“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 addresses the weaknesses of the capitalist market economy, and academic studies exploring this are being conducted in numerous countries. In addition, public officials in charge of social enterprises have been expending a great deal of effort on the enactment and revision of various laws, and the incentives and support systems for spreading these laws. In particular, in developing countries which are receiving aid from developed countries, technology to produce and sell is needed to start up social enterprises and to operate them sustainably: in other words, practical skills are required for starting a business. In order to solve the problems attendant on this, it is necessary actively to provide technology for starting a business using the social enterprise support system. The technologies that are required for developing countries with low development levels are those appropriate to the specific case, not high-tech ones. Appropriate technologies, as they are called, are not very powerful in terms of technology, but involve vital real-life skills. In order to provide such technology stably, it is necessary to utilize a great many intellectual property rights, such as patents whose rights protection period has expired. For example, in a country that produces a lot of intellectual property rights such as Korea, around 100,000 patents are registered every year. As in many foreign countries, patents can be used by anyone after twenty years’ registration. In other words, then, the exclusive right of the patent owner is extinguished. For example, a technology registered as a patent in 2000 becomes a technology that anyone can use in 2020, twenty years later. Even technology registered in 2000 in Korea can work in developing countries. This is because, for instance, in 2000, Korea’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, these 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

|   | st. of Speech | Frequency | Word length | Name Type | Author Keywords |
|---|---------------|-----------|-------------|-----------|-----------------|
| 1 | business      | 325.0     | 8.0         | ""        | "False"         |
| 2 | innovation    | 220.0     | 8.0         | ""        | "False"         |
| 3 | development   | 230.0     | 11.0        | ""        | "False"         |
| 4 | entrepreneurship | 198.0 | 11.0        | ""        | "False"         |
| 5 | model         | 184.0     | 5.0         | ""        | "False"         |
| 6 | technology    | 150.0     | 10.0        | ""        | "False"         |
| 7 | process       | 120.0     | 7.0         | ""        | "False"         |
| 8 | market        | 120.0     | 8.0         | ""        | "False"         |
| 9 | approach      | 100.0     | 8.0         | ""        | "False"         |
| 10 | knowledge     | 120.0     | 9.0         | ""        | "False"         |
| 11 | education     | 115.0     | 9.0         | ""        | "False"         |
| 12 | framework     | 114.0     | 9.0         | ""        | "False"         |
| 13 | service       | 109.0     | 9.0         | ""        | "False"         |
| 14 | challenge     | 105.0     | 9.0         | ""        | "False"         |
| 15 | country       | 105.0     | 9.0         | ""        | "False"         |
| 16 | policy        | 105.0     | 9.0         | ""        | "False"         |
| 17 | system        | 105.0     | 9.0         | ""        | "False"         |
| 18 | enterprise    | 105.0     | 9.0         | ""        | "False"         |
| 19 | strategy      | 105.0     | 9.0         | ""        | "False"         |
| 20 | role          | 98.0      | 5.0         | ""        | "False"         |
| 21 | role          | 98.0      | 4.0         | ""        | "False"         |
| 22 | organization  | 98.0      | 12.0        | ""        | "False"         |
| 23 | university    | 95.0      | 10.0        | ""        | "False"         |
| 24 | community     | 93.0      | 9.0         | ""        | "False"         |
| 25 | sector        | 92.0      | 6.0         | ""        | "False"         |
| 26 | management    | 92.0      | 10.0        | ""        | "False"         |
| 27 | entrepreneur  | 92.0      | 10.0        | ""        | "False"         |
| 28 | impact        | 90.0      | 6.0         | ""        | "False"         |
| 29 | change        | 89.0      | 6.0         | ""        | "False"         |
| 30 | resource      | 88.0      | 8.0         | ""        | "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.
As a result of conducting thematic analysis using the words that appeared and the paper containing the words, a total of ten topics were found. Figure 2 shows the results of this topic analysis.

The ten topics that appeared as a result of the topic analysis will be explained individually. First, the Topic 1 is made up entirely of prepositions, which have very little thematic meaning. Thus Topic 1 can be safely ignored, and 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, stakeholder, science and design. This may be said to be the ‘theoretical framework for social enterprise’ topic. As social enterprises develop, theories relating to them emerge and continue to spread.

Figure 4 shows Topic 3. Topic 3 consists of innovation, enterprise, ecosystem, service, country, datum and technology. This topic may be said to concern the ecosystem of social enterprises. It highlights the fact that in order for social enterprises to develop sustainably, such an ecosystem must be established.
Figure 5 shows the components of Topic 4. Topic 4 consists of education, university, engagement, change, logic, society and community. This may be said to be a topic relating to education and social enterprises.

Figure 5: Topic 4: Education and social enterprise

Figure 6 shows the components of Topic 5. Topic 5 consists of market, capital, entrepreneurship, entrepreneur, student and education. This 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. Topic 6 consists of change, person, problem, world, form, issue and right. This may be said to be a topic relating to environmental changes in social enterprise.

Figure 7: Topic 6: Environmental changes in social enterprise

Figure 8 shows the components of Topic 7. Topic 7 includes the words impact, health, company, 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. Topic 8 consists of strategy, chain, supply, model, concept, organization and state. This topic concerns the supply chain of social enterprises and relates to the intellectual property rights to be addressed in this study.

Figure 9  Topic 8: Supply chain of social enterprises

Figure 10 shows the components of Topic 9. Topic 9 is made up of model, process, policy, market, value, innovation and management. This may be called the ‘social enterprise management model’.

Figure 10  Topic 9: Management model of social enterprise

Figure 11 shows Topic 10. Topic 10 contains words such as sector, ONG, NGO, China and food. This topic relates to the role of NGOs, etc., that are necessary for the functioning of social enterprises. Therefore, we can call Topic 10 a topic relating to ‘social enterprises and NGOs’.

Figure 11  Topic 10: Social enterprises and NGOs

Figure 12 shows the results of a concentric circle analysis of keywords relating to social enterprises and intellectual property rights. It indicates that the words located at the centre of the concentric circles play an important role in 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.

Table 2  Degree centrality of keywords

| Keyword          | In-Degree Centrality | Out-Degree Centrality |
|------------------|----------------------|------------------------|
| entrepreneur     | 0.114715             | 0.014716               |
| innovation       | 0.014712             | 0.014712               |
| framework        | 0.013467             | 0.013467               |
| process          | 0.013104             | 0.013104               |
| student          | 0.013086             | 0.013086               |
| service          | 0.012738             | 0.012738               |
| change           | 0.012554             | 0.012554               |
| country          | 0.012471             | 0.012471               |
| society          | 0.012596             | 0.012596               |
| entrepreneurship | 0.009863             | 0.009863               |
| chain            | 0.009500             | 0.009500               |
| supply           | 0.009495             | 0.009495               |
| company          | 0.007722             | 0.007722               |
| university       | 0.009898             | 0.009898               |
| education        | 0.009143             | 0.009143               |
| model            | 0.007892             | 0.007892               |
| NGOs             | 0.007399             | 0.007399               |
| state            | 0.007381             | 0.007381               |
| knowledge        | 0.007377             | 0.007372               |
| technology       | 0.006839             | 0.006839               |
| person           | 0.005443             | 0.005443               |
| world            | 0.006339             | 0.006339               |
| stakeholder      | 0.006240             | 0.006240               |
| sector           | 0.005036             | 0.005036               |
| problem          | 0.005995             | 0.005995               |
| NGO              | 0.005445             | 0.005445               |
| strategy         | 0.005030             | 0.005030               |
| enterprise       | 0.004330             | 0.004330               |
| form             | 0.004229             | 0.004229               |
| value            | 0.003006             | 0.003006               |

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                        |
|---|----------------------------|--------------------------|
| 1 | Efraim Turban              | University of Hawaii     |
| 2 | Marian Edrezares           | South Champlain Business School |
| 3 | iic Michael Lanele         | Toulouse Business School  |
| 4 | Nagy K. Hanna              | University of Maryland   |
| 5 | Mitt Nowshadak Kabin       |                          |
| 6 | indian Timmermann          | University of Chile      |
| 7 | Jonatan Jellen             | Parsons The New School for Design |
| 8 | Linda Lai                  | Macau Polytechnic Institute |
| 9 | Judy Strauss               | University of Nevada     |
| 10 | Telbornah C. Turba         | Turba Company Inc.       |
| 11 | Ting-Peng Liang            | National Sun Yat-sen University |
| 12 | Jae Kyu Lee                | Yonsei University        |
| 13 | Daniel King                | IDA Software             |
| 14 | Henk van den Blau          | Wageningen University    |
| 15 | Michael Korthals           | Wageningen University    |
| 16 | Ellie Okada                | Boston Cancer Policy Institute |
| 17 | israel Hickling Gen        | The University of the West Indies |
| 18 | Barry D. Friedman          | University of North Georgia |
| 19 | Aihua Yan                  | of Hong Kong, Tai Chue Ave, Hong Kong |
| 20 | Matt Katzer                |                          |
| 21 | Andrey Klimczak            | Warsaw School of Economics |
| 22 | part.James Richar           | University of Melbourne  |
| 23 | Mary C. Iacity             | University of Missouri   |
| 24 | Anarya Rajegopal           | Universidad Anahuac Mexico Sur |
| 25 | Jenzy Czewnik               | Kozmierki University     |
| 26 | Sandra K. Kauanu           | Florida Gulf Coast University |
| 27 | Eric Ansemaru              | Florida Gulf Coast University |
| 28 | Lynette L. Sherman         | California State University Channel Islands |
| 29 | Jing-Jie Wu                | National Chongsh University |
| 30 | Ming-Jen Yu                | National Chongsh University |

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

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    |
|---|---|------|------|
| 1 | Guy Yeomans | 0.140025 | 0.140025 |
| 2 | Gita Stovall | 0.140025 | 0.140025 |
| 3 | Aaron B. Rosa | 0.140025 | 0.140025 |
| 4 | Trevor Haldenby | 0.140025 | 0.140025 |
| 5 | Ken Ecklund | 0.140025 | 0.140025 |
| 6 | Jake Dunagan | 0.140025 | 0.140025 |
| 7 | Yannick Dujardin | 0.140025 | 0.140025 |
| 8 | Cornelia Dahlem | 0.140025 | 0.140025 |
| 9 | Mary Teli Baker | 0.140025 | 0.140025 |
| 10 | John A. Swannay | 0.140025 | 0.140025 |
| 11 | Efrain Turbin | 0.080125 | 0.080125 |
| 12 | Deborah C. Turbin | 0.080125 | 0.080125 |
| 13 | Ting-Pei Liang | 0.080125 | 0.080125 |
| 14 | Jae Kyu Lee | 0.080125 | 0.080125 |
| 15 | David King | 0.080125 | 0.080125 |
| 16 | John C. Blund | 0.080125 | 0.080125 |
| 17 | Sandra K. Kaunui | 0.031250 | 0.031250 |
| 18 | Eric Amanewu | 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 Ambrose | 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 Shaw | 0.031250 | 0.031250 |
| 28 | Guillema Cordova | 0.031250 | 0.031250 |
| 29 | Felipe Simmon | 0.031250 | 0.031250 |
| 30 | Urs Jager | 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
Enterprises and intellectual property rights can be said to constitute policy issues. From this point of view, the results of the analysis allowed 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 impact of social enterprises; environmental changes in social enterprises; social entrepreneurs; social enterprise and education; the social enterprise ecosystem; and social enterprises and NGOs. These nine key issues formed a theoretical framework for the research. They represent areas that should be of great interest from the point of view of conducting business activities that link social enterprises and intellectual property rights. On the other hand, examination of the co-author patterns of authors writing about social enterprises and intellectual property rights suggests that those employing multi-disciplinary characteristics should conduct more active joint research activities. Although 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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