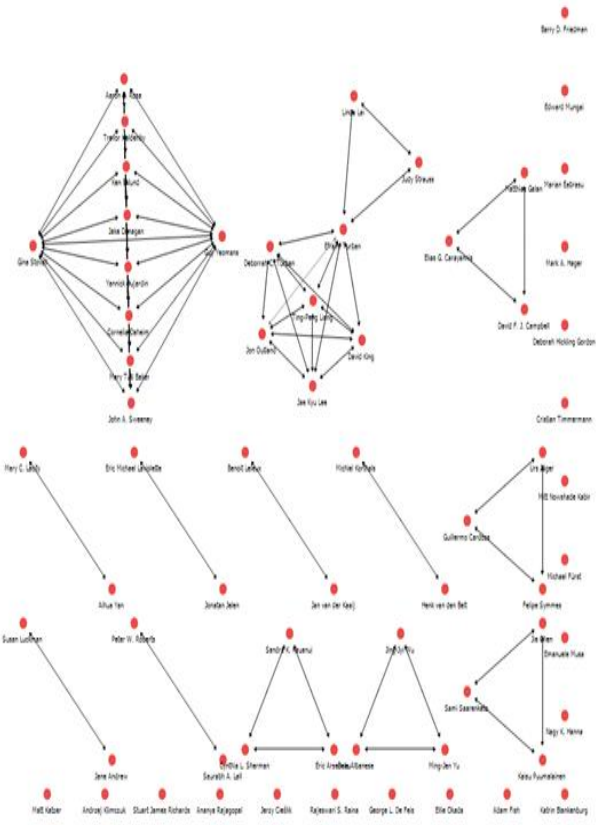

Figure 15 Co-author pattern

Figure 16 shows the results of concentric circles analysis of the authors. Authors located in the centre of the concentric circles are those showing active influence in the field of social

enterprises and intellectual property rights.

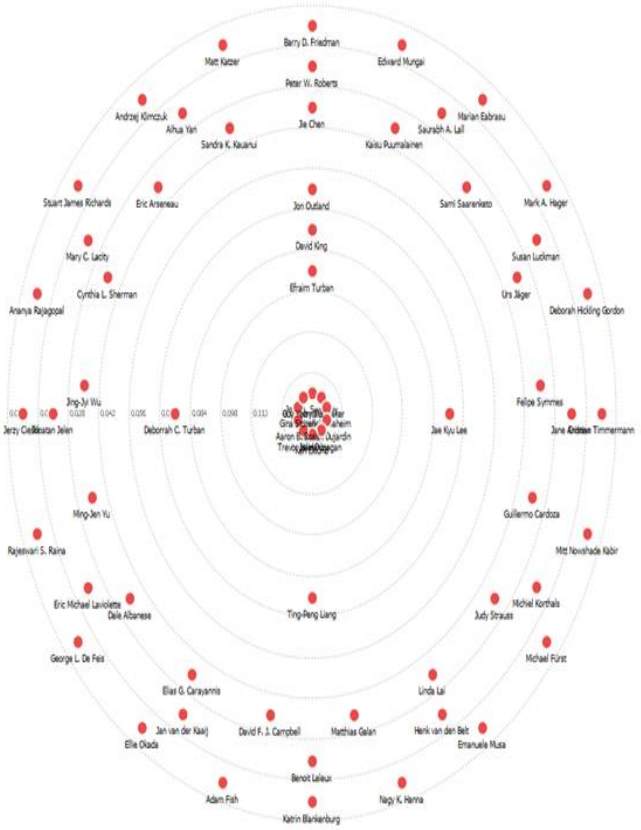

Figure 16 Results of concentric circles analysis of authors

Meanwhile, Table 4 shows the influence of these authors. The higher the in-degree centrality, the more influential authors are in the field of social enterprise and intellectual property.

Table 4 Degree centrality of authors

		1	2
		In-Degree Centrality	Out-Degree Centrality
1	Guy Yeomans	0.140625	0.140625
2	Gina Stovall	0.140625	0.140625
3	Aaron B. Rosa	0.140625	0.140625
4	Trevor Haldenby	0.140625	0.140625
5	Ken Eklund	0.140625	0.140625
6	Jake Dunagan	0.140625	0.140625
7	Yannick Dujardin	0.140625	0.140625
8	Cornelia Daheim	0.140625	0.140625
9	Mary Tuti Baker	0.140625	0.140625
10	John A. Sweeney	0.140625	0.140625
11	Efraim Turban	0.093750	0.093750
12	Deborrah C. Turban	0.078125	0.078125
13	Ting-Peng Liang	0.078125	0.078125
14	Jae Kyu Lee	0.078125	0.078125
15	David King	0.078125	0.078125
16	Jon Outland	0.062500	0.062500
17	Sandra K. Kauanui	0.031250	0.031250
18	Eric Arseneau	0.031250	0.031250
19	Cynthia L. Sherman	0.031250	0.031250
20	Jing-Jyi Wu	0.031250	0.031250
21	Ming-Jen Yu	0.031250	0.031250
22	Dale Albanese	0.031250	0.031250
23	Elias G. Carayannis	0.031250	0.031250
24	David F. J. Campbell	0.031250	0.031250
25	Matthias Galan	0.031250	0.031250
26	Linda Lai	0.031250	0.031250
27	Judy Strauss	0.031250	0.031250
28	Guillermo Cardoza	0.031250	0.031250
29	Felipe Symmes	0.031250	0.031250
30	Urs Jäger	0.031250	0.031250

4 CONCLUSIONS

In this study, papers published in 145 social science journals managed by the internationally renowned publishing company Springer were analysed using the text mining method. The aim of the study was to analyse what keywords are found in these papers, and what topics these keywords form. In addition, in reviewing the pattern displayed by co-authors of papers relating to social enterprises and intellectual property rights, we focused on drawing out the implications for research in this field in the future. As a result of the analysis, several such implications can be drawn.

First, the research topics relating to social ent

erprises and intellectual property rights can be said to constitute policy issues. From this po int of view, the results of the analysis allowe d us to classify these topics according to nine issues. These are: the management model of social enterprises; social enterprises and NGOs ; the supply chain of social enterprises; the i mpact of social enterprises; environmental cha nges in social enterprises; social entrepreneurs hip; social enterprise and education; the social enterprise ecosystem; and social enterprises a nd NGOs. These nine key issues formed a the oretical framework for the research. They repr esent areas that should be of great interest fro m the point of view of conducting business a ctivities that link social enterprises and intellec tual property rights. On the other hand, exami nation of the co-author patterns of authors wri ting about social enterprises and intellectual pr operty rights suggests that those employing m ulti-disciplinary characteristics should conduct more active joint research activities. Although such authors have achieved notable results to date, their engaging more actively in joint res earch activities should enhance the success of policies linking social enterprises and intellectu al property rights.

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