Semantic Network Analysis of Newspaper Articles related to Agro–healing

Yumin Park1,4 and Yong–Wook Shin2,3,4*

1Ph.D. Candidate, Department of Plant Resources, Gyeongsang National University, Jinju 52725, Republic of Korea
2Professor, Department of Plant Resources, Gyeongsang National University, Jinju 52725, Republic of Korea
3Professor, Department of Plant & Biomaterials Science, Gyeongsang National University, Jinju 52725, Republic of Korea
4Institute of Agriculture & Life Science, Gyeongsang National University, Jinju 52828, Republic of Korea

ABSTRACT

Background and objective: Despite the fact that the COVID–19 pandemic has increased the demand for mental health services, access has been limited, resulting in service gaps and severance. Agro–healing, which is expected to be utilized successfully to promote mental health for both individuals and communities, could be a solution. This study was conducted to provide basic data for revitalizing policies and research related to agro–healing by analyzing the trends in big data of online news articles over the last decade.

Methods: A total of 2,310 news articles related to agro–healing were collected from January 1, 2012 to December 31, 2021 by crawling Naver News. To extract nouns with practical meaning, the Okt morphological analysis of the KoNLPy module in Python 3.9 was employed. Semantic network analysis was conducted to validate degree centrality, betweenness centrality, and eigenvector centrality in order to understand the centrality and connectivity of significant keywords. The data was visualized using Gephi 0.9.2 by performing CONCOR analysis to generate clusters.

Results: The keywords with the highest degree centrality were agro–healing, followed by healing, care farm, vitality, RDA, citizens, and rural tourism. Agro–healing, Healing, stress, urban, disabilities, care farm, dementia, and rural area were highest in terms of betweenness centrality. The eigenvector centrality was highest in agro–healing, followed by vitality, healing, care farm, and effect. As a result of the CONCOR analysis, four clusters were identified: ‘agro–healing characteristics’, ‘agro–healing resources’, ‘agro–healing activities’, and ‘agro–healing target and effect’.

Conclusion: According to the findings, social expectations and need for agro–healing to improve public health became a significant part of the discourses. This research is expected to help determine future research and policy directions, as the vitality of agro–healing continues to provide national welfare services and seek sustainable growth in agricultural and rural areas.

Keywords: online news, text mining, CONCOR analysis, big data, keyword analysis

Introduction

The prolonged COVID-19 pandemic is increasing the demand for mental health services while also bringing confusion to accessing and providing services. According to the mental health services survey on 130 countries by the WHO (2020), the ongoing COVID-19 has increased the sense isolation, depression, anxiety, and insomnia, and the concern or fear about income decrease and the pandemic itself led to severe mental health problems, and thus 89% of the member states felt the need for mental health services. However, insufficient experts and infrastructures or concerns about infection due to face-to-face services resulted in lower service accessibility, causing the service gap and severance among not only the users that had been using mental health services before but also general citizens suf-
ferring from direct or indirect psychological trauma due to the COVID-19 pandemic (Yun, 2020; Park, 2020). Under these circumstances, agro-healing (or healing agriculture) that refers to activities and industries promoting physical, emotional, mental, cognitive, and social health of citizens using agriculture or rural resources (RDA, 2016) can be the solution.

Jang et al. (2019) discovered that agro-healing activities had a positive effect on the emotional aspect of the elderly such as psychological stability by lowering their stress and blood pressure. Cacciatore et al. (2020) stated that programs using the nature and animals of care farms help emotionally heal people who experienced emotional trauma, and thus can be an alternative to antipsychotic medications. Moreover, agro-healing activities have a great impact on mental well-being by increasing life satisfaction, positive emotions, and self-esteem and reducing loneliness, anxiety, and depression (Greenleaf and Roessger, 2017; Hine et al., 2008; Hemingway et al., 2016). They are also free of negative stigma about sanatoriums, rehabilitation centers, and medical institutions related to mental health (Elings, 2012), thereby showing potential in attracting active participation and smoothly providing services.

As such, agro-healing is proved to be an effective measure to promote mental health for individuals and society. Thus, the Netherlands, the United Kingdom, and the United States are actively implementing and studying agro-healing programs that systematically linked agricultural production, public health, and social services (Hassink et al., 2014; Bragg, 2013; Artz and Davis, 2017). With the growing interest and need for agro-healing that followed the enforcement of the Act on Research, Development, and Promotion of Healing Agriculture in 2021, South Korea has been mostly conducting basic studies for development and promotion of agro-healing, such as analysis of care farm programs (Yoo et al., 2021), qualitative research on agro-healing in social welfare (Lee et al., 2020), and priority analysis on the agro-healing classification system (Yoo et al., 2021).

However, despite the social interest and importance, there is insufficient research that identified the public awareness and trends about agro-healing using big data. In particular, considering how each local government establishes ordinances related to agro-healing and conducting individual studies to find ways to expand and promote agro-healing, it is necessary to identify the discourse on agro-healing that has become a social issue. Therefore, the purpose of this study is to analyze the trends in articles about agro-healing over the past 10 years and provide basic data to activate policies and research related to agro-healing.

Research Methods

Data extraction and purification

Although the Act on Research, Development, and Promotion of Healing Agriculture has been enforced in March 2021, the social discourse has begun to be formed in 2012 when agro-healing was selected as a keyword to focus on regarding change in the agro-industry (RDA, 2012). Thus, the data collection period was set as 10 years starting from 2012. For the data collection platform, this study used Naver News that has the biggest number of users among web portals and provides news data of major media companies at once (Park and Shin, 2021).

First, to collect news articles using ‘agro-healing’ as the keyword, BeautifulSoup and SeleniumLibrary of Python 3.9 (Pycon, USA) were used to crawl Naver News of 10 years from January 1, 2012 to December 31, 2021. After eliminating redundant data, total 2,310 news articles were selected for final analysis.

Analysis method

It is more effective to tokenize and embed Korean words in morphemes rather than tokenizing them based on spaces like English words (Kang and Yang, 2018). To analyze the keywords of the finally selected news articles, Okt morphological analysis of Python KoNLPy that is widely used in natural language processing was used for tokenization that extracts nouns with actual meanings. Moreover, compound nouns were identified to analyze the key related words and designated as a single word, and stop words like special characters were eliminated.

Then, to identify the trend in the newspaper article discourse, NetworkX of Python was used to conduct a semantic network analysis that can analyze the semantic pattern
of messages through the relationship between words used simultaneously within one sentence and the frequency of words (Shi et al., 2016). Semantic network analysis is a useful methodology in identifying the flow of intentional meanings of the text in news articles (Kim, 2017a). This study used the CONvergence of iterated CORrelations (CONCOR) to identify the relationship between clusters using centrality analysis and UCINET 6 (Analytic Technologies Corp, USA). The results were visualized using Gephi 0.9.2 (USA) (Fig. 1).

**Results and Discussion**

**Analysis of related keywords in agro–healing news articles**

From 2012 to 2015, there were around 60 articles related to agro-healing every year, maintaining a similar level, but the number doubled in 2016 and has since constantly increased. In particular, the heatmap analysis in Fig. 2 shows the rapid increase in the number of articles since 2020 when the Act on Research, Development, and Promotion of Healing Agriculture was enforced and the WHO announced the COVID-19 pandemic. A heatmap is a useful chart for data visualization when there are many variables or subjects of comparison since the high and low values can be identified at a glance using different shades (Ryu and Song, 2014).

Table 1 shows the results of analyzing keywords in 2,310 news articles on agro-healing from 2012 to 2021. The top 30 among 436 keywords derived based on words with at least two characters and at least 30 times of co-occurrence were: agro-healing (2,071), rural area (1,573), program (1,489), care farms (1,485), education (1,456), support (1,355), healing (1,307), operation (1,276), urban (1,262), and society (1,253). These words well display the characteristics of the discourse on agro-healing, through which it was possible to identify the trend in the social perception of agro-healing such as operating and supporting agro-healing activities including various programs and education using agro-healing resources like rural areas and care farms.

The top 5 keywords in each year were as follows. In 2012, they were rural area (64), healing (43), society (42), health (39), and environment (35), and in 2013, they were support (60), vegetable garden (58), healing (45), program (41), and village (39). In 2014, they were healing (188), industry (179), targets (148), plants (135), and education (75), and in 2015, they were care farms (259), rural area (151), urban (122), operation (102), and healing (84). In 2016, they were healing (291), education (249), citizen (230), rural tourism (220), and resources (216).

In 2017, the top 5 keywords were healing (326), rural area (260), vitality (247), program (199), and rural tourism (176). In 2018, they were education (345), care farms (341), welfare (324), future (327), and healing (315), while in 2019, they were development (421), care farms (416), agro-healing (402), effect (377), and welfare (298). In 2020, they were support (585), agro-healing (506), dementia (421), RDA (413), and COVID-19 (372). In 2021, they were agro-healing (562), dementia (508), stress (466), society (421), and COVID-19 (403) (Table 2).
As agro-healing emerged as a keyword in agricultural and industrial changes with the words above, agro-healing activities began to receive attention, proving people’s interest and expectations for community development through agro-healing and welfare services that are applicable to various targets. This is in line with the results of previous studies proving that agro-healing leads to preventive, therapeutic, and rehabilitation effects in physical, cognitive, psychological, and social aspects of humans throughout the entire life (Jang et al., 2021) and that it can be used positively to reduce various problems in the modern society (Jang et al., 2019). In particular, considering that COVID-19 pandemic is one of the main keywords of 2020 and 2021, agro-healing is receiving more attention as an activity for emotional support that relieves depression and stress due to COVID-19 pandemic.

### Semantic network analysis

Semantic network analysis is an analytical method using social network analysis that is used to identify the flow

#### Table 1. Top 30 frequent keywords of agro-healing in online news articles

| Rank | Keywords      | Freq. | Rank | Keywords | Freq. | Rank | Keywords      | Freq. |
|------|---------------|-------|------|----------|-------|------|---------------|-------|
| 1    | Agro-healing  | 2,071 | 11   | Dementia  | 1,252 | 21   | Targets       | 1,250 |
| 2    | Rural area    | 1,573 | 12   | Health    | 1,223 | 22   | Vitality      | 1,249 |
| 3    | Program       | 1,489 | 13   | Plan      | 1,219 | 23   | Environment   | 1,249 |
| 4    | Care farms    | 1,485 | 14   | Effect    | 1,210 | 24   | University    | 1,245 |
| 5    | Education     | 1,456 | 15   | Resources | 1,206 | 25   | Welfare       | 1,243 |
| 6    | Support       | 1,355 | 16   | Rural tourism | 1,205 | 26   | Plants        | 1,241 |
| 7    | Healing       | 1,307 | 17   | Vegetable garden | 1,193 | 27   | Citizen       | 1,187 |
| 8    | Operation     | 1,276 | 18   | RDA       | 1,179 | 28   | Stress        | 1,183 |
| 9    | Urban         | 1,262 | 19   | Village   | 1,160 | 29   | Future        | 1,152 |
| 10   | Society       | 1,253 | 20   | Development | 1,130 | 30   | Industry      | 1,148 |

Freq.: Frequency.

#### Table 2. Top 5 frequent keywords of agro-healing in online news articles by year

| Year of | Keywords | Freq. | Keywords | Freq. | Keywords | Freq. | Keywords | Freq. | Keywords | Freq. |
|---------|----------|-------|----------|-------|----------|-------|----------|-------|----------|-------|
| 2012    | Rural area | 64   | Support  | 60   | Healing  | 188  | Care farms | 259  | Healing  | 291  |
|         | Healing  | 43   | Vegetable garden | 58   | Industry | 179  | Rural area | 151  | Education | 249  |
|         | Society  | 42   | Healing  | 45   | Targets  | 148  | Urban     | 122  | Citizen   | 230  |
|         | Health   | 39   | Program  | 41   | Plants   | 135  | Operation | 102  | Rural tourism | 220  |
|         | Environment | 35  | Village  | 39   | Education | 75   | Healing   | 84   | Resources | 216  |
| 2017    | Healing  | 326  | Education | 345  | Development | 421  | Support   | 585  | Agro-healing | 562  |
|         | Rural area | 260  | Care farms | 341  | Care farms | 416  | Agro-healing | 506  | Dementia | 508  |
|         | Vitality | 247  | Welfare  | 324  | Agro-healing | 402  | Dementia   | 421  | Stress    | 466  |
|         | Program  | 199  | Future   | 327  | Effect    | 377  | RDA       | 413  | Society   | 421  |
|         | Rural tourism | 176 | Healing  | 315  | Welfare   | 298  | COVID-19  | 372  | COVID-19 | 403  |

Freq.: Frequency.
of intentional meaning in the text of newspaper articles (Cha, 2015; Choi and Kweon, 2014). This study examined degree centrality, betweenness centrality, and eigenvector centrality in the centrality analysis of semantic network analysis to identify the centrality and connectivity of the top 50 keywords (Table 3).

### Table 3. Semantic network analysis of top 50 related words

| Keywords            | Degree Centrality | Coef. | Betweenness Centrality | Coef. | Eigenvector Centrality | Coef. |
|---------------------|-------------------|-------|------------------------|-------|------------------------|-------|
| Agro-healing        | 1.00              |       | Agro-healing           | 0.75  | Agro-healing           | 0.98  |
| Healing             | 0.95              |       | Healing                | 0.69  | Healing                | 0.86  |
| Care farms          | 0.94              |       | Stress                 | 0.67  | Healing                | 0.81  |
| Vitality            | 0.93              |       | Urban                  | 0.67  | Care farms             | 0.81  |
| RDA                 | 0.90              |       | Disabilities           | 0.67  | Effect                 | 0.78  |
| Citizen             | 0.90              |       | Care farms             | 0.67  | Citizen                | 0.74  |
| Rural tourism       | 0.90              |       | Dementia               | 0.67  | RDA                    | 0.74  |
| Family              | 0.88              |       | Rural area             | 0.67  | Family                 | 0.74  |
| Education           | 0.85              |       | Welfare                | 0.60  | Rural tourism          | 0.74  |
| Rural area          | 0.85              |       | Field                  | 0.60  | Education              | 0.60  |
| Farmhouse           | 0.84              |       | Patient                | 0.60  | Farmhouse              | 0.59  |
| Cure                | 0.84              |       | Experience             | 0.58  | Patient                | 0.58  |
| Environment         | 0.83              |       | Participation          | 0.58  | Program                | 0.58  |
| Program             | 0.83              |       | RDA                    | 0.58  | Environment            | 0.53  |
| Patient             | 0.83              |       | Vitality               | 0.58  | Operation              | 0.53  |
| Industry            | 0.83              |       | Health                 | 0.54  | Plants                 | 0.53  |
| Effect              | 0.80              |       | Education              | 0.54  | Stress                 | 0.52  |
| Disabilities        | 0.80              |       | Happiness              | 0.54  | Job creation           | 0.52  |
| Urban               | 0.80              |       | Rural tourism          | 0.52  | Cure                   | 0.31  |
| Culture             | 0.80              |       | Industry               | 0.31  | Happiness              | 0.31  |
| Dementia            | 0.79              |       | Vegetable garden       | 0.29  | Industry               | 0.31  |
| Field               | 0.79              |       | Nature                 | 0.28  | Urban                  | 0.30  |
| Plan                | 0.79              |       | Service                | 0.27  | Rural area             | 0.30  |
| Participation       | 0.79              |       | Effect                 | 0.27  | Disabilities           | 0.30  |
| Resources           | 0.79              |       | Program                | 0.26  | Support                | 0.30  |
| Vegetable garden    | 0.78              |       | Environment            | 0.25  | Dementia               | 0.30  |
| Cultivation         | 0.67              |       | Operation              | 0.25  | Society                | 0.30  |
| Welfare             | 0.67              |       | Village                | 0.24  | Future                 | 0.30  |
| Operation           | 0.67              |       | Society                | 0.24  | Health                 | 0.30  |
| Job creation        | 0.67              |       | Future                 | 0.23  | Expert                 | 0.21  |
| Stress              | 0.67              |       | Resources              | 0.23  | Experience             | 0.21  |
| Smart               | 0.67              |       | Expert                 | 0.23  | Mind                   | 0.21  |
| University          | 0.64              |       | Plan                   | 0.22  | Field                  | 0.21  |
| Youths              | 0.64              |       | Mind                   | 0.22  | Plan                   | 0.21  |
| Horticulture        | 0.64              |       | Cure                   | 0.22  | Participation          | 0.21  |
| Development         | 0.63              |       | Targets                | 0.21  | Service                | 0.19  |
| Urban agriculture   | 0.63              |       | Culture                | 0.20  | Resources              | 0.19  |
Semantic Network Analysis of Newspaper Articles related to Agro-healing

For degree centrality of the keywords, agro-healing was highest at 1.0, followed by healing 0.95, care farms 0.94, vitality 0.93, RDA 0.90, citizen 0.90, and rural tourism 0.90. Degree centrality measures how many edges one node has attached to other nodes in the network, and the higher the degree, the more central the node is (Kim, 2017b). The words with high degree centrality at the top implied that agro-healing led by the RDA can bring vitality to rural areas using rural tourism and care farms. Moreover, words such as citizen, education, rural area, farmhouse, and program showed the public interest in agro-healing education and service as well as the direction for agro-healing.

For betweenness centrality, agro-healing was highest at 0.75, followed by healing 0.69, and then stress, urban, disabilities, care farms, dementia, and rural area showing the same centrality at 0.67. Compared to degree centrality, words such as stress, disabilities, and dementia were at the top, having a relatively great impact on the network. Nodes with high betweenness centrality have great control over the flow of knowledge and information exchange (Kho et al., 2013; Park and Kwahk, 2013). This indicates that agro-healing is widespread among not only general citizens in need of stress management, but also various members of the society such as persons with disabilities or dementia. Words like welfare, field, patient, and experience show that they affect participation and promotion of agro-healing associated with social services.

For eigenvector centrality, agro-healing was highest at 0.98, followed by vitality 0.86, healing 0.81, care farms 0.81, and effect 0.78. Words at the top except effect all matched the four words at the top for degree centrality. Eigenvector centrality shows the words that are at the centermost of the entire structure, considering not only the nodes that are directly and indirectly connected but also the centrality of the other nodes that are connected (Kim and Ahn, 2012; Hong and Yun, 2014). Thus, the word effect along with vitality, healing, and care farms with high eigenvector centrality has high connectivity with agro-healing as well as a great impact, thereby serving as a keyword that is the center of the social discourse formation and development.

The results above are visualized with Gephi 0.9.2 after identifying the clusters through CONCOR analysis (Fig. 3). CONCOR is a method identifying the clusters of words and determining the relationship among the clusters by repeatedly analyzing Pearson’s correlation among words and finding an adequate level of similarity groups (Eum and Leem, 2021: Kim and Jun, 2014). The results showed that there were total 4 clusters, each of which was named agro-healing characteristics, agro-healing resources, agro-heal-

| Degree Centrality | Betweenness Centrality | Eigenvector Centrality |
|-------------------|------------------------|------------------------|
| Keywords          | Coef.                  | Keywords               | Coef.                  | Keywords                  | Coef.                  |
| Support           | 0.63                   | Family                 | 0.19                   | Welfare                   | 0.19                   |
| Future            | 0.63                   | Support                | 0.18                   | Urban agriculture         | 0.18                   |
| Nature            | 0.63                   | Job creation           | 0.17                   | Village                   | 0.18                   |
| Targets           | 0.63                   | Farmhouse              | 0.14                   | Horticulture              | 0.17                   |
| Health            | 0.63                   | Cultivation            | 0.09                   | Vegetable garden          | 0.17                   |
| Service           | 0.59                   | Development            | 0.09                   | Targets                   | 0.15                   |
| Happiness         | 0.59                   | University             | 0.09                   | Nature                    | 0.15                   |
| Experience        | 0.59                   | Plants                 | 0.09                   | University                | 0.14                   |
| Plants            | 0.58                   | Citizen                | 0.09                   | Youths                    | 0.14                   |
| Village           | 0.58                   | Horticulture           | 0.08                   | Smart                     | 0.14                   |
| Society           | 0.58                   | Urban agriculture      | 0.08                   | Culture                   | 0.14                   |
| Mind              | 0.58                   | Youths                 | 0.08                   | Development               | 0.14                   |
| Expert            | 0.58                   | Smart                  | 0.08                   | Cultivation               | 0.14                   |

Table 3. (continued)

*Coef.: Coefficient.
ing activities, and agro-healing target and effect.

First, the ‘agro-healing characteristics’ group comprised of words such as vitality, healing, care farms, RDA, program, education, and service represents agro-healing itself, which aims to regain the vitality of rural areas and activate agro-healing resources and activities, thereby promoting mental, social, cognitive, and physical health of citizens (Kim et al., 2013). Second, the ‘agro-healing resources’ group comprised of words such as rural area, rural tourism, village, expert, farmhouse, field, and university includes words that represent resources used in agro-healing such as venue or human resources for relevant activities. These words showed that the value and role of rural areas are emphasized as a healing space, and proved the importance and demand for experts and operating agencies.

Next, the ‘agro-healing activities’ group comprised of words such as vegetable garden, cultivation, horticulture, nature, environment, future, and support showed the aim for sustainable growth of agriculture and rural areas through agro-healing. Moreover, agro-healing activities such as vegetable gardens and horticultural activities are used as a means to recover health and improve the quality of life. Finally, the ‘agro-healing target and effect’ group comprised of words such as disabilities, dementia, citizen, stress, happiness, effect, and welfare reflects the expectations for welfare services and promotion of public health using agro-healing for all citizens that include persons with disabilities and dementia as well as general citizens. In particular, it was possible to identify the trend in positive mental and emotional effects such as stress relief and happiness. This shows that the discourse on agro-healing is formed and expanded, showing public needs and interest in solving public health problems and seeking a healthy life.

**Conclusion**

The enforcement of the Act on Research, Development, and Promotion of Healing Agriculture in March 2021 has led to a growing interest in agro-healing and active R&D by the RDA to lay the groundwork for agro-healing (Yoo et al., 2021). Moreover, as the five-year comprehensive plan for healing agriculture begins to be established since 2022 according to Article 5 in Chapter 2 of the Act on Research, Development, and Promotion of Healing Agriculture, there have been more and more discourses on agro-healing. Accordingly, this study conducted semantic network analysis to provide the basic data to activate related policies and research by analyzing online news articles on agro-healing.

Based on the results, the keywords were clustered into four groups: ‘agro-healing characteristics’, ‘agro-healing resources’, ‘agro-healing activities’, and ‘agro-healing target and effect’. The results of identifying the trend in the social discourse on agro-healing can be summarized as follows. First, the discourse first began to be formed in 2012 when agro-healing was selected as a noteworthy keyword in agricultural and industrial changes. Issues have been raised in the need to provide services using agro-healing facilities or resources through rural area development.

Second, words such as healing, care farms, vitality, and effect were mentioned throughout all years, indicating that there is an ongoing trend that aims for sustainable growth of agriculture and rural areas based on expectations for the value and role of rural areas as a healing space as well as activation of agro-healing. This provides great implications for the factors to consider first in agro-healing policies as well as the future direction.

Third, the main discourse was on the interest and importance of providing welfare services at the national level to solve mental health problems such as stress and dementia through agro-healing and reducing social costs in prevention, recovery, and rehabilitation of mental and physical diseases. In particular, the explosive increase in the number of ar-
articles on agro-healing since 2020 may have been due to the fact that social expectations and need for agro-healing to promote public health became a significant part of the discourse due to the enforcement of the Act on Research, Development, and Promotion of Healing Agriculture and the COVID-19 pandemic that caused mental and physical health problems like depression and anxiety.

This study has significance in verifying the social expansion of the discourse on agro-healing by identifying the agro-healing trend through newspaper articles and analyzing big data generated in the last 10 years. However, this study is limited in that it analyzed only online news articles on the Naver News platform while excluding traditional news media such as TV and radio. By collecting unstructured data in various subjects of discourse, it will be possible to more closely analyze the social perception or trend. In addition, the results cannot be generalized since this study analyzed only the titles and main text of the articles. By also analyzing the comments and time-series data of the news articles, it would be possible to develop discussions from multiple angles based on the changes in public emotional reactions over time.

References

Artz, B. and D.B. Davis. 2017. Green care: A review of the benefits and potential of animal-assisted care farming globally and in rural America. Animals 7(4):31. https://doi.org/10.3390/ani7040031

Bragg, R. 2013. Care farming in the UK—key facts and figures. Summary report for natural England (pp. 1-9). Essex, England, UK: University of Essex. https://www.farmgarden.org.uk/sites/farmgarden.org.uk/files/care_farming_key_facts.pdf

Cacciatore, J., R. Gorman, and K. Thieleman. 2020. Evaluating care farming as a means to care for those in trauma and grief. Health & Place 62:102281. https://doi.org/10.1016/j.healthplace.2019.102281

Cha, M.K. 2015. Semantic network analysis of arts management in newspaper articles - From 1990 to 2014. The Journal of Cultural Policy 29(2):168-200. http://dx.doi.org/http://dx.doi.org/10.16937/jcp.29.2.201508.168

Choi, Y.J. and S.H. Kweon. 2014. A semantic network analysis of the newspaper articles on big data. Journal of Cybercommunication Academic Society 31(1):241-286.

Elings, M. 2012. Effects of care farms: Scientific research on the benefits of care farms for clients. Plant Research International, Wageningen UR, the Netherlands. https://library.wur.nl/WebQuery/wurpubs/450976

Eum, S.W. and B.H. Leem. 2021. A study on lecture comments using CONCOR analysis. Korean Business Education Review 36(4):25-47. http://dx.doi.org/10.23839/kber.2021.36.4.25

Greenleaf, A.T. and K.M. Roessger. 2017. Effectiveness of care farming on veterans’ life satisfaction, optimism, and perceived loneliness. The Journal of Humanistic Counseling 56(2):86-110. https://doi.org/10.1002/johc.12046

Hassink, J., W. Hulsink, and J. Grin. 2014. Farming with care: the evolution of care farming in the Netherlands. Wageningen Journal of Life Sciences 68:1-11. https://doi.org/10.1016/j.njas.2013.11.001

Hemingway, A., C. Ellis-Hill, and E. Norton. 2016. What does care farming provide for clients? The views of care farm staff. Wageningen Journal of Life Sciences 79(1):23-29. https://doi.org/10.1016/j.njas.2016.09.001

Hine, R., J. Peacock, and J. Pretty. 2008. Care farming in the UK: contexts, benefits and links with therapeutic communities. Therapeutic communities 29(3):245-260. http://repository.essex.ac.uk/id/eprint/5058

Hong, J.H. and H.J. Yun. 2014. Presidential candidate’s speech based on network analysis: Mainly on the visibility of the words and the connectivity between the words. The Journal of the Korea Contents Association 14(9):24-44. http://dx.doi.org/10.5392/JKCA.2014.14.9.024

Jang, H.S., G.M. Gim, S.J. Jeong, J.S. Kim, and E.H. Yoo. 2019. Psychological and physiological changes in the elderly due to agro-healing activities. Journal of People, Plants, and Environment 22(5):425-434. https://doi.org/10.11628/kjsppe.2019.22.5.425

Jang, J.H., S.Y. Jeong, H.Y. Kamg, E.S. Lim, J.I. Lee, and S.M. Lee. 2021. SA Study on agro-healing as a tourism resource healing experience tourism resources. Journal of Rural Tourism 24(1):111-118.

Kang, H.S. and J.H. Yang. 2018. The Analogy test set suitable to evaluate word embedding models for Korean.
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Journal of Digital Contents Society 19(10):1999-2008. http://doi.org/10.9728/dcs.2018.19.10.1999

Kho, J.C., K.T. Cho, and Y.H. Cho. 2013. Recent research trends in technology management examined through keyword network analysis. Journal of Intelligence and Information Systems 19(2):101-123. http://dx.doi.org/10.13088/jiis.2013.19.2.101

Kim, H.C. and K.H. Ahn. 2012. Relation of population, jobs, social capitals and centrality in Seoul metropolitan area, using social network theory. Journal of Korea Planning Association 47(3):105-122.

Kim, H.S. 2017a. A semantic network analysis of big data regarding food exhibition at convention center. Culinary Science & Hospitality Research 23(3):257-270. https://doi.org/10.20878/cshr.2017.23.3.024

Kim, H.S. 2017b. An exploratory study on the semantic network analysis of food tourism through the big data. Culinary Science & Hospitality Research 23(4):22-32. https://doi.org/10.20878/cshr.2017.23.4.003

Kim, H.W. and C.N. Jun. 2014. An exploratory study on content creation methods utilizing big data: Linguistic and story resources for effective creation of TV home shopping content. Journal of Cybercommunication Academic Society 31(3):5-51.

Kim, K.M., J.H. Moon., S.J. Jeong., and S.M. Lee. 2013. Analysis of the current status and characteristics of agro-healing in Korea. Journal of Agricultural Extension & Community Development. 20(4):909-936. http://dx.doi.org/10.12653/jeced.2013.20.4.0909

Lee, S.W., J.Y. Cho, K.W. Kim, E.H. Yoo, and Y.S. Jang. 2020. A qualitative study on care farming in the field of social welfare. Journal of Public Policy Studies 37(2):273-301. https://doi.org/10.33471/IL.A.37.2.11

Park, J.H. and K.Y. Kwahk. 2013. The Effect of patent citation relationship on business performance: A Social network analysis perspective. Journal of Intelligence and Information Systems 19(3):127-139. http://dx.doi.org/10.13088/jiis.2013.19.3.127

Park, S.M. 2020. The impact of the COVID-19 pandemic on mental health among population. Korean Journal of Health Education Promotion 37(5):83-91. https://doi.org/10.14367/kjhep.2020.37.5.83

Park Y.M. and Y.W. Shin, 2021. Trend analysis of Grow-Your-Own using social network analysis: Focusing on hashtags on Instagram. Journal of People, Plants, and Environment 24(5):451-460. https://doi.org/10.11628/ksppe.2021.24.5.451

RDA (Rural Development Administration). 2012, January 11. Agricultural industry in 2012 as a keyword. RDA Interobang 49:1-20. Retrieved from https://www.nongsaro.go.kr/portal/ps/psv/psvrc/rdainterDtl.ps?menuId=PS00063&cntntsNo=34260

RDA (Rural Development Administration). 2016. Understanding of agro-healing (care farming) (pp. 1-95). Wanju, Korea: National Institute of Horticultural and Herbal Science, RDA. Retrieved from https://lib.rda.go.kr/search/mediaView.do?mets_no=00000187083

RDA (Rural Development Administration). 2020, March 24. Act On Research, Development, And Promotion Of Healing Agriculture. Retrieved from https://elaw.klri.re.kr/kor_service/lawView.do?hseq=55063&lang=ENG

Ryu, J.W. and J.H. Song. 2014. Visualization for big data. Review of Korea Contents Association 12(1):21-26. http://doi.org/10.20924/CCTHBL.2014.12.1.021

Shi, M., W. Zhu. H. Yang, and C. Li. 2016. Applying semantic web and big data techniques to construct a balance model referring to stakeholders of tourism intangible cultural heritage. International Journal of Computer Applications in Technology 54(3):192-200. https://doi.org/10.1504/IJCAT.2016.079873

WHO. 2020, October 5. COVID-19 disrupting mental health services in most countries, WHO survey. Retrieved from https://www.who.int/news/item/05-10-2020-covid-19-disrupting-mental-health-services-in-most-countries-who-survey

Yoo, E.H., Y.M. Park. S.J. Jeong, J.S. Kim, Y.G. Kang, and Y.J. Jeong. 2021. A Study on priority of classification system for agro-healing using the analytic hierarchy process. Journal of People, Plants, and Environment 24(6):663-672. https://doi.org/10.11628/ksppe.2021.24.6.663

Yoo, E.H., J.S. Kim, S.J. Jeong, Y.G. Kang, and H.R. Kwon. 2021. Analysis of programs provided by agro-healing farm in Korea - Focusing on agro-healing farms participated in agro-healing development pilot project. Journal of Recreation and Landscape 15(3):1-12. http://dx.doi.org/10.51549/JORAL.2021.15.3.001

Yoo, E.H., J.S. Kim, S.J. Jung, Y.K. Kang, and H.L. Kwon. 2021. Analysis on current status of agro-healing farm
business through agro-healing industry classification. Journal of Recreation and Landscape 15(4):57-68. http://db.koreascholar.com/article.aspx?code=412339

Yun, G.J. 2020. Changes and tasks in Korea’s healthcare system in times of the COVID-19 pandemic. Health and Welfare Forum 290:34-49. https://doi.org/10.23062/2020.12.4