

Analysis of Home Furnishing Trends Caused by the COVID-19 Pandemic

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Abstract The purpose of this study was to investigate consumer trends and perceptions of home furnishing in the COVID-19 pandemic using social media data and online news and provide fundamental data to decision-makers for the development of home furnishing products. Text mining and network analysis were employed to extract meaningful words related to home furnishing and reveal the relationships among them. The text data were collected from blogs and online news searched by Naver and Daum with the keyword "home furnishing." The big data was analyzed using text mining, network, CONCOR, and sentiment analysis. The results revealed that keywords such as home furnishing brands, product items, retail brands, usages, and functions were mentioned with high frequency. In the results of TF-IDF, the ranking of home furnishing brands stood out. Moreover, the keywords were clustered into four groups: the impact of COVID-19 on the market, purchasing criteria, retailing, and product characteristics. Lastly, the sentiment analysis highly expressed positive emotions through words such as favorite, interest, and joy related to home furnishing. This study provides insights into the home furnishing industry by identifying the increasing trend of online shopping, leading brands and a new representative brand, and items of interest.

Keywords Home furnishing, COVID-19, Big data, Text mining

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Introduction

The pandemic caused by the rapid spread of COVID-19 at the end of 2019 significantly affects human thinking, lifestyle, and economic activity, which accelerates the change of traditional lifestyle and the effect on the entire industry (Hong, 2020). This damage has been more accelerated by the development of traffic and rapid globalization, which made not only the movement and interchange of people but also a rapid spread of the virus in the world. The pandemic situation possibly happened forward could be inevitably more experiencing environment (Kang, 2020).

COVID-19 decisively affects human health and survival and the recognition and behavior of enterprises and consumers, which causes a big change to the entire global

economy and industry (Hwang, 2020). At the same time, COVID-19 quickly made human life a routinized social distance and isolated lifestyle to a contactless environment. In addition, many social phenomena caused by COVID-19 such as working from home, employment crisis, consciousness inspiration on the environment extensively affect the change of lifestyle that is individual culture-consuming behavior. Value consumption of individualism more increased than unnecessary consumption due to income decrease and instability (Kim, Sin, & Kim, 2021). The consumption increased for individual stability and anxiety settlement.

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Also, trust and safety were more vital in consumption (Kim, 2021).

The contactless-centered new life environment creates a new environment, culture, and industry by accelerating digital life in the entire social area such as medicine, education, logistic, consumption, culture, working, and home. In the enterprise working environment, as working from home routinely enlarged and positive change of social recognition on contactless-working style expanded with the settlement of new working environment, the related enterprises are rapidly increasing (Kim et al., 2021). In particular, the pandemic makes the industrial change more accelerated from the process to the digital society expressed as the 4th industrial revolution that causes a big change in the whole industry (Lee & Choi, 2018). These changes make industries ambiguous and create new industrial business models fused with various industries.

Among the industries, the lifestyle industry is forced to develop a fused model with a new paradigm to respond to consumer needs seeking working space change as the pandemic situation continues (Lee & Ji, 2021). A new space-created home furnishing is required for sharing work and rest beyond the existing interior concept.

Therefore, this research is carried out to investigate consumer trends on home furnishing during the pandemic with big data analysis. Home furnishing (home fashion) is a growing industry in developed countries. As many products in the home furnishing will be required for a safer and more comfortable interior environment in a situation such as a pandemic, the analysis of consumer recognition and emotion on home furnishing is expected to be essential data for product planning of home furnishing.

Theoretical Background

Industrial Change by COVID-19. The rapid spread of COVID-19 pandemic that appeared at the end of 2019 makes economic activities of each country stop that affects the global supply chain, tourism, finance market, and economic psychology, as well as economic crisis, is expanding to the entire world (Chang, 2020). It shows a big ripple effect to all

industrial fields by saying that capitalism would divide before and after COVID-19. The structure of the economy and society in the world is changing by the COVID-19 pandemic, in which contactless activity and anti-globalism increase in various fields to prevent the spread of COVID-19 worldwide (H. Kim, 2020).

At the same time, human life is rapidly changing to contactless-oriented. The digital life needs are increasing in many social fields such as work, education, consumption environments, and the social lifestyle changes such as social distancing and isolating life became common by COVID-19 pandemic (Kim & Lim, 2020). It is time to prepare a new era for human life by naming a new normal (Choi, 2021; LaBarre, 2003). A new business based on the new normal is predicted to show a big difference from the traditional business, especially the business channel. The growth of the new business based on digital will accelerate with the increase of contactless communication and egoistic tendency caused by COVID-19 (Koo & Lee, 2016).

This trend expects to make a new-styled economic system in society by absorbing even the old generation not skilled with the digital into the environment established by COVID-19. Digital transition naturally conducted in the industry is a core change in the fourth industrial revolution (Kim & Lim, 2020). The fourth industrial revolution is quickly progressing as acceptance of digital transition is increased in all areas of economy, society, and culture. Consuming behavior is changing much since COVID-19. Currently, individual value-conscious consumption is increased because of income decrease and instability while unnecessary consumption reduces (Hwan & Kim 2020). Therefore, it is essential to investigate the consumption style changes provoked by social anxiety and fear caused by COVID-19 for creating a new business (Lee & Lee, 2020).

As working from home, flexible working, and video conference are primarily introduced in most enterprises, digital-based services for the hobby, leisure, and self-development activities were increased connecting with egoistic value consumption. As working from home enlarges, social recognition to contactless working style is positively expanded. Moreover, the business related to image conference systems and online business tools is abruptly

growing to support the contactless working style (Baek, 2020).

Even a complex space with various functions and roles was spotlighted before, but a small and personal space got the interests of consumers since COVID-19. Many current consumers look for and select a particular spot in a house and workplace. Likewise, COVID-19 reduced consumers' outdoor activities and travels. Many social and cultural activities around the house expect to increase in the area unit (Kim & Lee, 2020; Sigala, 2020).

Market fragmentation based on the establishment of traditional marketing strategy is still crucial for marketing achievement even though purchasing pattern of the consumer changed in the period of digital and pandemic. While the dependence on face-to-face purchasing is still high in the fashion industry, contactless purchasing is rapidly increasing in the platform community, and millennials and generation Z consumers who become the primary consumer group can handle mobile devices with ease (Y. Kim, 2020).

Many people, including the young consumers, have already experienced the contactless society due to COVID-19 and high cognition to contactless culture. The extension of the contactless culture was predicted to be vital to changing new consumption patterns and market factors (Song & Kim, 2020). Consumers became health- and safety-oriented since the COVID-19 pandemic. Virus, cleanliness, hygiene, safety, and health maintenance are decisive factors from past to present. However, current consumers have stronger cognition due to COVID-19 (Lee & Kang, 2021).

The COVID-19 also changed consuming activity into a convenience-centered one. From sales performances of the fashion category in march 2020, sales of leggings, training pants, cardigans, and loose fit t-shirts increased for women; sales of training wear, casual pants, half-sleeved shirts increased for men (Song, 2020). Stylish but easy looks became more popular than formal looks in daily wear. Styling such as sneakers instead of a high heel and jacket-matched one-piece, or casual look instead of discomfort suit is preferred (Y. Kim, 2020). Many apparel enterprises focused on survival than growth and minimization of sale loss (Lee, 2020; Xie & Youn, 2020). They closed inefficient stores to reduce the loss of property

efficiency. Moreover, they promoted online sales by gradually reducing off-line stores (Lee, 2020; Y. Kim, 2020).

Home Furnishing. In human history, war or infectious diseases have changed in social class, labor market, industry, culture, and so on. The COVID-19 pandemic brought about another significant change in the social and economic aspects by changing our lifestyle (H. Kim, 2020).

Lifestyle is an overall style consuming money and time for human living, and lifestyle form trends (Seo, 1986). The study on the lifestyle provides a behavior pattern of consumers and the market trends. Lifestyle is highly changed by politics, economy, society, culture, technology, and the environment. The sudden change of lifestyle by the pandemic more diversely changed the sentiment and cognition of consumers.

The lifestyle change, related to the contactless environment caused by COVID-19, made people stay at home for an extended time and plan a new home life, which increases their interest in home furnishing (home fashion). As the role of a house was expanded to a workplace and leisure space, the interest in home furnishing was extensively increased. People recognized that to make comfort and aesthetic space was a way to increase the quality of life. Also, decorating residing places according to people's tastes is one of the indexes to express who they are. (Kim, 2021).

In addition, a trend to positively enjoy home-life began to be shown as changing the entire interior in a house and doing various activities. Survey results which were conducted by Jikbang (2021), showed the required function of a residence in a COVID-19 era as follows; 'hobby, rest, and exercise (47.9%)', 'disinfection, fumigation, and ventilation (15.4%)', 'business (14.6%)', and 'fellowship forming (8.9%)'. Most of the ages wanted the home spaces for hobby, rest, and exercise. However, the age of 20s to 40s wanted the spaces for business, and 50s to 60s wanted the particular function related to healthy residence such as fumigation and ventilation in the second rank (Park, 2021). The results showed the business function was essential to the 20s to the 40s, who most assertively attend to social activity. Fumigation and ventilation are essential for the 50s to the 60s

because they had high needs to keep their health after retirement. (Park, 2021). In addition, as the interest in the quality of the home-life increased, demand for home furnishing increased to satisfy various emotions of consumers. Consumers' interests in personal space are expected to increase even after the COVID-19 disappear. The domestic market of home furnishing was forecasted to grow from 12 trillion in 2020 to 18 trillion in 2023 due to the desire for life quality improvement (Ahn, 2020).

The interest and demand for home furnishing rapidly increase with cognition change on the living/working environment by COVID-19. The demand for safety and comfort, relaxing space, and decoration of personal space increased. Requirements for home furnishing are more increased due to the environment to use the residence as a working place (Kim & Lee, 2020). Interior environment style needs to be created as a new one to satisfy the needs of the home furnishing by suitably joining existing factors in various aspects of aesthetic, function, economic utility for making the interior environment for the main space for working and relaxing.

Home furnishing is a compound word of home and furnishing, which is defined to decorate a home with various goods including furniture, lighting, wallpaper, bedding, carpet, and much interior equipment (Yu, 2009). Home textiles among the home furnishing goods take an essential role to decorate the interior and change the interior mood by the ways of their application. Home textile products are goods such as bedding, kitchen, living room, wall, curtain, and so on. Home textile products take a crucial role not only in changing interior mood but also in satisfying the psychological and emotional needs in daily life (Kim, 2014). Therefore, the lifestyle change caused by COVID-19, with the increased proportion of home activities, must have given rise to a new desire for home furnishings in people. As COVID-19 changed our life, how consumers think and feel about home furnishing changed. It is significant to investigate consumers' perception and sentiment for home furnishing.

Semantic network analysis using text mining from big data

Consumers actively express their opinions on various social

media platforms. Recently, researchers conducting studies using big data of social media has increased due to the advantage of obtaining more customer-centered and in-depth information (Youn & Jung, 2021). Research using big data from social media can analyze consumers' thoughts in-depth (Zhao & Min, 2019). New informatics techniques can provide an advanced approach to investigate the segmented market (Silva, Hassani, Madsen, & Gee, 2019). Text mining is helpful to extract extensive knowledge and generate insights that inspire theoretical explanations (Hofacker, Malthouse, & Sultan, 2016). Semantic network analysis reveals knowledge and information about networks between words by demonstrating the information in a visual graph with labeled nodes (Zhao & Min, 2019). Principally, any words in semantic networks associated with other words can be considered nodes (An & Park, 2020). Consumer opinions in social media can be converted to valued data and deliver insights to help make business decisions founded on consumers' preferences (Grover, Chiang, Liang & Zhang, 2018).

Research Method

Research Questions

This research established the following topics to investigate consumer trends on home furnishing by analyzing big data from social media and news.

- RQ1.** What are the keywords related to home furnishing, how frequently have these keywords been mentioned?
- RQ2.** How are the keywords related to home furnishing connected and how are these keywords grouped?
- RQ3.** What sentiments do people perceive related to home furnishing?

Data Collection

To investigate the opinions related to home furnishing, this study conducted text mining techniques and semantic network analysis. The data were collected along with the

following process to achieve the research purpose. First, we collected text data from Naver blogs, Daum blogs, and news, including "home furnishing" in the title and text posted from April 1, 2020, to March 31, 2021, using TEXTOM. TEXTOM is a big data analysis solution using text mining technology to collect and process data and create a data matrix in a web environment. A total of 6,495 data were collected. Following the refining process (Youn & Jung, 2021), we combined, and unified data, words, and synonyms. Authors considered filtering out advertising content on blogs and news but finally decided not to remove them. It is because, like news, advertisements can show current trends in home furnishing. However, to avoid bias caused by the duplicated advertisements, authors paid attention to unifying the repeated advertisements

Analytical Methods

This research conducted text mining, including frequency analysis and term frequency-inverse document frequency (TF-IDF) models, network analysis, and sentiment analysis. Textom is a big data analysis solution using text mining technology that can collect and process data and create a data matrix in a web environment. Textom was used to analyze the frequency, TF-IDF, degree centrality, and sentiment

analysis. Network analysis was carried out with the UCINET 6.0 for connecting strength based on the matrix analysis results with the upper 50 keywords extracted from the frequency analysis. The network analysis results were visualized by the NetDraw as a network map. Each word was presented as a node, and its size shows the frequency. A specific network map can be interpreted by the degree, which indicates the number of relevant nodes (adjacent nodes, connected nodes) and their relationships (links, ties, evaluations) (Youn & Jung, 2021). Additionally, the CONCOR analysis was conducted for the structural analysis of the relationships between the hidden key subgroups related to home furnishing in the complicated network clusters. It was a helpful way to identify the meaning between the nodes through the word groups to which individual words belong and to identify the meaning substance that texts convey

Results and Discussion

Frequency and TF-IDF Analysis of Keywords Related to Home Furnishing

Table 1 shows the top 30 keywords of appearing frequency from the refined texts. In frequency analysis, the order of

Table 1. Frequency of top 30 keywords

Rank	Word	Frequency	Rank	Word	Frequency
1	Home Furnishing	4044	16	Open	397
2	IKEA	1992	17	Hyundai Rivat	386
3	Furniture	1545	18	Subsidiary goods	364
4	Interior	1343	19	Online	349
5	Brand	838	20	Professional	337
6	Products	707	21	Domestic	328
7	House	702	22	Living	325
8	Selling area	628	23	Customer	318
9	Offer	569	24	Premium	303
10	Service	466	25	Enterprise	301
11	Design	461	26	Increase	280
12	Korea	461	27	Goods	271
13	MarketB	445	28	Hyundai department	269
14	Space	441	29	Time	267
15	Market	414	30	Showroom	266

"Home Furnishing," "IKEA," "Furniture," "Interior," "Brand," "Products," and "House" positioned in the upper ten texts with highly appeared frequency. Keywords extracted from the frequency analysis relate to the product name, product brand, sale place, usage, function, which showed cognition of current information and relative contents to home furnishing. In particular, consumers mostly recognized IKEA, the leading brand of home furnishing products and furniture. Consumers had an increased interest in home furnishing-related products and brands to make a safe and stable house caused by the COVID-19 environment. As needs for home furnishing with aesthetic and functional added-value products increased, the trend appeared to make a safe and comfortable own place. Especially, as several keywords of home furnishing brand were shown in the frequency analysis results, consumer's recognition on the home furnishing seemed to be related to personality expression and style maintenance.

TF-IDF is a way to evaluate the importance of text in big data (Lee & Kim, 2009). It is used to examine the importance of a specific word in a document, searching results in a system and document similarity. While frequent analysis is for the frequency of words in the collected big data, TF-IDF has the advantage of knowing the importance

of each word. The results of TF-IDF were not noticeably different from the results of frequency as shown in Table 2, but the rankings of home furnishing brands such as IKEA, MarketB, and Hyundai Rivat stood out.

Network Analysis of Keywords Related to Home Furnishing

In the network analysis results, the connections between keywords were meaningful. Figure 1 showed that keywords related to products, brands, sales, market, and function were located in the center. The results showed important recognition of consumers on products and items related to home furnishing. In the current COVID-19 environment, consumers are seriously concerned about tasty, cozy, and functional space. Therefore, they have much interest in home furnishing products and brands.

Additionally, CONCOR analysis was conducted to make groups with similarly attributed keywords in the entire network structure (Figure 2), in which four groups formed with naming. The keywords such as "corona," "interest," "online," and "demand" were positioned in the first group. Therefore, the first group was named the impact of COVID-19 on the market. As Kim (2014) referred, a lifestyle

Table 2. TF-IDF of top 30 keywords

Rank	Word	TF-IDF	Rank	Word	TF-IDF
1	IKEA	2974.327	16	Space	1125.482
2	Home Furnishing	2339.309	17	Open	1054.332
3	Furniture	2198.359	18	Online	1005.235
4	Interior	2133.042	19	Subsidiary goods	981.6387
5	Brand	1682.841	20	Professional	946.1299
6	House	1544.296	21	Domestic	936.5913
7	MarketB	1530.376	22	Living	936.1071
8	Products	1510.392	23	Customer	925.2301
9	Selling area	1413.178	24	Event	882.6793
10	Offer	1299.25	25	Planning	876.4525
11	Korea	1282.088	26	Studio	875.1584
12	Service	1185.677	27	Sale	874.4163
13	Hyundai Rivat	1175.03	28	Premium	868.4112
14	Design	1169.414	29	Hyundai department	863.3913
15	Market	1136.802	30	Enterprise	853.2228

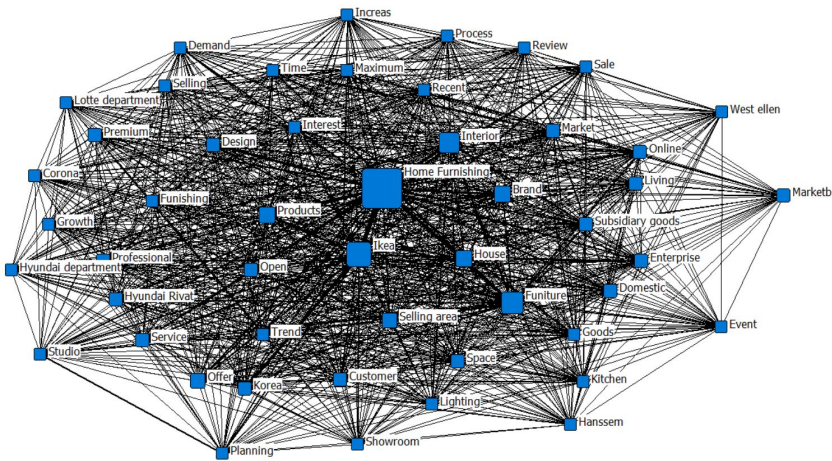


Figure 1. Network visualization of keywords

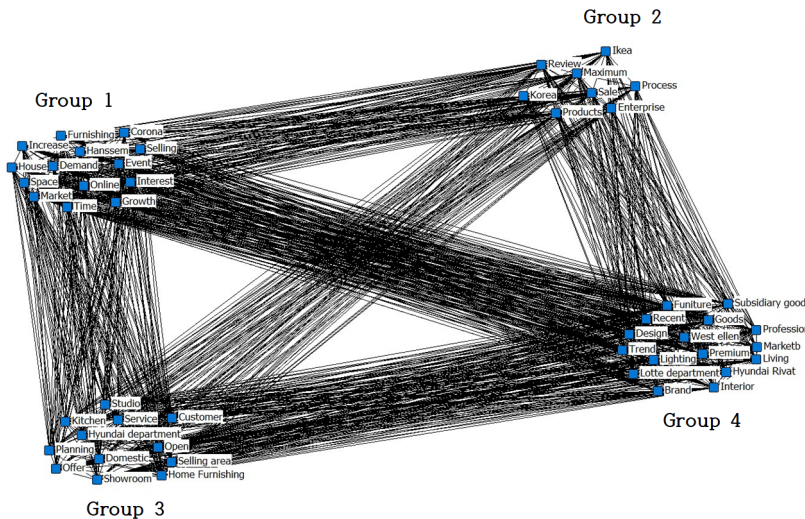


Figure 2. The results of CONCOR analysis for home furnishing

change aroused a new desire for home furnishing, this group showed a new interest in home furnishing and a desire to purchase caused by COVID-19. The keywords such as "IKEA," "products," "process," "sale (discount)," and "review" were in the second group and named as purchasing criteria. Since this group included IKEA, there was an argument about naming purchasing criteria. However, considering that many consumers compared products with IKEA goods when searching for designs and prices of various home furnishing products (Kim, 2018), the authors

concluded that it was appropriate to name the group as purchasing criteria. The keywords such as "selling area," "showroom," "offer," "kitchen," "studio," and "customer" were in the third group and named as retailing. The third group showed that showroom and studio type displays had played a critical role in the home furnishing retailing, as Chung and Nah (2016) mentioned. The keywords such as "premium," "lighting," "design," "subsidiary," "MarketB," and "Hyundai Rivat" were in the fourth group and named as product characteristics. The keywords in each group

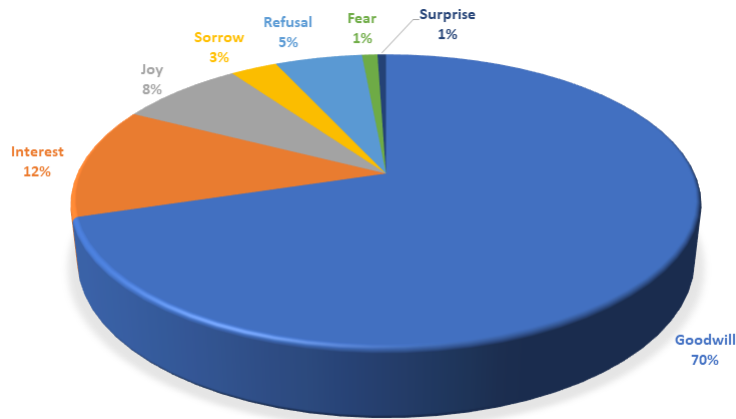


Figure 3. Classification of sentiment words.

characteristic also showed consumer recognition on home furnishing in various aspects.

Sentiment Analysis of Keywords Related to Home Furnishing

Sentiment analysis is an essential tool to investigate consumer needs, which are widely used to develop product concepts in design-related areas, including clothing and textiles (Park, 2012). This research analyzed the sentiment words frequency using TEXTOM sentiment dictionary function. This function finds the sentiment words among the original text data. It classifies them into sentiments such as

goodwill, interest, joy, sorrow, and fear, based on the sentiment dictionary TEXTOM developed. Figure 3 showed people perceived positive sentiments (goodwill:70%, interest:12%, joy:8%) much more than negative sentiments (refusal:5%, sorrow:3%, fear:1%) on home furnishing.

Among the positive sentiment, the favorite was most dominant in the consumer's recognition of home furnishing (Figure 4). The favorite consisted of keywords such as "recommend," "contemporary," "growth," "emotion," and "nice." The interest consisted of keywords such as "new," "want," "expect," and "special"; the joy consisted of keywords such as "delightful," "happy," "thank," "comfort," and "best."

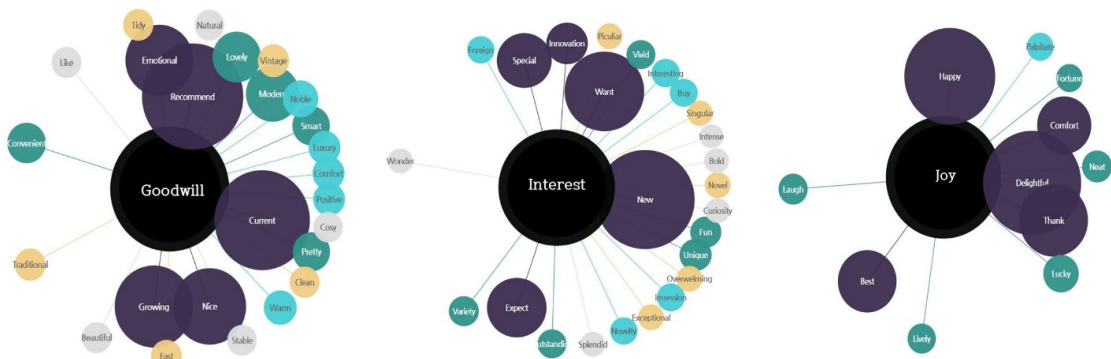


Figure 4. Ego-network of 3 positive keyword groups.

Conclusion

A new interest in home furnishing was raised because of a significant change in lifestyle by COVID-19. As expectations gradually increase on a safe and comfortable residence, consumers focus on a new home furnishing by the trend. The research was conducted to investigate consumer cognition and sentiment on home furnishing by big data analysis. The research used big data such as social media posts and news. Big data analysis is an effective tool to investigate consumer needs by analyzing trends.

The results of the research were as follows. Firstly, through frequency analysis, among the keywords related to home furnishing, it was found that keywords such as home furnishing brands, product items, retail brands, usages, and functions were mentioned with high frequency. The results of TF-IDF were not noticeably different from the results of frequency, but the rankings of home furnishing brands stood out. This research found the relationships among IKEA Korea, home furnishing items, home furnishing brands, and retailers positioned in the network. The results showed that consumer interests change on home furnishing. As IKEA Korea positioned as a leading home-furnishing enterprise, the interest in home furnishing products and brands was accordingly increased. Thirdly, the keywords were clustered into four groups as the impact of COVID-19 on the market, purchasing criteria, retailing, and product characteristics. Lastly, consumers positively recognized that home furnishing had expectations to make comfortable housing. However, consumers also perceived negatively about home furnishing due to the economic and functional burden. The favorite was the most dominant sentiment in consumer recognition of home furnishing among the positive sentiment.

This research has significance in identifying consumer trends and sentiments about home furnishing by utilizing big data from social media texts and news reflecting the consumer perception changes after COVID-19. Understanding consumers' interests in home furnishing would help set the fundamentals for establishing industry marketing and policies. The consumer recognizes needs on a new way of home furnishing after COVID-19 and has much interest in products and brands of home furnishing in the

results. However, this study is limited in representing the perceptions of consumers who are not active in social media. Besides, social media shows the phenomenon, but it is hard to explain its motivation. Therefore, it is expected that further research conducting a qualitative survey using consumer motive surveys or interviews can supplement this study.

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