A Study on Leadership Trends from the Perspective of Domestic Researcher's Using BERTopic and LDA

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Abstract

Purpose − This study aims to find clues necessary for the direction of leadership development suitable for the current situation by exploring the direction in which leadership has been studied from the perspective of domestic researchers, along with the arrangement of leadership theories studied in various ways.

Research design, data, and methodology − A total of 7,425 papers were obtained due to the search, and 5,810 papers with English abstracts were used for analysis. For analysis, word frequency analysis, word clouding, and co-occurrence were confirmed using Python 3.7. In addition, after classifying topics related to research trends through BERTopic and LDA, trends were identified through dynamic topic modeling and OLS regression analysis.

Result − As a result of the BERTopic, 14 topics such as 'Leadership management and performance' and 'Sports leadership' were derived. As a result of conducting LDA on 1,976 outliers, five topics were derived. As a result of trend analysis on topics by year, it was confirmed that five topics, such as 'military police leadership' received relative attention.

Conclusion − Through the results of this study, a study on the reinterpretation of past leadership studies, a study on LMX with an expanded perspective, and a study on integrated leadership sub-factors of modern leadership theory were proposed.

Keywords: Leadership, Research Trend, Domestic Researcher, BERTopic, LDA (Latent Dirichlet Allocation).

JEL Classification Code: C60, C80, L20, M10, M59.

1. Introduction

Domestic and foreign business environments are becoming increasingly complex and challenging due to the long-term recession and unexpected pandemics such as COVID-19. The complexity of the changing business environment has become a big wave related to the existence of companies. For this reason, leaders in various fields are faced with a situation where they must not only respond to the pace of change but also strive to address the complexity of the challenges they face, both for themselves and for the survival and development of their organizations. Unlike the past, the current situation referred to as the VUCA (Volatile, Uncertain, Complex, Ambiguous) era is very ambiguous, and difficult to interpret the current situation or predict the future due to non-linear reasons. Also known as information overload, the interconnectedness of systems and business communities, the dissolving of traditional organizational boundaries, and the emergence of new technologies disrupt traditional practices, technologies that disrupt old work practices, different values and expectations of new generations entering the workplace, and increased globalization leading to the need to lead across cultures. Researchers argue that new leadership is needed for these reasons (Petrie, 2011). Studies such as CSR and Leadership (Hu & Dutta, 2022; Liu et al., 2022; Zhao et al., 2023) and ESG and Leadership (Friedman & Mizrachi, 2022; Niu et al., 2022; Zhuravleva, 2022) are the results of the demands for bold business environment changes such as CSR (Corporate Social Responsibility) and ESG (Environmental, Social, and Governance).

On the other hand, some scholars positively predict the current situation, saying that unexpected crises pose a significant social threat and provide a platform for growth. For example, Leonhard (2016) predicted that the core of post-COVID-19 is transformation, and through this, moral leadership based on morality and the smart platform industry will emerge from financial-based leadership that relied on financial statements in the past (Leonhard, 2016). He said that people in crisis tend to lean on moral authority to find truthful answers, wise leadership, and hope (Leonhard, 2016).

This study is interested in leadership research trends because even modern societies with developed individualism cannot live without the presence of communities or others, so the emergence of outstanding leadership is necessary to reduce social division and prepare for the future society. In addition to the various factors presented above, companies need to face a new environment that is complex, volatile, and unpredictable to lay the groundwork for developing managers as leaders. Since most managers become leaders through field experience, education, and coaching/mentoring, checking leadership theories and research trends can provide them with helpful information. Researchers will also be able to serve as a guide for overall leadership or leadership research in each field by identifying research trends so far. These are examples of studies such as Yeşilbaş and Kantek (2022) reported research trends in nursing leadership through research using nursing categories and leadership as keywords, while Bhaskar and Kaushik (2022) reported research trends in female leadership targeting female entrepreneurs in India.

This study aims to find clues for the direction of leadership development needed in the present era by exploring the direction in which leadership has been studied from the perspective of domestic researchers and the arrangement of leadership theories. Word frequency analysis, word clouding, and word co-occurrence frequency analysis were performed for research trend analysis, and trend analysis for each topic was conducted after deriving topics using BERTopic and LDA (Latent Dirichlet Allocation).

The results of this study are expected to be used as primary data for fostering managers as leaders, along with what kind of leadership should be used in various changing situations suggested by Petrie (2011). In addition, it was expected that researchers would be able to serve as a guide for future leadership research by confirming past research trends.

2. Literature Review

2.1. Leadership

The concept definition of leadership is very diverse, so it is unreasonable to limit something to leadership. This is because it needs to be clarified to distinguish which type of leadership is better, and it is also ambiguous to judge whether the source of leadership type is the leader or the situation. For example, Bass (1990) classified leadership as a concept that is the focus of the group process. However, other scholars have identified personality prospects, a combination of particular traits or characteristics, an act or behavior, the power relationship that exists between leaders and followers, an instrument of goal achievement, and a skills perspective (Northouse, 2021). Stogdill (1974) defined leadership as having the group member orientate toward a specific goal and exercising influence actually to take action

to achieve that goal. On the other hand, Northouse (2021) defined leadership as a process whereby an individual influence a group of individuals to achieve a common goal.

The flow of research on leadership theory can be classified into a modern perspective, focusing more on influences such as relationships with members and trust while trying to find the source of leadership in the leader's characteristics, behaviors, or situations from a traditional perspective. This can be interpreted in the same context as classifying leadership into trait theories and process theories related to the characteristics of leaders. Specifically, leadership theories include The Great Man Theory (Jago, 1982; Madanchian et al., 2016), The Trait Theory (Bass & Stogdill, 1990; Mann, 1959; Northouse, 2007; Stogdill, 1948; Yukl, 2011), Skill -based leadership model (Mumford et al., 2000; Yamamarino, 2000), leadership style approach ((Blake & Mouton, 1964; Cartwright & Zander, 1960; Hemphill & Coons, 1957; Katz & Kahn, 1951 The situational approach to leadership (Blanchard, 1985; Blanchard et al., 1985; Hersey & Blanchard, 1969), Contingency Theory (Fiedler, 1964, 1967; Fiedler & Garcia, 1987), and Path-Goal Theory (Evans, 1970; House, 1971; House & Dessler, 1974; House & Mitchell, 1974). Research emphasizing subordinates and situations, LMX Theory conceptualized around the interaction between leaders and subordinates (Dansereau et al., 1975; Graen, 1976; Graen & Uhl-Bein, 1995), Transactional leadership (Burns, 1978), Transformational leadership (Bass, 1985; Bennis & Nanus, 1985; Burns, 1978). Other issues include team leadership based on teams (McGrath et al., 2014; Porter & Beyerlein, 2000; Zaccaro et al., 2001), authentic leadership based on authenticity (Avolio & Gardner, 2005; Avolio et al.,2009; Gardner et al., 2005; Shamir & Eilam, 2005; Walumba et al.,2008), and servant leadership that focuses on serving its members (Ehrhart, 2004; Hale & Fields, 2007; Walumbwa et al., 2010; Spears, 2010), and adaptive leadership (Heifetz et al., 2009; Heifetz & Linsky, 2002) to develop adaptability to cope with changing situations. Liden et al., 2008), inclusive leadership that embraces members as insiders based on interactions between leaders and members (Hollander, 2009; Shore et al., 2011; Uhl-Bien, 2006), Etc. is being studied. In addition, some studies emphasize the ethics of leaders (Thiel et al., 2018; Wang et al., 2018), studies on leadership types by gender (Eagly, 2013; Zenger & Folkman, 2019), and studies related to followership (Crossman & Crossman, 2011; Kelly, 2008) are reported. <Table 1> below summarizes the leadership theories introduced by Northouse (2021).

Table 1: Fundamental Leadership Theories and Characteristics

Leadership Theory		Characteristics	References
The Great Man Theory		- Great leaders are heroic and mythical - This theory identifies leadership in terms of inheritance, in which leaders genetically possess higher qualities that distinguish them from followers	Jago (1982), Madanchian et al. (2016)
The Trait Theory		- Study the characteristics that distinguish leaders and followers, such as energy, intelligence, honesty, confidence, appearance, knowledge, optimism, and stress tolerance - Intelligence, confidence, determination, sociability and conscientiousness are key leadership characteristics	Stogdill (1948), Mann (1959), Bass & Stogdill (1990), Northouse (2007), Yukl (2011)
Skill-based leadership model		- Leadership effectiveness depends on the leader's ability to solve complex organizational problems - Effective leadership depends on the professional, interpersonal, and conceptual skills the leader possesses	Mumford et al. (2000), Yammarino (2000)
Leadership style research	Common	- Focus on what leaders do and how they behave	-
	Ohio State University	- In the leadership process, the importance of the leader's caring behavior (relational behavior) was pointed out rather than the leader's characteristics - Sees initiative structure and considerate behavior as two separate and distinct continuums	Hemphill & Coons (1957), Stogdill (1974)
	University of Michigan	- Studying the effect of leader behavior on small group achievement - Categorized into employee and production orientation and conceptualized these two factors as being at opposite ends of a single continuum.	Cartwright & Zander (1960), Katz & Kahn (1951), Likert (1961, 1967)

	The Managerial Grid Model	- Explains how leaders can help organizations achieve their goals through concerns for production and concern for people. - The leadership grid is divided into attention to performance and concern for people. - Five types of leadership types categorized such as authority-compliance, country club management, impoverished management, middle-of-the-road management, and team management	Blake & Mouton (1964)
The situational approach to leadership		- Different situations demand different kinds of leadership - A leader matches his or her style to the competence and commitment of the subordinates	Hersey & Blanchard (1969), Blanchard (1985), Blanchard et al. (1985)
Contingency Theory		- Leader-match theory states that a leader must match his or her leadership to the appropriate situation. - Leaders should classify their leadership type fit as task-motivated or relationship motivated according to situational variables such as leader-member relation, task structure, and position power. - Classify relationship orientation or task orientation with LPC (Least Preferred Co-Worker Scale)	Fiedler (1964, 1967), Fiedler & Glarcia (1987)
Path-Goal Theory		- The stated goal of this leadership theory is to enhance employee performance and employee satisfaction by focusing on employee motivation - Conducts directive, supportive, participative, or achievement-oriented leadership behaviors according to the characteristics of subordinates and tasks based on the expectation theory	Evans (1970), House (1971), House & Dessler (1974), House & Mitchell (1974)
LMX Theory (Leader-Member Exchange)		- Leadership is a process that is centered in the interaction between the leader and follows - The dyadic relationship between the leader and the member is classified into an in-group type based on a role other than the formal role and an out-group relationship based on a specified role. - In-group subordinates receive more information, influence, trust, and attention from the leader than out-group subordinates	Dansereau et al. (1975), Graen (1976), Graen & Uhl-Bein (1995)
Transactional leadership		- Focus on the exchanges that occur between leaders and followers - Leadership factors include contingent reward, management-by-exception, and corrective transaction	Burns (1978)
Pseudo transformational leadership		- A self-destructive, exploitative, and power-oriented leader distorts moral values. - Focus on one's interests rather than those of others	Bass (1998), Bass & Riggio (2006), Bass & Steidlmeier (1999)
Transformational leadership		- Transformational leadership refers to the process whereby an individual creates a connection that raises the level of motivation and morality in both leaders and followers the leader and followers) - Socialized leadership that seeks to influence for the benefit of the group - Leadership factors include idealized influence, charisma, inspirational motivation, intellectual stimulation, and individualized consideration.	Avolio (1999), Bass (1985), Bennis & Nanus (1985), Burns (1978),

Team leadership	- Presents a mental road map intended to help leaders diagnose problems in their teams and take appropriate actions to address them - The leader decides whether to continue to observe and monitor or intervene and act on tasks and relationships at the internal level and the environment at the superficial level.	McGrath et al. (2014), Porter & Beyerlein (2000), Zaccaro et al. (2001)
Authentic leadership	- It focuses on whether leadership is genuine - Authentic leadership is defined from an intrapersonal perspective, a developmental perspective, and an interpersonal perspective. - By inducing positive psychological abilities and promoting an ethical climate, leaders who work with employees develop self-awareness and internalized moral perspectives, increase balanced information processing ability and transparency in relationships, and further promote positive self-development. - Leader behavior patterns consist of four distinct components: self-awareness, internalized moral perspective, balanced processing, and relational transparency. - Tangible behaviors are shaped throughout the lives of leaders.	Avolio & Gardner (2005), Avolio et al. (2009), Gardner et al. (2005), Shamir & Eilam (2005), Walumba et al. (2008)
Servant leadership	- The leader takes care of and cares for the members as a servant for the members - Servant leaders place the good of followers over their self-interests and emphasize follower development, putting the interests of their members ahead of their own and setting a solid moral example for their members and their organizations, showing strong moral behavior.	Ehrhart (2004), Hale & Fields (2007), Walumbwa et al. (2010), Spears (2010)
Adaptive leadership	- It focuses on how well leaders can inspire people to handle and respond well when faced with problems, challenges, and change. - A leader is not a rescuer who solves problems for people but someone who encourages people to solve problems for themselves. - Adaptive leadership helps people develop their values, change, and evolve according to the situation's needs.	Heifetz et al. (2009), Heifetz & Linsky (2002), Liden et al. (2008)
Inclusive leadership	- It is a social construct established through the interaction between leaders and members, and it sets the norms of active consultation and participation to make joint decisions within the organization as a group. - With high subordination and uniqueness, individuals are treated as insiders and encouraged to retain their uniqueness within the group.	Hollander (2009), Shore et al. (2011), Uhl-Bien (2006),

Source) A summary of the contents of Northouse (2021).

2.2. Exploring domestic leadership research trends

The search for research trends has the advantage of checking the characteristics of the results studied so far and contributing to the research being carried out in a developmental direction by extracting factors that would be useful in the future or making suggestions and implications. As a result of exploring leadership research trends, Lee et al. (2020) conducted a study on 696 SSCI-cited data from The Leadership Quarterly and found that modern leadership research includes transformational leadership, LMX theory, and implicit leadership theories. It was reported that studies on leadership affect and emotions, such as authentic leadership, charismatic leadership, and ethical leadership,

were conducted. In addition, there are many other studies have been announced, such as Zhang et al. (2014) and Yang et al. (2022)'s research on Chinese leaders and Dickson et al. (2001)'s cross-cultural leadership research.

Several studies on leadership research trends have been published overseas and in Korea. For example, Park (2020) researched 6,013 KCI journals from 1967 to 2019, and research related to leadership within organizations, such as transformational leadership, behavior, and performance, was conducted. Park (2020) reported that quantitative research was 78.3%, and 64.6% of studies in the social sciences were published. In addition, some studies have been studied related to specific leadership and social issues, such as Lee et al. (2014), Ham et al. (2017), Han and Park (2020), and Hwang et al. (2022) related to ESG.
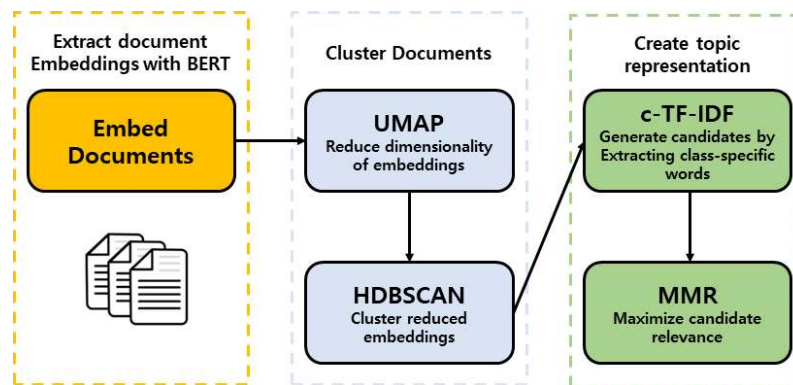
However, in the case of overseas studies, many leadership studies through topic modeling (e.g., Doldor et al., 2019; Sieweke & Santoni, 2020; Tonidandel et al., 2022) have been recently published, but in the case of domestic studies, research information sharing service (RISS), only three papers (Kang & Lee, 2020; Moon, 2021; Lim, 2022) were searched. In addition, since no study using BERTopic and LDA applied in this study could be found in domestic and foreign studies, it was judged that this study could make an academic contribution related to research trend research in terms of research methodology.

2.3. Topic Modeling

In this study, Ju et al. (2023), Yang (2022), Yang and Yang (2022a, 2022b), and Yang and Lee (2022) reported that BERTopic and LDA of topic modeling were used.

Topic modeling is one of the most powerful techniques in text mining for data mining, discovering latent data, and finding relationships between data and text documents (Yang, 2022; Yang & Lee, 2022; Yang & Yang, 2022a, 2022b). NMF (Non-Negative Matrix Factorization) (Févotte & Idier, 2011) or LDA (Blei et al., 2003) have various advantages in text mining. However, they require several topics, stopwords list, and morpheme analysis to obtain optimal results. Since it has the weakness that semantic relationships between words are ignored, text embedding technology is popular in the field of natural language processing (Yang, 2022; Yang & Lee, 2022; Yang & Yang, 2022a, 2022b).

BERT, released by Google in 2018, is an unsupervised learning model that can access input data from both sides to understand the context, and fine-tuning and pre-learning are possible (Kim & Yang, 2022). Unlike previous complex topic modeling (Bianchi et al., 2020; Devlin et al., 2018), BERTopic calls pre-trained language model data through BERT to remove elements of BoW (Bag of Word) and perform pre-learning as a technique that actively utilizes a language model (Devlin et al., 2018), it has recently been attracting attention in the academic world (Yang, 2022; Yang & Lee, 2022; Yang & Yang, 2022a, 2022b).
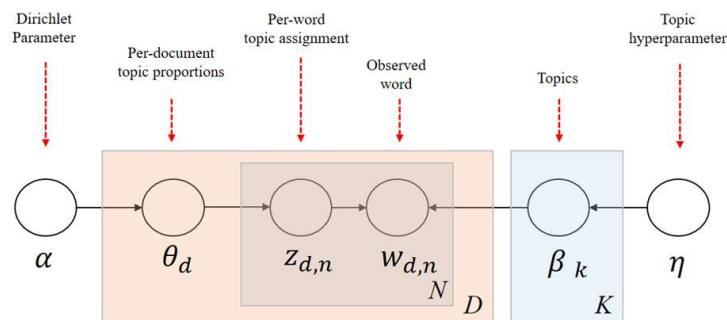

Source) Citing the data of Grootendorst (2022)

Figure 1: BERTopic algorithm

As shown in <Figure. 1>, Grootendorst (2022) said that BERTopic creates a topic expression through three steps (Grootendorst, 2022; Yang & Yang, 2022). Specifically, each document converts text data into an embedding representation using the framework of SBRT (Sentence-BERTT), which produces document embedding results from BERT with a pre-trained language model (Grootendorst, 2022; Yang & Yang, 2022). Next, we optimize the clustering process by reducing the dimensionality before clustering the embeddings using UMAP, clustering the reduced embeddings with HDBSCAN to generate semantically similar clusters, and based on user-defined classes in c-TF-IDF on document clusters. It involves extracting thematic expressions using transformations (Grootendorst, 2022;

Yang & Yang, 2022). That is, BERTopic measures the distribution of representative words by modeling the importance of words for each cluster using TF-IDF in units of clusters rather than documents (Yang & Yang, 2022).

On the other hand, LDA (Latent Dirichlet allocation) is the most used topic modeling technique in studies using topic models because it is highly applicable to structured and unstructured data (Blei et al., 2003). LDA-based topic modeling has been applied to natural language processing, text mining, social media analysis, and information retrieval (Jelodar et al., 2019; Yang, 2022; Yang & Lee, 2022; Yang & Yang, 2022a, 2022b). It has characteristics that excel at demonstrating discrete data and provide adequate access to find hidden structures and meanings in enormous amounts of information (Jelodar et al., 2019; Yang, 2022; Yang & Lee, 2022; Yang & Yang, 2022a, 2022b). Since LDA represents topics by word probabilities, the word with the highest probability in each topic is a characteristic that generally gives a good idea of what the word probabilities are from the LDA topic (Blei et al., 2003; Yang & Lee, 2022; Yang & Yang, 2022a, 2022b).

Source) Blei et al. (2003) and Yang & Yang (2022) are referenced and cited.

Figure 2: LDA Algorithm

As suggested by Yang (2022), Gibbs sampling is a Monte Carlo Markov-chain algorithm, which is a powerful technique of statistical inference, and many researchers (Lu et al., 2016; Rao, 2016; Tian et al., 2009; Xie et al., 2016) used this method for LDA. EM (expectation propagation) is a powerful method for obtaining parameter estimates of graphical models and is used for unsupervised learning. The EM algorithm includes the E-stage (expectation) and M-stage (maximization). It is to find the maximum likelihood estimate of a parameter when it depends on a specific latent variable (Chang & Blei, 2009; Yang, 2022; Zhu et al., 2009). Variational Bayes inference (VB) is an MD expansion algorithm that tries to optimize the goodness of fit by using parametric approximations of the posterior distribution of parameters and other latent variables, KL-divergence, etc, for observed items. (Chien & Chueh, 2010; Yang, 2022).

In this study, although BERTopic has various advantages, it is also noted that it is impossible to evaluate the performance of BERTopic with existing evaluation methods due to the characteristics of embedding (Bodrunova et al., 2020) (Yang, 2022). In fact, in the studies of Yang (2022) and Yang and Yang (2022), the number of topics derived through BERTopic was much larger than expected, so it was necessary to reduce it. It was pointed out that this does not fit the purpose of confirming actual research trends. Therefore, in this study, Ju et al. (2023), Yang (2022), Yang and Yang (2022a, 2022b), Yang and Lee (2022) as well as Ko et al. (2022), Kim and Yang (2022), as applied in the study, BERTopic and LDA by using them together, this study tried to approach the research purpose of research trend analysis appropriately.

3. Research Procedure

In order to confirm the leadership research trends of domestic researchers, the research was conducted as shown in <Figure 3>, and the analysis was performed using Python 3.7.
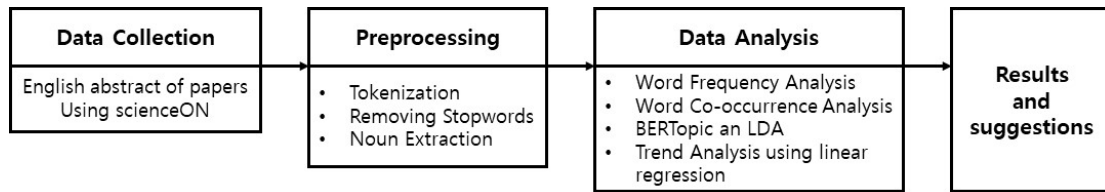
Figure 3: Research Procedure

3.1. Data Collection

As of July 20, 2022, due to extracting the keyword "leadership" from scienceON (www.scienceon.kisti.re.kr), 7,425 papers were searched, excluding duplicate papers among 7,828 papers. Of these, 1,806 papers included only Korean abstracts and 5,810 papers with English abstracts and English abstracts were selected for analysis. The year of publication of the subject paper is presented in <Table 2> below.

Table 2: Number of publications by year (n=5,810)

Year	1995~2000	2001~2005	2006~2010	2011~2015	2016~2020	2021~
Number	24	305	1,190	1,967	1,734	590

3.2. Data Preprocessing

Data preprocessing is a dictionary process that derives topics more elaborately while deleting stopwords or meaningless words. This study deleted special symbols and numbers such as purpose, conclusion, aim, and methodology, frequently used in English abstracts. Correlation, regression, SPSS, AMOS, and terms related to statistics, such as coefficient' and 'leadership' were also removed as stopwords to derive a topic composed of peripheral words related to leadership.

4. Empirical Analysis Results

4.1. Results of Word Frequency Analysis

As a result of word frequency analysis, it was found that the words were used in the order of relationship (5,322), job (4,828), leader (4,359), and satisfaction (3,949). The top 20 keywords and word clouding results are presented in <Table 3> and <Figure 4>.

Table 3: Top 20 keywords as a result of frequency analysis

No	Word	Freq.	No	Word	Freq.
1	relationship	5,322	11	influence	2,690
2	job	4,828	12	student	2,539
3	leader	4,359	13	management	2,393
4	satisfaction	3,949	14	school	2,288
5	behavior	3,772	15	program	2,262
6	performance	3,572	16	selfleadership	2,199
7	commitment	3,291	17	team	2,085
8	organization	3,146	18	education	2,007

| 9 | employee | 3,057 | 19 | group | 1,969 |
| 10 | teacher | 2,939 | 20 | role | 1,856 |

Figure 4: Results of Word Clouding

4.2. Results of Word Co-occurrence Frequency Analysis

In order to confirm the relationship between words, a dictionary was constructed that counts the frequency of co-occurring words, and then co-occurrence frequency analysis was performed after setting standards such as connection centrality, betweenness centrality, proximity centrality, and eigenvector centrality. As a result of the analysis, it was confirmed that the co-occurrence frequency of words such as 'influence', 'behavior', 'job', 'leader', and 'role' was high, centering on words such as 'relationship', 'employee', and 'performance'. These results are related to the frequent conduct of studies on relationships with employees, the influence of leadership, behaviors caused by leadership, and job satisfaction, as in the previous frequency analysis. The top 10 pairs of keywords with co-occurrence frequency are presented in <Table 4>, and the visualization results with more than 300 connection frequencies are presented in <Figure 5>.

Table 4: Results of Word Co-occurrence Frequency Analysis

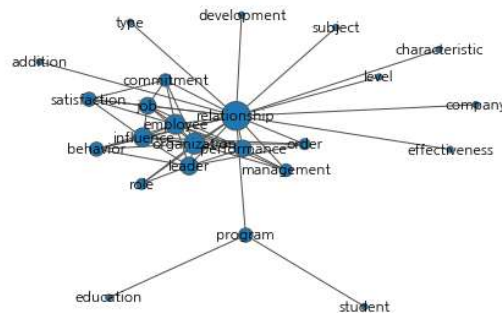| No	Word	Freq.	No	Word	Freq.
1	employee	752	6	leader	683
	relationship			relationship	
2	influence	736	7	job	667
	relationship			relationship	
3	organization	730	8	performance	606
	relationship			relationship	
4	behavior	688	9	relationship	602
	relationship			satisfaction	
5	job	683	10	relationship	572
	satisfaction			role	

Figure 5: Word Co-occurrence Visualization Result (connection frequency = 300 times)

4.3. Results of Topic Modeling

As a result of conducting BERTopic, 2,014 outlier data and a total of 53 topics were derived. However, as a result of checking each topic, a number of topics consisting of 10 to 30 pieces of data were derived. As a result of limiting the number of data pieces composed of each topic to more than 50 documents and conducting BERTopic again, 14 topics and 1,976 outlier documents were derived.

<Topic 1> derived through BERTopic consists of keywords such as 'job', 'commitment', 'behavior', 'performance', 'management', etc., and keywords such as 'employee', 'teacher', and 'student' appeared complexly. It was named 'Leadership management and performance' at the overall level. <Topic 2> consisted of keywords such as 'team', 'sport', 'player', and 'taekwondo' and was judged to be related to sports and was named 'Sports leadership'. <Topic 3> contained keywords such as 'policy', 'government', 'power', 'president', and 'party'. It was considered related to the exercise of power by the government, president, or CEO and named 'Political leadership'. <Topic 4> consists of keywords such as 'church', 'pastor', 'spirituality', 'god', 'jesus', 'ministry', and 'confucianism', and it was named 'Religious leadership' because it was judged to be related to religions such as 'Christianity' and 'confucianism'. <Topic 5> consists of keywords such as 'police', 'officer', 'soldier', 'commander', and 'cadet', and it was judged to be related to the police and military and was named 'Military-police leadership'. <Topic 6> is composed of keywords such as 'airline', 'flight', 'attendant', and 'crew', and it was judged to be related to airline pilots and cabin crew, so it was named 'Aviation leadership'. <Topic 7> consists of keywords such as 'safety', 'security', 'guard', and 'accident', and it was judged to be related to risk or safety-related management, and it was named 'Safety management leadership'. <Topic 8> consists of keywords such as 'entrepreneurship', 'startup', 'entrepreneur', and 'business', and it was judged to be related to business leaders such as startups and was named 'Entrepreneurial leadership'. <Topic 9> consists of words such as 'dance', 'dancer', 'dancing', and 'selfleadership', and was judged as leadership studies related to dance majors and named 'Dance leadership'. <Topic 10> consists of keywords such as 'game', 'disaster', 'fire', and 'emergency', and from a different perspective than <Topic 7>, it is judged to be related to emergencies such as 'game', 'addiction', 'disease', and 'fire', and it is classified as 'Crisis management leadership'. <Topic 11> consists of keywords such as 'beauty', 'salon', 'shop', 'service', and 'hair', and it was judged to be related to the leadership of those in the beauty industry, and it was named 'Beauty leadership'. Since <Topic 12> is composed of keywords such as 'lmx', 'exchange', 'quality', and 'leadermember', it was judged to be research related to LMX theory and named as 'Leader-member exchange'. <Topic 13> is composed of keywords such as 'climate', 'team', 'role', 'group', 'adaptation', and 'employee'. It was judged to be related to the leader role of an employee team or group and was named 'Group leadership'. <Topic 14> is composed of keywords such as 'librarian', 'library', 'university', and 'makerspaces', and it was judged to be related to the role of librarians, so it was named 'librarian leadership'.

Meanwhile, after performing LDA on 1,976 outlier documents, the highest coherence score was 0.3633 when there were five topics, so five topics were added. <Topic 15> was composed of keywords such as 'leader', 'style', and 'role', and was judged to be related to the leadership type and role related to performance within the organization, and named it 'Leadership style'. <Topic 16> is composed of keywords such as 'job', 'behavior', 'program', 'group', 'ability', etc., and it was judged to be related to education to strengthen leadership capabilities within the organization, and it was named 'Employee leadership training'. <Topic 17> consists of keywords such as 'teacher', 'school', 'education',

and 'student', and it is judged to be related to leadership job training for students in schools, and it was named 'Leadership job training for students'. <Topic 18> is composed of keywords such as 'satisfaction', 'job', 'employee', 'performance', and 'program', and it is judged to be related to the performance of the leadership education program targeting the members of the organization, and it was named 'Leadership education performance'. <Topic 19> is composed of keywords such as 'woman', 'relationship', and 'role', and it was judged to be related to women's leadership role in job situations, and it was named 'women's leadership'. <Table 5> presents each topic and the top 10 keywords organized in the topic.

Table 5: Results of Topic Modeling

Topic	Topic naming	Top 10 Keywords by Topic
1	Leadership management and performance	**job,** relationship, teacher, **commitment, behavior,** student, selfleadership, **performance, management,** employee,
2	Sports leadership	t**eam, sport, player, taekwondo, coach, athlete,** project, satisfaction, performance, leader
3	Political leadership	**policy,** union, **government, power, president,** korea, **party,** capital, reform, **politics**
4	Religious leadership	**church,** pastor, people, **spirituality,** community, **god, jesus, ministry,** leader, confucianism
5	Military & police leadership	**police, officer, soldier, commander,** cadet, organization, **combat,** unit, commitment, **army**
6	Aviation leadership	**airline, flight, attendant, travel, service,** job, agency, **crew,** satisfaction, **cabin**
7	Safety management leadership	**safety, security,** behavior, **guard,** climate, laboratory, site, **accident,** culture, manager
8	Entrepreneurial leadership	**entrepreneurship, startup, entrepreneur,** education, **business,** founder, university, selfleadership, incubator, intention
9	Dance leadership	**dance,** student, **dancer,** influence, **dancing, selfleadership,** school, thinking, university, efficacy
10	Crisis management leadership	game, **disaster, fire, system, emergency,** usage, response, damage, management, people
11	Beauty leadership	**beauty, salon,** job, **shop,** issue, rating, **service,** satisfaction, **hair,** selfleadership
12	Leader-member exchange	**lmx, exchange,** envy, dwb, relationship, **quality,** performer, similarity, l**eadermember,** job
13	Group leadership	**climate,** performance, facilitation, relationship, **group, team, role, adaptation, employee,** scholar
14	Librarian leadership	**librarian, library,** competency, **university, empowerment,** area, **makerspaces,** director, value, adult
15	Leadership style	**leader,** relationship, trust, organization, team, performance, **style,** behavior, influence, **role**
16	Employee leadership training	**job, behavior,** leader, relationship, satisfaction, selfleadership, **program, group,** performance, **ability**
17	Leadership job training for students	**teacher, school, education,** job, relationship, **student,** type, performance, team, commitment
18	Leadership education performance	relationship, **satisfaction, job, employee,** leader, **performance,** behavior, **program,** organization, influence
19	Women's leadership	commitment, leader, job, satisfaction, employee, **woman,** organization, **relationship,** management, **role**

Note) Bold type indicates the keywords used to determine the topic name

4.4. Trend Analysis Results of Each Topic

The trend of the topic can be confirmed by calculating the ratio of each topic assigned to a specific paper through topic modeling and calculating the average ratio by year of each topic using the calculated ratio and the year of publication of each paper (Blei & Lafferty, 2006). This analysis method is called dynamic topic modeling (Yang, 2022; Yang & Yang, 2022). Dynamic topic modeling has the advantage of tracking each topic's appearance over time because the topic ratio is flexible (Blei & Lafferty, 2006; Yang, 2022). The trend analysis results for each topic are visualized in <Figure 4>. As shown in <Figure 6>, in leadership research, 'Leadership management and performance' in <Topic 1> and 'Sports leadership' in <Topic 2> are quantitatively higher than other topics. Much research has been done. However, there is a limitation in that other trends, other than the liquidity check by year, cannot be confirmed.

Therefore, in this study, as in other studies such as Ju et al. (2023), Yang (2022), Yang and Yang (2022a, 2022b), Yang and Lee (2022), the independent variable was set to the publication year of the thesis, and the dependent variable was set to the average weight of the topic in the corresponding year, and then OLS regression analysis was performed (Ju et al., 2023; Yang, 2022; Yang & Lee, 2022; Yang & Yang, 2022a, 2022b). If the regression analysis result is a statistically significant positive (+) coefficient, it can be interpreted as a hot topic, and a negative (-) coefficient can be interpreted as a cold topic. If not, it can be concluded as a neutral topic (Griffiths & Steyvers, 2004; Ju et al., 2023; Yang, 2022; Yang & Lee, 2022; Yang & Yang, 2022a, 2022b).
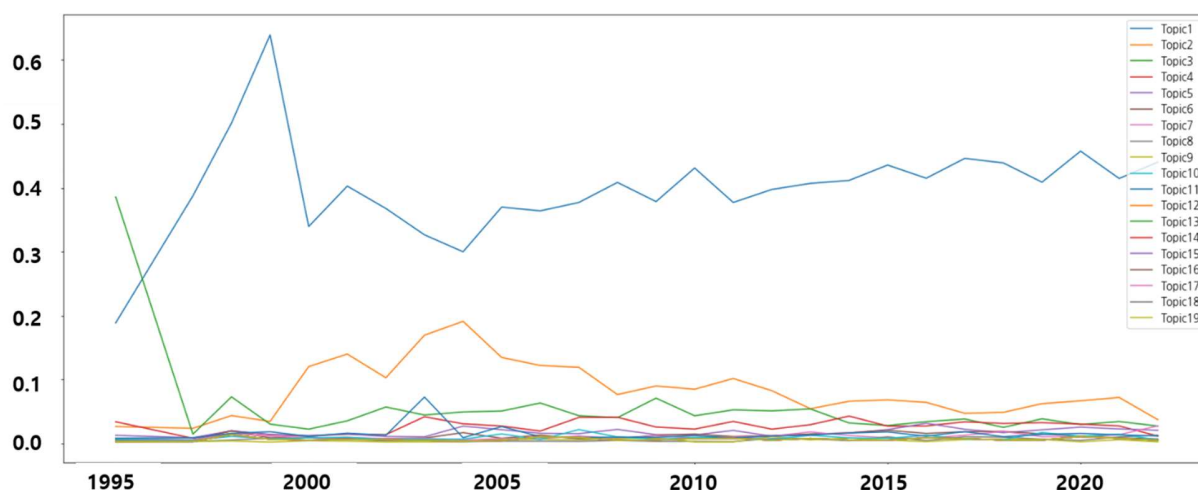

Figure 6: Visualization results of Trend Analysis

As a result of OLS regression analysis, 'Political leadership' (coeff.= -0.0033, p<.05) in <Topic 3> and 'Leadership education performance' (coeff.= - in <Topic 18>) 0.0024, p<.05) was identified as a relatively unnoticed topic at the 95% confidence level. On the other hand, 'Military-police leadership' in <Topic 5> (coeff.= 0.0004, p<.01), and 'Safety management leadership' in <Topic 7> (coeff.= 0.0003). , p<.01), 'Entrepreneurial leadership' in <Topic 8> (coeff.= 0.0002, p<.01), and 'Leadership style' in <Topic 15> (coeff.= 0.0042. , p<.05) appeared as a topic that received close attention at the 95% confidence level. ′Aviation leadership' in <Topic 6> was identified as a hot topic at the 90% confidence level. These results reflect the recent safety-related fields, special situations such as the military and police, and situations in which the importance of entrepreneurship-related leadership is being highlighted, and reflect researchers' interest in leadership types. In addition, it can be interpreted that social problems, such as lack of leadership due to a turbid political environment, have fallen into a field in which researchers have not been relatively interested. However, it would be desirable to interpret leadership education performance as being classified as a cold topic because a significant part of it was absorbed into <Topic 1>. The OLS regression analysis results for hot and cold topics, including 'aviation leadership' are presented in <Table 6>, and the visualization results are presented in <Figure 7>.

Table 6: Results of OLS regression analysis on topics by year

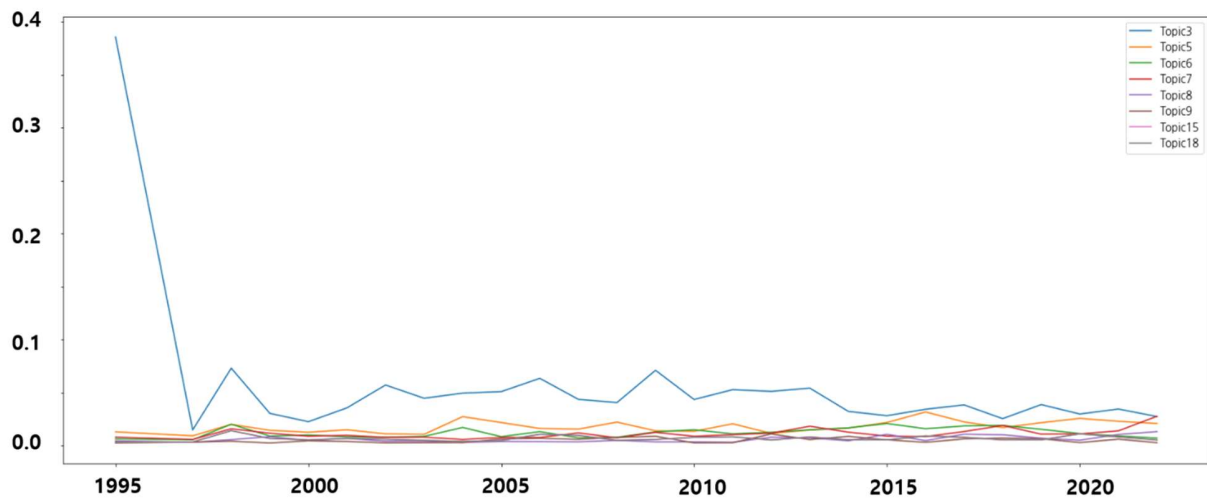| Topic	Topic naming	Coefficient	t-value	p-value	Trend
1	Leadership management and performance	0.0024	1.347	0.190	-
2	Sports leadership	-0.0012	-1.179	0.249	-
3	Political leadership	-0.0033	-2.095	0.046	Cold
4	Religious leadership	0.0004	1.591	0.124	-
5	Military-police leadership	0.0004	3.163	0.004	Hot
6	Aviation leadership	0.0002	2.035	0.053	Hot (Marginally)
7	Safety management leadership	0.0003	3.058	0.005	Hot
8	Entrepreneurial leadership	0.0002	3.393	0.002	Hot
9	Dance leadership	0.0000	1.672	0.107	-
10	Crisis management leadership	0.0001	1.139	0.266	-
11	Beauty leadership	-0.0002	-0.543	0.592	-
12	Leader-member exchange	0.0000	0.743	0.464	-
13	Group leadership	0.0000	1.766	0.090	-
14	Librarian leadership	-0.0000	-0.116	0.908	-
15	Leadership style	0.0042	2.350	0.028	Hot
16	Employee leadership training	0.0034	1.837	0.080	-
17	Leadership job training for students	-0.0013	-1.460	0.158	-
18	Leadership education performance	-0.0024	-2.264	0.034	Cold
19	Women's leadership	-0.0002	-0.679	0.504	-

Figure 7: Visualization results of hot & cold topic

5. Conclusions

The purpose of this study is to find clues necessary for the direction of leadership development suitable for the current situation by exploring the direction in which leadership has been studied from the perspective of domestic researchers, along with the arrangement of leadership theories that have been studied in various ways. To this end, the analysis results using 5,810 papers extracted from scienceON are as follows.

First, as a result of word frequency analysis, words such as relationship, job, leader, and satisfaction appeared frequently. The result of the co-occurrence frequency analysis also focused on words such as relationship, employee, and performance, and words such as influence, behavior, job, leader, and role. It was found that their co-occurrence was high. These results indicate that leadership-related research has been conducted on leadership research, relationships with employees, the influence of leadership, behaviors related to leadership, and job satisfaction. Second, from conducting BERTopic and LDA, 19 topics, including 'Leadership management and performance' were derived. The results identified by topic are studies related to the industry, job, group, etc. (e.g., <Topic 2~6>, <Topic 8~9>, <Topic 11>, <Topic 13~14>) and education training and educational outcomes (e.g., <Topic 17~18>), too. However, the main research area was 'Leadership management and performance' in <Topic 1>, which accounted for 42.3% of the data. In addition, it was confirmed that 'Safety management' (<Topic 7>), 'Crisis management' (<Topic 10>), 'Leader-member exchange relationship' (<Topic 12>), 'Leadership style' (<Topic 15>), and 'Woman leadership' (<Topic 19>) were studied. Third, as a result of confirming trends through dynamic topic modeling and OLS regression analysis for each topic, 'military police leadership', 'safety management leadership', and 'entrepreneurial leadership', it was confirmed that 'leadership style' and 'aviation leadership' are receiving relatively attention. However, 'political leadership' and 'leadership education performance' were analyzed as relatively unnoticed topics. This result is due to leaders' lack of evident achievements due to the chaos of the domestic political environment for a long time.

So far, the research results differ from the initially expected leadership research direction. Effective leadership is an organizational asset with a unique competitive value that all organizations seek (Northouse, 2021). For this reason, this study expected which theory would be more popular among the leadership theories presented in <Table 1> through BERTopic, LDA, and trend analysis. The results analyzed in this study are likely to be topic modeling limitations. Therefore, this study suggests the following research based on leadership research.

First, it is necessary to reinterpret research on leadership characteristics and capabilities that have recently begun to attract attention again. There is a fundamental problem with the leadership traits that have been studied in the past challenging to set the range and limits of each trait, not consider the situation, subjectivity of character determination, and proof limits for correlation with performance, and the classified traits can be easily changed through education or training. Indeed, competency models are also not accessible in that the scope of each model goes beyond the boundaries of leadership, has limitations in predictive power, and limits in generalization and pointing out that competence is also a part of characteristics. However, it is noteworthy that in recent leadership research, exemplary characteristics and competencies of leadership occupy a part of modern leadership theory. For example, the self-awareness or internalized moral perspective of authentic leadership is closely related to insight (Stogdill, 1974) among leadership characteristics. Therefore, research on leadership characteristics and competencies that can overcome the limitations pointed out so far will provide members who want to become leaders with various information to strengthen their strengths and supplement their weaknesses.

Second, an integrated study on leadership behavior is also needed in the above context. In this regard, it is necessary to pay attention to the recently announced Integrated Model of Leadership Behavior (IMoLB) by Behrendt et al. (2017). Based on the taxonomy of leader behavior developed by Yukl (2012), they present the relationship between the leader's task-oriented behavior and the relationship-oriented behavior for organizational change at an integrated level. Effective leadership for organizational performance eventually requires complex elaboration of tasks and relationships, so an effective leadership model linking the situation will be presented if related research is conducted.

Third, studying the LMX in <Topic 12> from an expanded perspective is necessary. As reported by Cropanzano et al. (2017), overseas studies study how emotions and leadership development through LMX play an essential role in high-quality relationships between leaders and subordinates. They believe that emotional agitation between leaders and followers leads to patterns of shared feelings over time, and these consequences affect the quality of the LMX relationship (Cropanzano et al., 2017). It is necessary to pay attention to the change in the quality of relationships caused by various factors. In addition, it is necessary to study how to solve the fairness problem caused by the classification into in-group and out-group, which is pointed out as a limitation of LMX.

Lastly, this study proposes a study that integrates the leadership sub-factors of modern leadership theory.
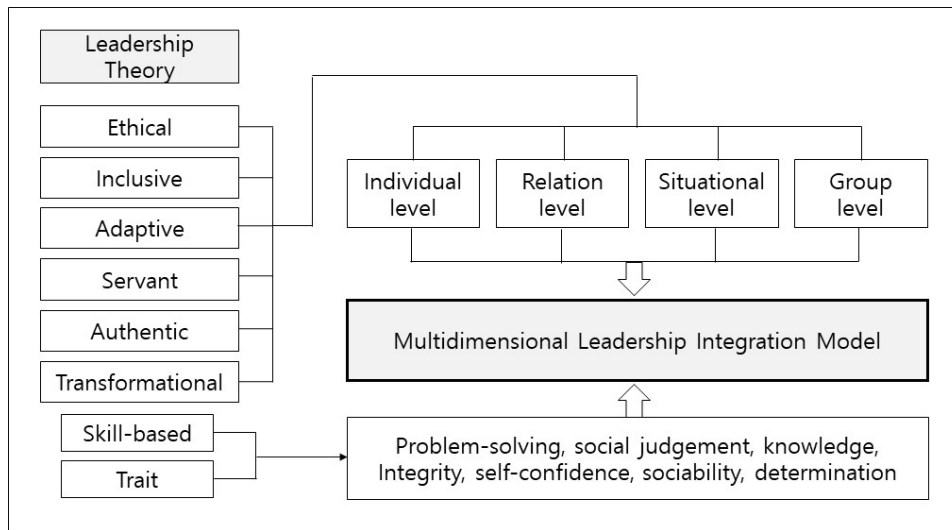
Figure 8: Visualization results of hot & cold topic

<Figure 8> is a conceptual map to build an integrated leadership model, which is a multidimensional reclassification of sub-factors of modern leadership theories, such as transformational leadership, into the individual, relationship, situation, and group/organizational levels based on the sub-factors of trait theory and competency theory among modern and traditional leadership theories. The basis of the multidimensional leadership integrated model is the assumption that the characteristics and capabilities of exemplary leaders can be developed, and the sub-factors of each theory are the leadership necessary factors at the level of individual leaders, the necessary factors for leadership in the level of relationships with members, the development of members, and the It means that influential variables can be determined through research that classifies and classifies into leadership requirements at the level of external situation change and leadership requirements at the group and organizational level, and checks their suitability and effectiveness.

Although this study has presented mixed results and suggestions through analysis of leadership studies conducted with interest by domestic researchers, there are some research trend studies limitations that need to be reflected in future studies. First, it is a limitation related to the topic name determination, which was raised as a common limiting point to many studies (e.g., Ju et al., 2023; Yang, 2022; Yang & Lee, 2022; Yang & Yang, 2022a, 2022b) that have performed topic modeling so far. This is because although experts in the field are involved in determining the topic name, it is only possible to reflect some of the specific contents of the classified topic. Therefore, future research must study the standards and methods for determining topic names. Second, as shown in this study, the results of which leadership type was more interesting could not be confirmed with BERTopic and LDA alone. This is a problem in the same context as extracting additional topics through LDA for outlier documents other than the topic derived from BERTopic. Therefore, new methods needed for trend analysis should be sought in future studies. Finally, there are limitations of research trend analysis which is pointed out such as Ju et al. (2023), Yang (2022), Yang and Yang (2022a, 2022b), Yang and Lee (2022), etc., In other words, many studies have suggested future directions through trend identification, but there is a problem that they need to be more specific. Therefore, future research must approach ways to provide more specific clues, such as identifying trends and establishing a causal model.

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