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Analysis on Domestic Franchise Food Tech Interest by using Big Data

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Abstract

Franchise are now a red ocean in Food industry and they need to find other options to appeal for their product, the uprising content, food tech. The franchises are working on R&D to help franchisees with the operations. Through this paper, we analyze the franchise interest on food tech and to help find the necessity of development for franchisees who are in needs with hand, not of human, but of technology. Using Textom, a big data analysis tool, "franchise" and "food tech" were selected as keywords, and search frequency information of Naver and Daum was collected for a year from 01 January, 2023 to 31 December, 2023, and data preprocessing was conducted based on this. For the suitability of the study and more accurate data, data not related to "food tech" was removed through the refining process, and similar keywords were grouped into the same keyword to perform analysis. As a result of the word refining process, a total of 10,049 words were derived, and among them, the top 50 keywords with the highest relevance and search frequency were selected and applied to this study. The top 50 keywords derived through word purification were subjected to TF-IDF analysis, visualization analysis using Ucinet6 and NetDraw programs, network analysis between keywords, and cluster analysis between each keyword through Concor analysis. By using big data analysis, it was found out that franchise do have interest on food tech. "technology", "franchise", "robots" showed many interests and keyword "R&D" showed that franchise are keen on developing food tech to seize competitiveness in Franchise Industry.

Keywords: *"Franchise", "Food Tech", "Big-Data"*

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1. Introduction

1.1 FOOD-TECH

The food tech industry is currently revolutionizing the entire sector. By integrating fourth industrial revolution technologies into agriculture and food production, we are experiencing innovation across the entire spectrum, from food production to distribution. These changes are not just transforming industries but also influencing our dietary habits and consumer culture significantly. The global food tech market is experiencing steady growth year after year, driven by the digitization and automation of agriculture and food industries. This transformation is particularly evident in the food supply chain, where consumers now have access to products of higher quality and safety standards. Moreover, the food tech industry is rapidly expanding in areas such as food delivery and alternative food options. Both the online food delivery and alternative food markets are experiencing high growth rates, indicating a growing demand for convenient and healthier options among consumers. Furthermore, the food tech industry is giving rise to new business models, fostering competition and innovation across various sectors such as retail, delivery, and consumption. This trend is expected to lead to even more rapid growth in the future, driving the establishment of safer and more efficient food systems [1].

The introduction of technology-based self-service in the service industry has been increasing steadily, and related research has also been actively conducted [2].

1.2 FRANCHISE

Despite years of low economic growth rates and economic downturns, the franchise market, considered a major sector in the restaurant industry, has consistently shown growth. In addition to the restaurant sector, which accounts for the largest share, the domestic franchise industry has been experiencing continuous growth in various fields, including convenience stores, lodging, education, beauty, real estate, and car centers, encompassing approximately 250 different sectors [3].

The integration of food-tech into franchising represents a strategic imperative for businesses seeking to thrive in the digital age. By embracing innovation, franchisors can unlock new opportunities for operational excellence, customer engagement, and market leadership. Moving forward, continued investment in technological advancements will drive the evolution of franchising, shaping the future of the foodservice industry.

1.3 Importance and Purpose of this Study

Purpose in this study is to analyze the interest of food tech from franchise, by using big data and see how movement of industry is being changed and what changes will be made in the future of franchise industry.

2. METHOD

2.1 Research Subject

This research selected Naver, Google and Daum(including blogs, news, café, web, and Jisik-in) as data collection channels. The chosen search items for information retrieval were “food tech” and “Franchise”. This decision was made to maximize the date collection by selecting most related keywords to the topic of this study. After individual analyses, the data value were aggregated, and a refinement process was conducted. Furthermore, the data analysis period ranged from 01 January, 2023 to 31 December, 2023. The keywords were limited to 50.

2.2 Research Tool

This study employed Text Mining and Semantic Network Analysis. Text Mining is a process and technique that summarizes vast amounts of text data to meet the user's specific objectives. It utilizes text processing technologies in various fields to structure documents. The structured documents are then analyzed to gain new insights for problem-solving in each respective.

Semantic Network Analysis involves analyzing the meaning of words through the structural relationships of their components in messages. It enables visualizing the interrelatedness between individual nodes and showing which nodes form the discourse, facilitating organizational analysis [4].

Furthermore, this study followed the two refinement procedures proposed by Lee, Jeong Hak, Lee, Jae Moon, Kim, Hoo Yeon [5]. Firstly, in the refinement process, the study examined words connected to key terms to understand the precise meaning of individual words. Secondly, to comprehend the accurate meaning of extracted words, direct searches were conducted aligned with the data collection channels and periods.

2.3 Data processing

This study utilized the social matrix program, Textom, for data collection and analysis. The analysis involved examining the frequency, TF-IDF, and centrality of words. To explore the connection structure and relationships among words, NetDraw function in Ucinet6 was used for visualization, and CONCOR (cluster) analysis was conducted. It's important to note that determining a word as a key word solely based on its high frequency might not be accurate [5].

TF-IDF (Term Frequency-Inverse Document Frequency) is a weight commonly used in information retrieval and text mining. It quantifies the statistical importance of a specific word within a document, considering a collection of documents. It is utilized for purposes such as measuring the similarity between documents, determining search engine result rankings, and extracting keywords from documents (Wikipedia, 2019).

Furthermore, centrality measures how many words are connected to a specific word and quantifies the degree to which the word is central. Higher centrality is associated with a larger number of connected words, indicating the word's importance [6]. CONCOR (Convergence of iterated correlations) analysis, a widely used method in structural equivalence analysis, identifies blocks and relationships among words based on Pearson correlation analysis of the co-occurrence matrix of words. Structural equivalence involves finding words that are structurally equivalent in their connections, indicating similarity among words.

3. RESULT

3.1 Data mining

From 01 January, 2023 to 31 December, 2023, texts were collected from Naver, Google and Daum, including blogs, cafes, Jisik-in, news, and web documents, using the keywords 'food tech' and 'franchise'. The collected texts contained a total of 10,049 words, with a cumulative size of 5.05MB.

3.2 Text Mining Analysis Result

Results from the text mining analysis on food tech and franchise, including word frequency, TF-IDF, and

centrality, are presented in the following Table 1. According to the frequency result, Franchise(10,398), Food Tech(4,605), Entrepreneurship(2,586), Brand(1,576), Company(1,115), Industry(1,109), Cafe(1,057), Chicken(1,053), Operation(1,025), Franchise Store(1,015), Headquarter(963), Technology(879) were in order. In TF-IDF result, Franchise(8615.8), Food Tech(6375.2), Entrepreneurship(5298.7), Brand(3458), Company(2817.5), Industry(2888.4), Cafe(3088.4), Chicken(3207), Operation(2581.1), Franchise Store(2784), Headquarter(2648.9), Technology(2389.5).

Table 1. Frequency and TF-IDF of Words

Word	Frequency	TF-IDF	Word	Frequency	TF-IDF
Franchise	10398	8615.778	Field	529	1653.751
Food Tech	4605	6375.187	Progress	522	1622.483
Entrepreneurship	2586	5198.729	Diverse	514	1599.912
Brand	1576	3457.972	Contract	492	1708.335
Company	1115	2817.464	Regarding	485	1522.843
Industry	1109	2888.426	Robot	467	1644.539
Café	1057	3088.352	Start	456	1479.249
Chicken	1053	3207.035	Investment	451	1585.168
Operation	1025	2581.149	Product	429	1456.517
Franchise Store	1015	2784.025	Information	422	1432.751
Headquarters	963	2648.866	Tech	419	1430.093
Technology	879	2389.521	Dining Out	358	1283.078
Food	739	2184.223	Development	354	1259.970
Price	707	2369.579	Providing	351	1219.878
Food	705	2184.223	Recruitment	351	1318.231
Business	680	2022.968	Interest	338	1185.744
Startup	669	2117.716	Cultivation	327	1140.832
Future	655	1918.646	Support	322	1180.501
Present	652	1845.361	Utilization	317	1136.133
Representative	620	1888.283	Advancement	314	1164.908
Domestic	606	1781.923	Profit	305	11229.049
Feasible	595	1788.950	Growth	298	1083.379
Market	583	1764.720	Cost	297	1141.843
Related	563	1703.026	Success	294	1091.907
Revenue	546	1738.761	Global	291	1083.151

3.3 Network Visualization Analysis Result

The results of network visualization and CONCOR analysis based on the matrix data extracted through streamlining analysis are as shown in the following Figure 1 and Figure 2. Convergent Correlation (CONCOR) is a method of finding similar groups by repeatedly executing the analysis until the correlation is found. In other words, it is the most effective method of finding clusters in a complex intertwined network [7]. According to the result of CONCOR analysis, Clustering of Food, Technology, Industry, AI, Advancement, Innovation, etc., formed a single cluster, and this was named as Food-Tech.

Research, Trend, Expert, Market, Field, Company, Domestic, Platform etc., formed a single cluster, and this was named as Domestic Company. Brand, Franchise Store, Contract, Revenue, Success, Cost, etc., formed a single cluster, and this was named as Franchise. Business, Time, Dining Out, Interest, Recruitment etc., formed a single cluster, and this was named as Business

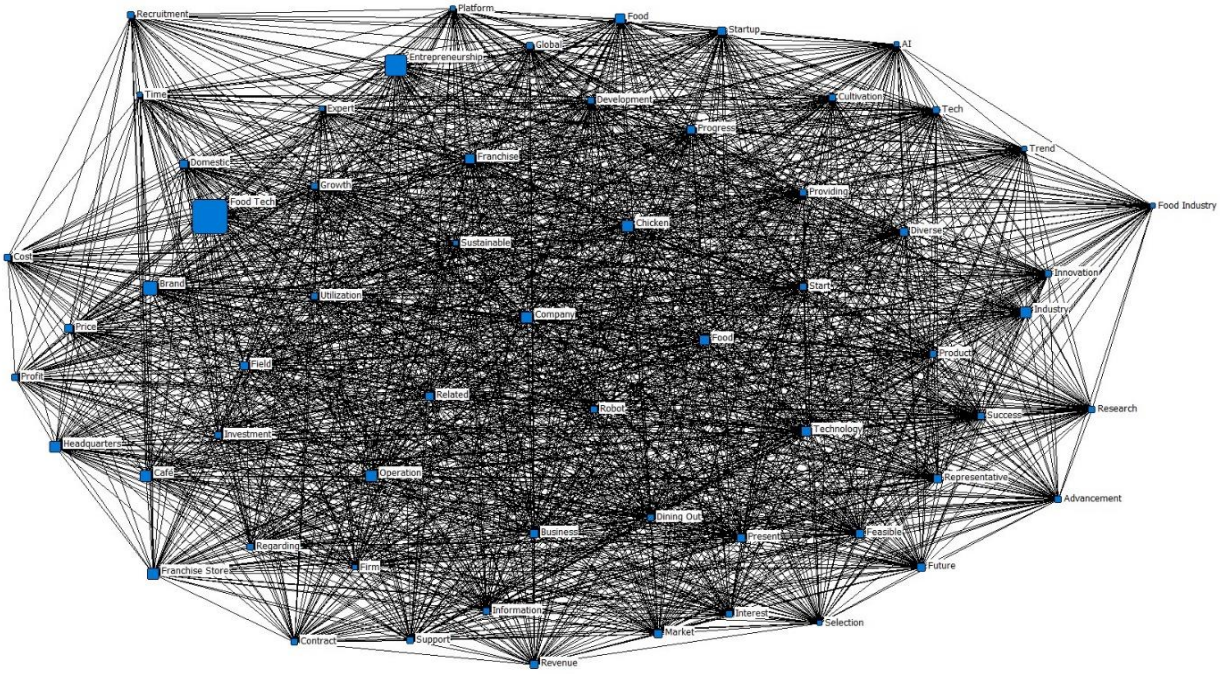

Figure 1. Network Visualization Analysis Results

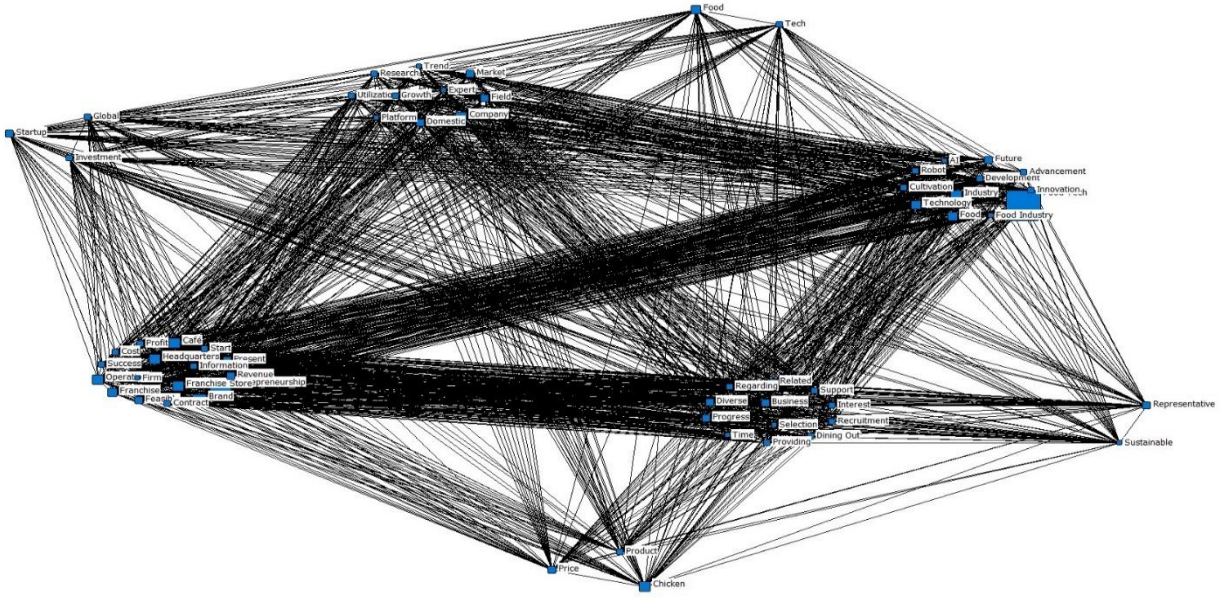

Figure 2. CONCOR Analysis Results

4. CONCLUSION

This study examined the interests of food tech by franchise companies using big data analysis through Textom. The goal was to understand the correlation of food tech and franchise, and how their strategy will it be for the franchise company. Text mining was conducted in the range of Jan 2023 to Dec 2023 for the latest interest of the franchise on food tech. Cluster and frequency of words highlights the franchise's interest were already towards on food tech and they are starting to release their technology. Franchise's relation with IT start-ups are something to look forward to according to the text mining.

However, this study doesn't concern with any of demographic information as Textom doesn't include it. Therefore, follow-up study, to cover up the above matter, qualitative study must be done using Delphi Method, Focus Group study and etc. Through this study, we could see the interests of food tech by franchise, hence individual analysis of destinations would give more diverse outcomes

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