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Detecting Knowledge structures in Impact Investment for Social Enterprise†

Duong Thuy Vy Pham* · Jaewon Choi**

··· **Abstract** ···

Investors around the world are making impact investments to unleash the power of capital for good. The growing impact investment market provides capital to address the world's most pressing challenges in sectors such as climate change, sustainable agriculture, renewable energy, conservation, etc and affordable and accessible basic services including housing, healthcare, and education. Social impact investing is becoming a hot issue in the social enterprises field recently. However, there is a lack of research on the practical measures for social impact investment. Therefore, in this study, we want to confirm the research trend by collecting data related to social impact investment in recent 5 years. In this study, social impact investment related papers from 2015 to 2020, March were collected using smart medical topics, and the social impact investment papers were rearranged based on this. Research trend analysis uses LDA topic modeling technique for topic information of theses, constructs topic network based on relation of topics, and tries to find out the main future research trends through topic.

Key Words : Social Economy, Social Enterprise, Impact Investment, Research Trends, Text Mining

Ⅰ. Introduction

Social impact investment has become increasingly relevant in today's economic setting as social challenges have increased while public funds in many countries are under pressure (Wilson et. al, 2015). Social Impact Bonds are an increasingly common tool for funding impact investments in the public sector (Chowdhry et. al, 2019)

Nowadays, impact investment is developing as a new trend. Specifically, a report said that Social Enterprise Ghana with funding from BUSAC, DANIDA and USAID in Ghana - a country that is said to have been consistently politically unstable and weakly in managed economically has begun advocacy to ensure policy makers and government pass and adopt the social enterprise and impact investing policy(Abubakar.Ibrahim, (myjoyonline.com)). Actually, it is not difficult to understand that focus on social impact and financial sustainability is essential for impact investments in order to create lasting impact. According to Lord Adebowale - chair of Social Enterprise UK (SEUK), Social enterprises are the future of business and social investment is a critical part of achieving the sector's potential. (Kirsty Weakley (civil society news - https://www.civilsociety.co.uk/)

Also on January 16th, 2019, Labour MPs of UK said that Social enterprises will be "at the heart" of Labour's economic policy, and a Labour government would look at legislative and financial opportunities to support them (Kate Plummer (civil society news - https://www.civilsociety.co.uk/)). And the figures from Social Enterprise UK say that there are 100,000 social enterprises in operation contributing £60bn to the economy and employing one million people.

Recently, social impact investment is becoming an issue that attracted many researcher's interest, but seems like there is still a lack of the research on this field. Especially the determination of future research issues is being considered as a demand of social impact investment areas. Although many research papers focus on crowdfunding or social enterprise, but very few of them mention to impact investing, also explore how crowdfunding can scale debt or equity impact investing, but there are very few studies focus on social impact investing. So the purpose of this study is finding the new research trends in social impact investment fields. According to that, the research questions are as follow. (1) What are the key research areas and contents studied in the field of impact investment? (2) Can we integrate the existing research in the field of impact investment to separate research areas and deduce the future research issues?

In this study, we collected impact investing papers and examine the research trends related to impact investing. Impact investing related papers were collected from January, 2015 to March, 2020 using topics related to impact investing. The research trend analysis used text mining technique for topic information of theses, constructed a topic network based on

the relation of topics (Benites-Lazaro et al., 2018).

Ⅱ. Literature Review

2.1 Impact investment with social enterprises

Early in 2010, despite the quantitative increase in social enterprises, the government-level support system for social enterprises fell short of the expectation along with the slowdown in the people's finance supplying, and the average non-operating income of social enterprises was 2.21 billion won, which is 30% of the average sales of 7.67 billion won. High dependency on government. Recently, the core of the financing plan for social enterprises has shifted from the government-based "support system" to the "investment type" by the private sector.

Social enterprises are typically hybrid organizations that can be structured as for-profit or nonprofits, with the mixed motives of balancing social and economic value creation (Dees J.G., 2001). Actually, in order for social enterprises to form, there are some innovative solutions need to be scalable and sustainable. They need to create social impact in a financially sustainable way, by adopting trade strategies. Moreover, the social impact that really comes with scale, the ability to influence large populations with social innovation is also very important and plays a

feasible role in social enterprises. According to the Global Impact Investing Network (GIIN), "Impact investments are investments made into companies, organizations, and funds with the intention to generate a measurable, beneficial social or environmental impact alongside a financial return" (Global Impact Investment Network 2014a,1).

One of the strongest reasons to be optimistic about the outlook for impact investment is the growing number of impact entrepreneurs applying their creative energy to find innovative and sustainable ways of addressing social problems. There is an untapped latent supply of the talent needed to build successful impact organizations. And as a matter of course, social enterprises are increasingly tapping into this growing mixed capital market. In its early stages, a social enterprise can tap into more traditional charitable donations and low-cost grants. These investors do not expect financial returns, but exploit social returns. When the business matures and is generating revenue, this will attract investors with market interest, who expect both financial and social returns. These hybrid investors, often referred to as impact investors, often outperform philanthropists, but increasingly include traditional investors looking for both measurable social and financial returns for their investments.

There has been a steady increase in the number of social sector organizations that raise revenue through government contracts or by charging for services or products they supply,

from hospitals to international development organizations. Also, the emergence of social entrepreneurship has planted the seeds for an increasing number and variety of educational activities related to the field. A key learning outcome of social entrepreneurship education is the development of skills and acquisition of knowledge to mobilize resources from various institutional spheres (Seelos et al. 2011).

Ⅲ. Research methodology

3.1. Data Collection and Characteristics

This study collected social impact investment keywords to collect objective data suitable for analysis purposes. The data is collected from Korea Citation Index (KCI) website (kci.go.kr), considering 'social impact investment'-related keywords. We analyzed the basic trends of social impact investment research trends, conducted data processing for topic modeling data analysis, and applied text mining by LDA (Latent Dirichlet Allocation). Finally, the trend of social impact investment research appreared. This study suggested the implications of the results. <Figure 1> shows the research procedure.

The data was collected from the KCI website using web crawler. We collected the data within from January 1st, 2015 to March 20th, 2020. Since there have been many changes in policies of social enterprises and impact investment every year, we decided to collect the data from 2015 up to now to ensure the effectiveness of the analysis results. Keywords to collect research papers related to 'Social impact investment are "social economy", "social enterprise", "impact investing", "impact investment" by Korean and English. This study used all articles with keywords in the titles,
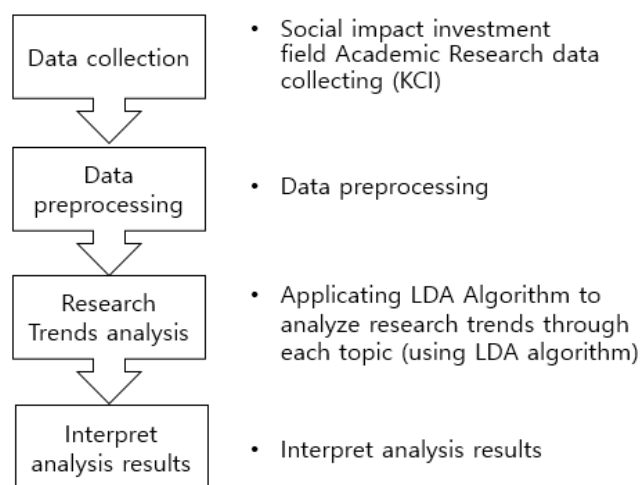

Figure 1. Research procedure

author keywords and abstracts. 1603 papers were totally collected (From January 1st, 2015 to March 20th).

3.2. Extraction Topics related to social impact investment

To analyze all of previous studies related to impact investment and social investment, this study conducted topic modeling based on text mining. Topic modeling is a compelling text-mining technique for discovering the latent semantic structure in a collection of documents. Topic modeling lies in the broader field of probabilistic modeling, a realm that has a wide range of applications such as linguistic understanding, image detection, automatic music improvisation identification and so on. (Lee and Ho, 2019).

Topic modeling is a type of statistical modeling for discovering the abstract "topics" that occur in a collection of documents. Among various techniques, LDA is an popular algorithm of topic modeling. LDA is used to classify text in a document to a particular topic. It builds a topic per document model and words per topic model, modeled as Dirichlet distributions. In this study, the LDA model was used as a perform of the topic modeling (Lim et al, 2019).

Latent Dirichlet allocation (LDA) is a generative probabilistic model of a corpus. The basic idea is that documents are represented as random mixtures over latent topics, where each topic is characterized by a distribution over words. The LDA algorithm is a generic model that finds hidden topics in the literature (Blei, 2003). Unlike the traditional way of matching specific problems to general solutions, probabilistic modeling gives assumptions with generic methods to compute. LDA (Latent Dirichelt Allocation) is one kind of probabilistic model that work backwards to learn the topic representation in each document and the word distribution of each topic (Lim et al., 2019). The creation model is a process of creating actual documents. In order to create a report document, it is necessary to model which topics are to be included in each document, and which words are to be selected and placed in each topic (Blei, 2012). Therefore, it is aimed to infer hidden variables such as the ratio of the subject and the assignment of the subject by the word through observed variables such as documents and words, and as a result, rate, and distribution of words to be included in each topic.

Dirichlet distribution is defined as:

$$f(x_1, \ldots x_K; \alpha_1, \ldots \alpha_K) = \frac{\Gamma(\Sigma_{i=1}^K \alpha_i)}{\Pi_{i=1}^K \Gamma(\alpha_i)} \prod_{i=1}^k x_i^{\alpha_i - 1}$$

Gamma function

$$\Gamma(n) = (n-1)! \text{ (for discrete variable)}$$

$$\Gamma(z) = \int_O x^{z-1} e^{-x} dx \quad \text{(for continous variable)}$$

where $\top$ is the gamma function. For a joint probability with m variables, the output of Dirichlet is m-dimensional and takes m parameters to model it. For example, the model $p(x_1, x_2, x_3, x_4)$ will have model parameters

α_1, α_2, α_3, and α_4. In LDA, model both word distribution for each topic and topic proportion for each document using Dirichlet distributions. For example, by learning α_i, we learn the topics proportion that a document may cover. The higher the value for α_i relative to others, the more likely the topic i will be picked (Jonathan H, 2019).

In order to identify the words (tokens) in the document to be analyzed as frequency-based, we aggregated the entire article data and recognized them as vectors for computing words in individual documents (Blei, 2006). Based on this, a Term-Document Matrix was created that calculates the frequency of words appearing in each document. In the analysis result, the complicated text form is refined in order to reduce the noise generation. In general, it is performed by applying a predetermined code to the tasks such as unification in small letters, elimination of insolence words, extraction of roots, elimination of numbers, removal of spaces and removal of punctuation marks.

The application of the LDA algorithm begins by constructing a term-matrix that constructs a matrix based on the collected documents, eliminating word order, sentence grammar structure and finally based on the frequency of words and words (Blei, 2012; Benites et al, 2018). The final stages of topic modeling are the definition and classification of derived topics. It means interpretation of n words with high probability of appearing for each subject derived through topic modeling and make

definition of the subject. Finally, it is possible to apply the finally derived topics to experts and field workers through validation. It is necessary to carry out the process of refining. In this study, a total of 1603 papers were used to identify trends in social impact investment.

Ⅳ. Results

In this study, four topics were analyzed to analyze the topic modeling results. We used title, keyword, and abstract for topic analysis. The final stage of the topic modeling analysis is to determine a topic that represents each topic group based on the derived topic. The combination of words derived through topic modeling was profiled as a representative subject of academic research in the field of social impact investment as follow.

In topic 1, there were 129 papers collected, words such as "finance", "profit", "entrepreneur, "variable" and "index" were derived and confirmed that topics related to entrepreneurship.

In topic 2, there were 64 papers collectes, words such as "strategy", "China", "evaluation", "overseas" and "international" were derived, and it was confirmed that topics related to entrepreneur's profit and invesment.

There were 60 papers collected in topic 3. Topic 3 was derived from the words "investment", "capital", "cost", "investor" and "finance" which confirmed that topics related to the concept of government policy and impact

investment.

In topic 4, there were 54 papers collected, words such as "accounting", "efficiency", "risk", "small – medium enterprises" and "inspection" which confirmed that topics related to customer relationship management .

Therefore, Topic 1 was chosen as the entrepreneurship, Topic 2 as entrepreneur's profit and investment, Topic 3 as the concept of government policy and impact investment, Topic 4 as the customer relationship management. A total of 307 papers were categorized as 129 of Topic 1, 64 of Topic 2, 60 of Topic 3 and 54 of Topic 4.

In essence, the topic models capture the word co-occurrence information and these

<Table 1> Co-occurrence Score for Each Topic

	Topic 1	Topic 2	Topic 3	Topic 4
1	Finance	Strategy	Investment	Accounting
	0.059	0.123	0.157	0.091
2	Profit	China	Capital	Efficiency
	0.052	0.079	0.102	0.079
3	Entrepreneur	Evaluation	Cost	Risk
	0.047	0.056	0.073	0.072
4	Variable	Overseas	Investor	S–M Enterprise
	0.042	0.042	0.042	0.062
5	Index	International	Finance	Inspection
	0.033	0.04	0.041	0.054
6	Ratio	Public enterprise	Institution	Information
	0.033	0.038	0.034	0.049
7	Expose	Indicator	Procurement	Model
	0.028	0.035	0.029	0.038
8	Information	Multi–national	Increase	Earnings
	0.027	0.033	0.029	0.034
9	Use	Contribution	Level	Scale
	0.026	0.029	0.025	0.034
10	Level	Positive	Growth	System
	0.026	0.029	0.024	0.032
11	Verification	Global	Corporate governance	Internal
	0.025	0.028	0.023	0.029
12	Justice	Comparison	Decision	Industry
	0.024	0.028	0.023	0.027
13	Evaluation	Execution	Industry	Decrease
	0.024	0.026	0.022	0.025
14	Certificate	Ethics	Domestic	Index
	0.022	0.026	0.02	0.024
15	Tax	Domestic	Scale	Notice
	0.021	0.025	0.019	0.02

highly co-occurrance words are put together to compose a topic (Divya et al., 2013; Mimno et al., 2011). So, the key to find out high quality topics is the corpus must contain a large amount of word co-occurrence information and the topic model has the ability to correctly capture the amount of the word co-occurrence.

LDA capture the word co-occurrence in document-level (Divya et al., 2013; Yan et al., 2013). The word co-occurrence in document-level means that the amount of the word co-occurrence relation comes from a single document. On the contrary, the word co-occurrence in corpus-level means that the amount of the word co-occurrence relation comes from a full corpus which contains many documents (Chen et Kao, 2015)

4.1. Topic 1: Entrepreneurship

The keywords frequency was confirmed by collecting the top 10 words based on keywords co-occurrence (Co-Occurrence index was 0.01 or higher). Mainly used keywords are "finance" and so on. The most frequently used words were Finance, profit, management, variable, index, ratio, disclosure, information, use, level etc. <Table 2> shows the top 10 words in frequency of topic 1.

Based on top 10 keywords frequency, we can identify the recent research topic is about
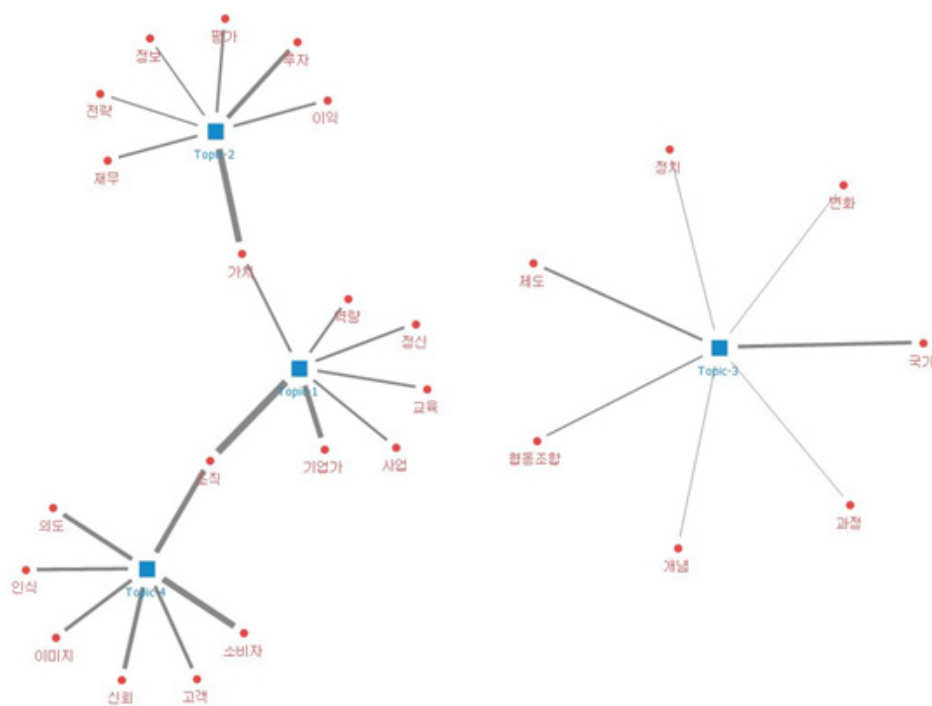

Figure 2. Word Network of LDA

the finance and finance management in entrepreneurship.

Table 2. Co-occurrence Score of Topic 1

Rank	Word	Co-Occurrence
1	Finance	0.059
2	Profit	0.052
3	Entrepreneur	0.047
4	Variable	0.042
5	Index	0.033
6	Ratio	0.033
7	Expose	0.028
8	Information	0.027
9	Use	0.026
10	Level	0.026

As a change agents, social entrepreneurs harness innovation at a systemic level to bring about a change in social equilibrium (de Bruin & Ferrante, 2011). But actually, growing disillusionment of for-profit business models has drawn attention to social entrepreneurship and social innovation to ease social issues (Philips et al., 2015). Despite increasing recognition of the contribution that social entrepreneurship makes to a nation's social, economic, cultural, and environmental wealth (Fayolle & Matlay, 2010), research effort in the area is somewhat disjointed and disparate, resulting in an array of definitions and perspectives (Zahra et al., 2009, p. 521).

Due to these issue, in the future, it is necessary to develop future research topics that can help finding the financial management solutions during the start-up stage for social enterprises.

4.2. Topic 2: Entrepreneur's profit and invesment

The keywords frequency was confirmed by collecting the top 10 words based on keywords co-occurrence (Co-Occurrence index was 0.01 or higher). Mainly used keywords are "entrepreneur's profit and invesment" and so on. The most frequently used words were Strategy, China, Evaluation, Overseas, International, Public Enterprise, Indicator, Multi-national, Contribution, Positive etc.

Table 3. Co-occurrence Score of Topic 2

Rank	Word	Co-Occurrence
1	Strategy	0.123
2	China	0.079
3	Evaluation	0.056
4	Oversea	0.042
5	International	0.04
6	Public enterprise	0.038
7	Indicator	0.035
8	Multi-national	0.033
9	Contribution	0.029
10	Positive	0.029

<Table 3> shows the top 10 words in frequency of Topic 2. Based on top 10 keywords frequency, we can identify the recent research topic is about the entrepreneur's profit and invesment, esspecially invest in foreign market. Entrepreneurial returns are a significant source of income in a dynamic economy. But there is a lack of research on this area. Due to that issue, it is possible to develop future research topics that will help to find new

directions in foreign social impact investment trends.

4.3. Topic 3: Government policy and impact investment

In topic 3, with the same methodology, it is not difficult to find out the top 10 words based on keyword co-occurrence. Mainly used keywords are "entrepreneur's profit and invesment" and so on. The most frequently used words were investment, capital, cost, investor, finance, institution, procurement, increase, level, growth etc. <Table 4> shows the top 10 words in frequency of Topic 3.

Table 4. Co-occurrence Score of Topic 3

Rank	Word	Co-Occurrence
1	Investment	0.157
2	Capital	0.102
3	Cost	0.073
4	Investor	0.042
5	Finance	0.041
6	Institution	0.034
7	Procurement	0.029
8	Increase	0.029
9	Level	0.025
10	Growth	0.024

Based on top 10 keywords frequency, we can identify the recent research topic is about the government policy for impact invesment business. Actually, government policies and preferential policies are the most important things that impact investor concerned about. Recently, Australians need a government can recognizes the critical role of private capital and looks to scale impact investing. There is a lack on the research of government policy in social impact investment field. Due to that issue, it is possible to develop future research topics that can help to find out the concerns about government policies as so as the solutions.

4.4. Topic 4: Customer relationship management

Similar to Topic 1,2,3, the keywords frequency of topic 4 was confirmed by collecting the top 10 words based on keywords co-occurrence. The most frequently used words were Accounting, Efficiency, Risk, Small and Medium Enterprise, Inspection, Information, Model, Earnings, Scale, System and so on. <Table 5> shows the top 10 words in frequency of Topic 4.

Table 5. Co-occurrence Score of Topic 4

Rank	Word	Co-Occurrence
1	Accounting	0.091
2	Efficiency	0.079
3	Risk	0.072
4	S-M Enterprise	0.062
5	Inspection	0.054
6	Information	0.049
7	Model	0.038
8	Earnings	0.034
9	Scale	0.034
10	System	0.032

Based on top 10 keywords frequency, we can identify the recent research topic is about the customer relationship management. In a

highly competitive market, companies need to maintain positive relationship with their customer. A good CRM (customer relationship management) program that helps company in satisfying the customer. The study of (Rana et. al, 2015) concluded that CRM is playing a major role in increasing the market share, it enhances productivity, superior employee's morale in the mean while it improves the in depth customer knowledge and also higher customer satisfaction to improved customer loyalty company will also have the clear information that what are their customers, what are their needs, and what will make them more satisfied. There is very few research in the field of customer relationship in social impact investment enterprises. Due to that issue, it is possible to develop future research topics that can find how to develop customer relationship in social impact enterprises.

Ⅴ. Conclusion

In this study, we analyzed the research trends related to social impact investment based on academic research in "social economy", "social enterprise", "impact investment", and "social enterprise" applying quantitative analysis technique based on objective data. In order to grasp the global research trend of social impact investment, we confirmed the trend according to the number of articles per year. As a result, the number of articles related to entrepreneurship increased

overall. The topics were identified using the words used in the title, keywords and abstract.

The study's theoretical implications are as below: Our study conducts quantitative analysis based on academic data in order to analyze the trend of social impact investment academic research scientifically. It also explored the global trends in the field of social impact investment and provided meaningful information in research design and topic selection for further studies. Finally, this study was conducted to confirm the issue of social impact investment in social enterprises field. We collected papers in social impact investment field and classified the documents through LDA topic modeling analysis. In order to understand the research trends on social impact investment, we analyzed the topic modeling analysis network analysis to identify trends.

Besides, the practical implications are described as below: based on the classified topics, we can find solutions to solve the issues such as orientation to find out the financial management solutions in the start-up stage for social enterprises, find out the solutions for government policy on how to support social enterprises and social investors in a completely way etc.

The study of the social impact investment field is increasing. As a result, we have presented four subject areas in social impact investment field. Previous studies have shown ways to attract funds in social impact investment area, but it has been confirmed that there is lack of research on the solutions. In the

other words, future research will need to expand the scope of scalable and sustainable solutions in line with the growth of the social impact investment needs in recent years. It is expected that these studies can be used as a means to actively exchange academic knowledge among related researchers.

In order to analyze the trends of academic research related to social impact investment, scientific analysis method and objective data were used to present the results. However, there are some limitations in terms of methods and subjects of research. First, in terms of methodological aspects of the research, there is a limit that the contents of the individual research of the consideration of the research fields are numerically reflected only by caring out the quantitative analysis of the data center. In the later studies, it is expected that more qualitative results can be obtained if qualitative research on individual studies is supported. Second, data analyzed was collected by KCI Website only and collect additional data through more websites such as SPRINGER. Future researchs are hoped will provide more accurate results if trend analysis is conducted across the broader social impact investment articles.

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