

## The study of the restaurant start-up chatbot system using big data

Sung-woo Park\*, Gi-Hwan Ryu\*\*

*\*Department of Immersive Content Convergence, Graduate School of Kwangwoon University, Seoul, Korea*

*\*\*Professor, Department of Tourism and Food Industry, Graduate School of Smart Convergence, Kwangwoon University, Seoul, Korea  
E-mail : { lly6959, allryu }@kw.ac.kr*

### **Abstract**

*In the restaurant industry, along with the fourth industry, there is a food technology craze due to IT development. In addition, many prospective restaurant founders are increasing due to restaurant start-ups with relatively low entry barriers. And ChatGPT is causing a craze for chatbots. Therefore, the purpose of this paper is to analyze factors for restaurant start-ups with big data and implement a system to make it easier for prospective restaurant start-ups to recommend restaurant start-ups that suit them and further increase the success rate for restaurant start-ups. Therefore, this paper is meaningful in analyzing the start-up factors desired by prospective restaurant founders with big data, turning them into text, and furthermore, designing and studying the start-up factors shown as big data into a restaurant start-up chatbot system.*

**Keywords:** *Big data, food tech, restaurant, start-ups, chatbots systems*

### **1. Introduction**

In the restaurant industry, food technology that combines eating out and IT is developing through IT development along with the development of the fourth industry. Food tech, which is famous in the restaurant industry, is combining food technologies such as robot arms that make coffee for one-person restaurant start-ups with eating out devices that incorporate AI such as serving robots. In addition, as the field of technology grafting for chatbots is increasing due to ChatGPT, dependence on restaurant chatbots such as catchtables is increasing in the restaurant industry. In other words, food technology is a combination of robot-like technology with food, and the existing conveyor belt carries materials and furthermore, at the kiosk level, robots make their own food and even serve it.[1] Investment in food technology has soared around the world, and food technology is currently developing around online to offline (O2O) services, showing a trend of expanding to various fields due to the development of science and technology. As Food Tech is leading untact consumption as it changes the face of the global food industry, and as untact trends and social distancing spread due to concerns over virus infection, robots, not humans, have begun to play a key role

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Corresponding Author: allryu@kw.ac.kr

Tel:\*\*\* - \*\*\*\* - \*\*\*\* Fax: +82-2-940-5443

Professor, Department of Tourism and Food Industry, Graduate School of Smart Convergence, Kwangwoon University, Seoul, Korea

not only in food planning but also in manufacturing, serving, and delivery.[2]

The development of food technology mentioned above is used as a way to solve various problems in modern times and as a preparation for the not-too-distant future. Due to the rising labor costs and the development of technology, more and more managers are looking for automation systems.[3] However, with the development of food technology, devices incorporating AI are developing, but food technology for restaurant start-ups is still insufficient. Moreover, counseling for restaurant start-ups is still sticking to how to start a restaurant by meeting with each franchise supervisor or counselor. Therefore, a restaurant start-up chatbot is needed for prospective restaurant founders, and a food tech chatbot is needed to collect basic data. Using the restaurant start-up chatbot, prospective restaurant start-ups can check the basic restaurant start-up industry and business status suitable for them, and restaurant start-up counselors can save time and labor costs by obtaining basic surveys of prospective restaurant start-ups through chatbots. This paper is meaningful in analyzing the start-up factors desired by prospective restaurant founders with big data, turning them into text, and furthermore, designing and studying the start-up factors that appeared as big data into a restaurant start-up chatbot system.

## **2. Main subject**

### **1. Chatbot Overview**

Artificial intelligence (AI) has influenced how we engage in daily activities by designing and evaluating applications and devices called intelligent agents that can perform various functions. Chatbot is an artificial intelligence program and a human-computer interaction (HCI) model.[4] According to the dictionary, chatbots are "computer programs designed to simulate conversations with human users, especially over the Internet." [5] A chatbot or chatbot is a computer program designed to perform specific tasks through conversation with humans through voice or text. It is also called a talkbot, a chatbox, or just a bot.[6] The main goals that chatbots want to achieve are classified into information chatbots, chat-based/interactive chatbots, and task-based chatbots. When a user communicates with a chatbot and stores certain information in a fixed source, information-type chatbots such as Guardian, Facebook M, and FAQ chatbots are used. And chat-based/interactive chatbots have natural conversations with users like real people. Finally, task-based chatbots are excellent in processing various functions such as room reservations, requesting information, and responding appropriately to users.[7][8] In this paper, chat-based/interactive chatbots were selected because counseling chatbots were developed by analyzing food service start-up factors using big data. Chatbot-related terms that you need to know to produce chatbots include chatbot builders, entities, intents, and user utterances.

### **2. Big Data**

McKinsey, a global consulting firm, defined big data as "a dataset scale that goes beyond the ability to collect, store, manage, and analyze data from typical database management tools." IDC (IDC: Industrial Development Corporation, 2011) defined the task of performing data processing with "next-generation technologies and architectures designed to extract value from a wide variety of large-scale data at low cost and support ultra-fast collection, discovery, collection, and analysis of data." [9] Since then, big data has been defined as 3V (Variety, Velocity, Volume) as a property that processes large amounts of data quickly, with tens of terabytes or tens of petabytes or more.[10] In recent years, whether the collected data has a value to analyze or whether there is a characteristic of visualizing and presenting processed valuable information to consider data quality. Among them, it is important that big data has not existed until now, but as technologies for handling many different types of data have developed, structured, semi-structured, and unstructured data can now be different, resulting in new values from the numerous scattered data.[11]

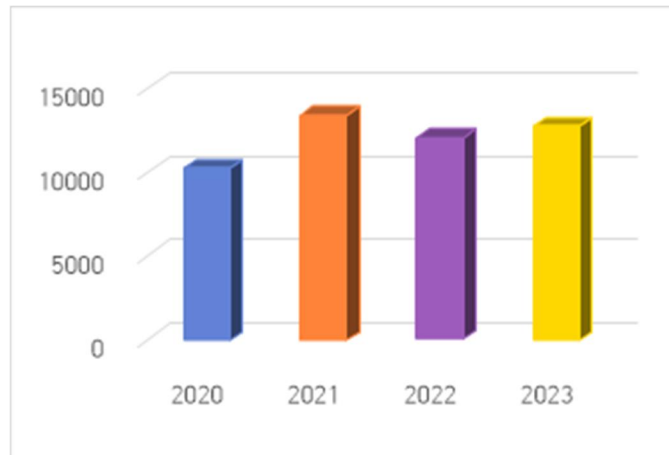
## **3. Method**

In this study, in order to understand what factors prospective restaurant start-ups after COVID-19 think are important with "restaurant start-ups" as big data, a collection period is set after COVID-19 from 2020 to 2023, and text data is analyzed with big data. Furthermore, the food service start-up factor extracted based on text data is added as a factor in the food service start-up chatbot system to implement the system.

## 4. Empirical analysis

### 1) Big Data Analysis of "Restaurant Start-ups"

Big data analysis of restaurant start-ups was conducted by analyzing restaurant start-ups as central words. Moreover, due to COVID-19, the collection period was set from 2020 to 2023. The figure 1. below shows the number of collections within the collection period.



**Figure 1. Number of collections within the collection period**

When analyzing restaurant start-ups as a central word, there were 1,0301 cases in 2020. The number was 1,3428 in 2021, 1,2929 in 2022, and 12,901 in 2023. Due to COVID-19, awareness of restaurant start-ups decreased in 2020, and restaurant start-ups were prevalent in 2021 due to restaurant start-ups and shared kitchens, but in 2022, the number of collections of restaurant start-ups decreased as COVID-19 spread again. In 2023, it was found that the number of collections increased as the awareness of restaurant start-ups increased as the Corona gradually decreased. Next, the top 30 words were analyzed to analyze the factors for constructing the chatbot. The table 1. below is the top 30 words.

**Table 1. top 30 words**

Ranking	Word	Freq.	Ranking	Word	Freq.
1	Startups	33645	16	Dining Room	1697
2	Eat out	24231	17	Scene	1675
3	Menu	9049	18	Success	1643
4	Cooking	6445	19	Foody	1527
5	Youth	5802	20	Delivery	1507
6	Cook	3896	21	Planning	1468
7	Kitchen	3826	22	Product	1431
8	Preliminary	3544	23	Tradition	1386

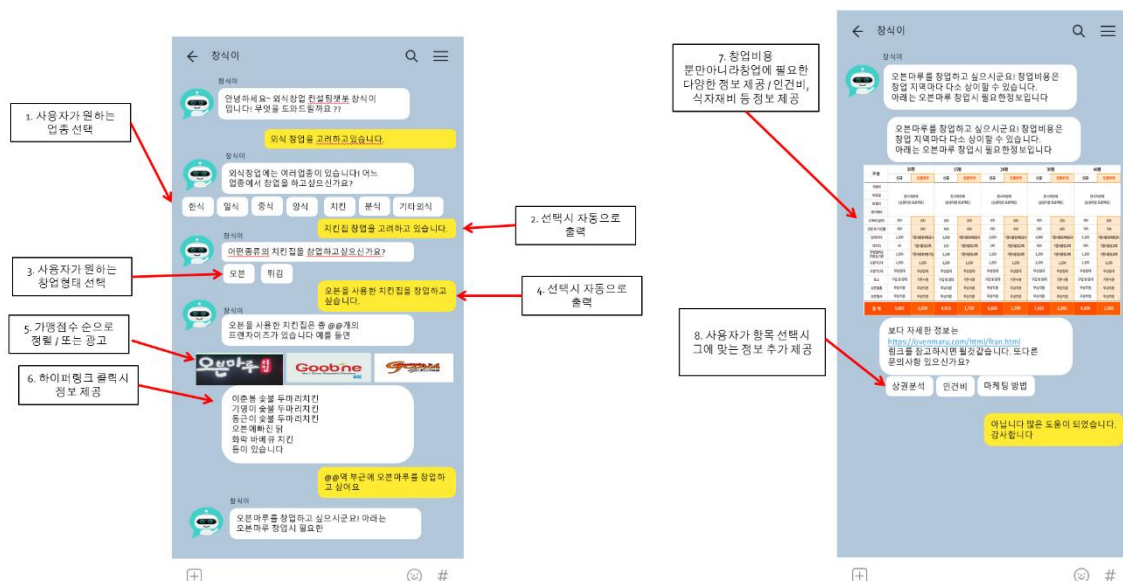
9	Education	3480	24	Space	1311
10	Franchise	2459	25	Covid-19	1296
11	Food	1973	26	Café	1271
12	Marketing	1930	27	Market	1249
13	Brand	1852	28	Recipe	1231
14	Sale	1741	29	Item	1152
15	Major	1721	30	Finger food	1146

When analyzing the top 30 words, it was confirmed that the number of users who can use food technology increased as the 5th-ranked youth increased their awareness of restaurant start-ups. The No. 10 franchise was identified as a word for most prospective restaurant start-ups to start franchises that are well known to the public rather than individual restaurant start-ups. And the 13th-ranked brand also confirmed in the same context. It was confirmed that the 20th place delivery company also prefers industries that deliver a lot depending on the industry.

**2) Implementation of the "Restaurant Start-up" Chatbot System**

Therefore, based on the above singularity, the chatbot system is implemented. In particular, the chatbot system was implemented through Kakao open I builder, which is used the most by users.

As shown in the figure 2. above, the entity and NLU pattern are analyzed and learned through the Kakao open I builder, and when the prospective founder enters the speech, the open builder operation passes the analysis to the restaurant start-up chatbot and emits a response to the prospective founder. The figure 2. below explains the operating principle of the restaurant start-up chatbot.



**Figure 2. Restaurant Start-up Chatbot System**

In the restaurant start-up chatbot, users first choose the industry they want. Second, when a business type is selected, the open builder automatically produces a response and thirdly, the user selects the desired type of start-up. Fourth, interactive communication with prospective restaurant founders is conducted through an open builder response according to the type

of start-up. Fifth, franchise factors in big data are entered into the open builder and franchises are recommended to prospective restaurant founders through the number of franchises or franchise recommendations. Sixth, by providing a franchise hyperlink that prospective restaurant founders want, they can check the details of restaurant start-ups. Seventh, it provides detailed information to prospective restaurant founders by providing information such as various information necessary for start-up, labor costs, and food materials costs as well as start-up costs. Finally, it provides additional information such as commercial area analysis, labor costs, and marketing methods that prospective restaurant founders want in detail.

## 5. Conclusion

In the restaurant industry, food technology that combines eating out and IT is developing through IT development along with the development of the fourth industry. Food tech, which is famous in the restaurant industry, is combining food technologies such as robot arms that make coffee for one-person restaurant start-ups with eating out devices that incorporate AI such as serving robots. However, with the development of food technology, devices incorporating AI are developing, but food technology for restaurant start-ups is still insufficient. Moreover, counseling for restaurant start-ups is still sticking to how to start a restaurant by meeting with each franchise supervisor or counselor. Therefore, a restaurant start-up chatbot is needed for prospective restaurant founders, and a food tech chatbot is needed to collect basic data.

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