

# Restaurant Business Insights based on Zomato Online Food Marketplace Big Data Scraping

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## Abstract

The aim of this study is to find restaurant data in the online food marketplace to analyse the insights that can be obtained from an online food marketplace Big Data. Data search is performed using Web Scraping methods to extract the Big Data of online food marketplaces from Zomato online food marketplaces in real-time. We do business analysis based on locations, ratings, reviews, costs, and restaurant facilities from the massive amounts of data that received. This study was limited to restaurants spread across 30 regions in the city of Bandung, Indonesia. This study analyses how restaurants, types of cuisine, and cost are set in the growing online food retail. This study also analyses how number of reviews given by customers and the facilities in restaurants affect restaurant ratings.

## Keywords

big data, web scraping, online food marketplace, restaurant facility, restaurant rating

## 1. Introduction

The Internet of Things, also known as IoT has played a huge role in technology industry. IoT makes the unthinkable possible. With the internet we can dig up various information and collect data from various online sources. One business intelligence in IOT is the use of Web Scraping. Web Scraping is a technique to extract data or information from online source. Web Scraping (or screen scraping, information scraping) describes the automated process of accessing web documents and downloading specific, pre-defined information, such as prices, from each, to then transform and save them into a structured format (Hillen 2018). Web scrapers are excellent at gathering and processing large amounts of data (among other things). Rather than viewing one page at a time through the narrow window of a monitor, you can view databases spanning thousands or even millions of pages at once (Mitchel 2015).

IoT data scraping can play a major role for survey, especially in the food industry. Nowadays, online food marketplace is growing so fast day by day in the world. Bandung, one of the cities in Indonesia is the most popular tourist destination, it's no wonder there are many culinary delights in Bandung. Restaurants are competing with each other to provide various services to attract customers, both from the menu and the prices offered and the facilities available. Restaurants that are able to know the market trend will win.

Zomato is an online platform that is responsible for powering amazing dining experiences for users daily both in home and whilst dining out. Zomato connects more than 52M users with 1.3M restaurants globally every month. Zomato can provide a list of millions of restaurants in many locations in 19 countries in the world with additional information that we can find out about these restaurants. This information is very useful to be used for competitor surveys. We can collect the information and gain invaluable insights in a real-time for a huge amount of data about locations, food categories, service facilities, and prices in the market. From here we can find out how customer satisfaction is based on food categories, facilities, and prices offered. Restaurants that have high ratings on Zomato reflect the great customer satisfaction experience of the restaurant offers.

In the midst of the Coronavirus pandemic as it is happening now, business owners are trying to find various ways to maintain their business. IoT like Zomato can help promote restaurants via online. Digital marketing in the age of the Coronavirus can support the restaurant business owners to promote their restaurants to support the social physical

distancing government regulation. Moreover, Redalkemi (2019) said, online advertising is crucial for the success of an online business. Research shows that people are increasingly using the internet to seek information about products and their prices before making final decisions. This means you can't really afford to ignore online advertising as most of your customers are researching online.

Restaurant businessman can do data scraping with IoT online food marketplace to scrape variables that affect the restaurant business, such as restaurant's name, address, state, city, cost, ratings, email, cuisines, latitude & longitude, opening hours, menu, price range, phone, review, and restaurant's website. They can extract the data frequently from Zomato to make sure get the update about newest restaurants data. This can help restaurant businessman to know what factors that influence restaurant business day by day. Moreover, if there is a change in environmental conditions (such as a pandemic) that greatly affects the restaurant business, this becomes a very effective alternative choice. The restaurant business needs to pay attention to government regulations in reopening the restaurant business in the midst of a pandemic. Restaurants must prepare new strategies to deal with new normal life as environmental conditions develop.

### **1.1 Objectives**

This research has two main objectives to be able to contribute to the entrepreneurs of restaurants. First, recommend the use of Web Scraping techniques instead of conventional surveys (interviews) and online survey questionnaires. Second, to gain a variety of hidden insights with a data-driven approach from an online food platform Big Data. By obtaining various attributes from restaurant Big Data (type of restaurant, types of cuisine, cost, number of reviews, facilities, and ratings) it is expected that restaurant entrepreneurs can always pay attention to market trends that occur for competitive competition.

## **2. Literature Review**

The digital transformation of manufacturing and service in the fourth industrial makes it undeniable that business competition is getting tougher. Therefore, nowadays many entrepreneurs are considering how to run their business smarter, more agile and more efficiently. The use of appropriate data is needed to support efficient and effective decision making. This is known as Data-Driven decision making or what we can call evidence-based decision making, which emphasizes making decisions based on data analysis rather than relying on intuition (Provost and Fawcett 2013).

Jia, et al. (2015) defines Data-Driven decision-making capability as the ability of an organization to utilize data, information, and insight assets in a series of coordinated decision-making processes to support, inform, or make decisions. From this definition, it can be seen that the decision-making process based on Data-Driven goes through a continuous process. This process includes "collecting, organizing, analyzing, summarizing, synthesizing, applying, and feedback" (Mandinach et al. 2008). It starts from defining important questions, collecting targeted data and organizing them, then making meaning from the targeted data, then taking action based on the targeted data, and finally assessing and evaluating the actions that have been taken (Rallis and MacMullen 2000).

The distribution of huge amounts of data in the internet freely has replaced conventional surveys. The use of Data-Driven with online Big Data instead of conventional surveys has a number of advantages. First, the data in online Big Data is readily available in several forms. Researchers generally cannot choose what data to collect, or how to collect it (Callegaro and Yang 2018). Meanwhile, in conventional surveys, it is necessary to collect new primary data. Primary data collection can take a long time and can also be expensive to obtain. Second, conventional surveys tend to have declining response rates over a long period of time. The number of available online data sources continues to increase so that the speed of access and mining of both structured and unstructured data also increases from time to time. Therefore, the importance of the ability to obtain and process the Data-Driven from online Big Data Data is very useful for generating information quickly for decision support.

The development of artificial intelligence today, there are many web scraper tools available on the market, both paid and open source. One of the tools for doing Web Scraping is the Web Scraper Google Chrome Extension. Web Scraper is an open source application to extract data from the internet massively & quickly with a point-and-click interface. This tool can be operated by everyone without programming skills. Web Scraper as a simple Web Scraping tool can be a powerful solution to replace online data collection from manual (copy and paste) to automatic.

### 3. Methods

This research was conducted based on the results of restaurant data scraping in Bandung, Indonesia on the Zomato marketplace. Data scraping was accessed in March 2020 with Web Scraper from Google Chrome extension. From the scraping, 3,291 data were obtained from restaurants in 30 regions in Bandung. Data were analyzed using descriptive analysis method to find out the hidden insights from the Big Data online food marketplace. Restaurant Big Data obtained from the Zomato marketplace is processed and analyzed using Microsoft Excel, as well as Python and R programming language as data analytics tools.

### 4. Data Collection

To extract data, the first thing to do is to scrap the restaurant data on the website. On Zomato, the restaurants interface design in each area is viewed by page, which is called the pagination link and each restaurant has many item variables. Figure 1 illustrates how the link selector should be created. Link selector is used for link selection and website navigation (*Web Scraper<sup>a</sup>* 2021). After that, text selector is used for text selection. The text selector will extract text from the selected elements (*Web Scraper<sup>b</sup>* 2021).

We start by building a sitemap that visits each restaurant and extract items (name, location, address, review, rating, and facilities) from restaurant page. The restaurant facility items extracted are made up to 10 because the maximum facility column displayed on Zomato is 10 columns. Figure 2 is the example of graph selector of a restaurant location. After one page has been extracted, Web Scraper will extract the remaining pages in the same way.

Some locations have a large number of restaurants. On Zomato website, the interface design of a restaurant location can contain up to 6 button pages per interface, of which 1 page contains 15 restaurants. In this case, Web Scraper can only read per  $\leq 6$  button pages. The button next page “>” cannot work. To outsmart this problem, the sitemap must be made in a number of multiples of 6 until all restaurant displays in that location run out. As can be seen in Figure 3, several restaurants in a location created several sitemaps.

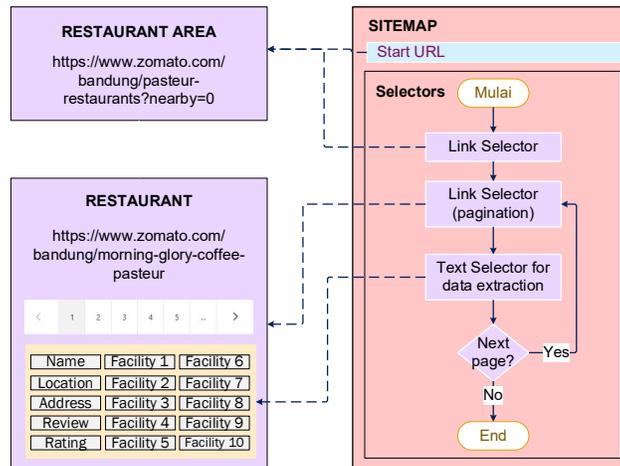


Figure 1. Web Scraper data scraping flow

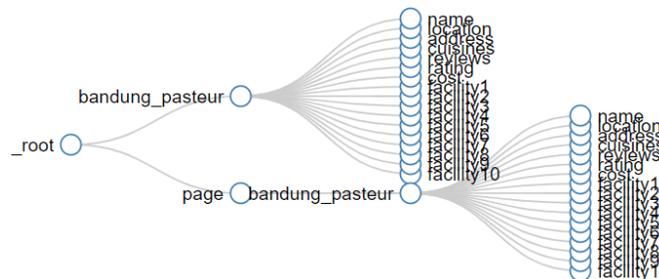


Figure 2. Web Scraper graph selector

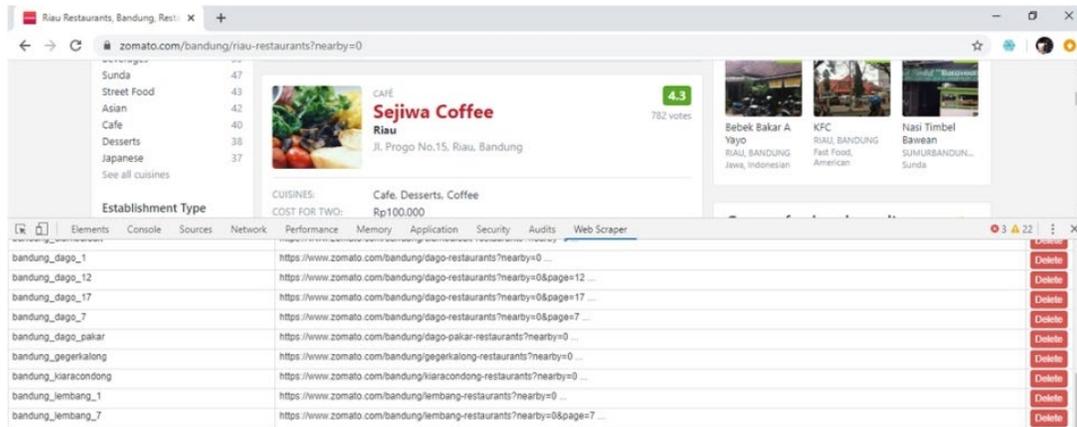


Figure 3. Restaurant sitemaps

After exporting the raw data and import it to Microsoft Excel, unnecessary columns such as the scraper ID and URL address of each restaurant are removed. Then cleaning up the noisy data scraped from the website, for example, erroneous value, incomplete data, and incorrect information. Each column of facilities 1 to 10 can contain different facilities, so we edit based on the name of the facility with the help of the IF function in Microsoft Excel, which is categorized as yes/no and numbers 1/0 based on restaurant facilities. Of all the facilities identified, this study only analyzed seating facilities, dining options, online delivery, and Wi-fi facilities. Data that has been cleaned up and has been carefully arranged is ready to be analyzed.

## 5. Results and Discussion

### 5.1 Restaurant Location

Table 1 shows the number of restaurants in 30 regions in Bandung, Indonesia. It can be seen that Riau is an area that has the highest number of restaurants, with 533 restaurants. While the smallest number of restaurants is in the Cibiru area. Riau is a name of a road in Bandung (also known as RE Martadinata street). This area is the highest number of restaurants because it is already famous as a centre for fashion, culinary, and a lot of hotels lined up along the road. Cibiru or also known as Kampung Kancil, is a village that cultivates traditional games and classes of interests and talents for children. Nevertheless, this area has few tourist attractions, so that restaurants in the Cibiru area are still very few. This could be an opportunity for investors to start a restaurant business in the Cibiru area because there are still very few competitors.

Table 1. Total number of restaurants in Bandung

Location	Code	Total	Location	Code	Total	Location	Code	Total
Riau	RI	533	Cicendo	CC	115	Dago Pakar	DP	43
Dago	DG	273	Bandung Wetan	BW	107	Sersan Bajuri	SJ	43
Andir	AN	212	Pasirkaliki	PL	95	Margacinta	MC	39
Sukajadi	SK	195	Pasir Koja	PK	93	Cidadap	CD	36
Braga	BG	187	Cihampelas	CH	90	Kiaracandong	KC	32
Lengkong	LK	154	Pasteur	PS	86	Batununggal	BN	26
Sumurbandung	SB	149	Gegerkalong	GK	81	Sarijadi	SR	20
Pungkur	PR	140	Ciumbuleuit	CB	79	Ujungberung	UB	19
Buahbatu	BB	136	Surapati	SP	75	Cikutra	CK	18
Lembang	LB	133	Astanaanyar	AA	74	Cibiru	CR	8

### 5.2 Type of Restaurant

As can be seen in Figure 4a, restaurants in Bandung are dominated by quick bites restaurants because people prefer to buy at restaurant that serve food quickly. The second most type of restaurant is a food court because in Bandung has many tourist attractions and entertainment such as malls which usually have many food court outlets. The third type of restaurant is casual dining restaurant. In casual dining restaurant people have the characteristics of liking many food



### 5.4 Cost

The location with the highest average cost spent by customers at a restaurant in Bandung is in Buahbatu, which is Rp 700,000 for two people and the lowest is in the Cicendo area Rp 15,000 for two people. Some findings from the visualization of cost for eat in restaurants (see Figure 6), such as in Cidadap (CD), Dago Pakar (DP), Sergeant Bajuri (SJ), and Sukajadi (SK), tend to vary. The average cost in CD and SK areas tend to be low, while in DP and SJ regions are evenly distributed. Cibiru (CR) is an area with the highest cost for eat. The average cost for eat in many restaurants in Riau (RI) are not uniform, there are several restaurants with costs that exceed the median costs in the RI region.

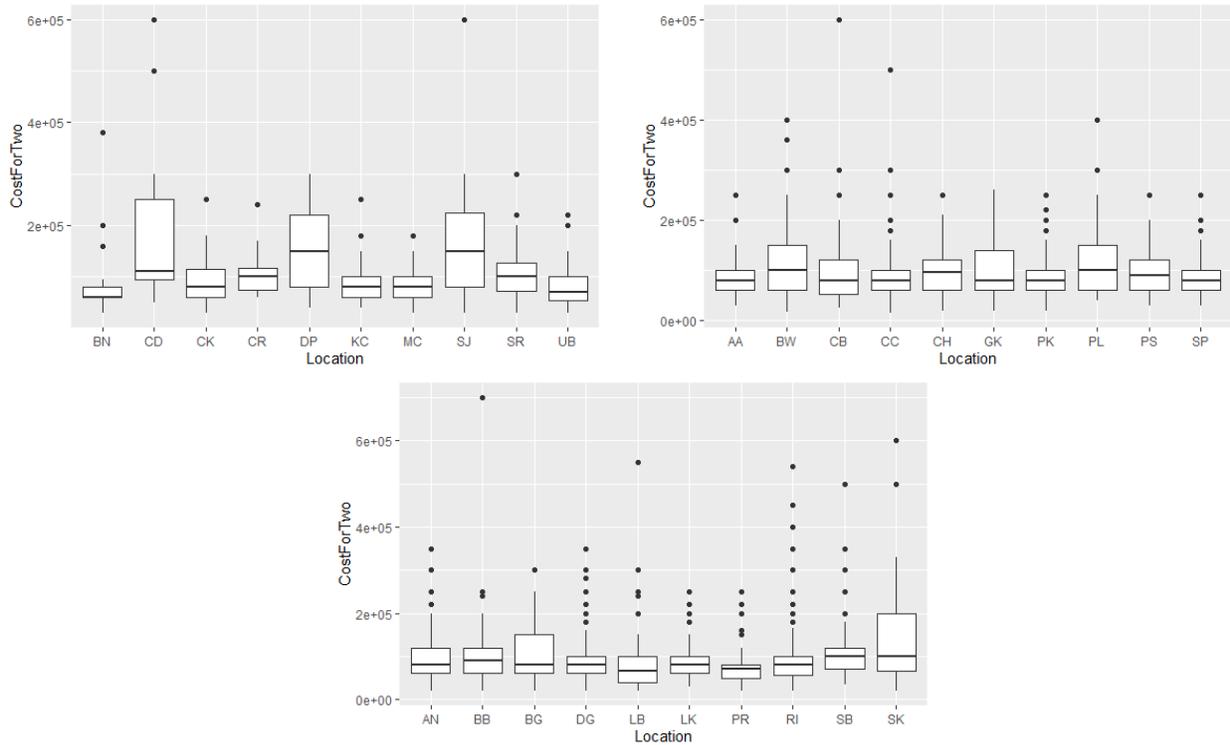


Figure 6. Distribution of average cost for two people

### 5.5 Restaurant Ratings

A high rating on Zomato not only reflects the great experience restaurant offers, it also drives further growth through footfalls and higher spends (Zomato 2019). Restaurant ratings on the Zomato marketplace can be influenced by the cost of food for two people, customer reviews, and restaurant facilities. Index rating on Zomato is divided into 6, which are 0 = Not rated, 1 – 2,9 = Poor, 3 – 3.4 = Average, 3.5 – 3.9 = Good, 4 – 4.4 = Very Good, and 4 – 4.5 = Excellent. Figure 7a shows the relationship between restaurant’s cost and rating. The cost and rating have a positive relationship with a correlation coefficient of 0.327. This indicates the higher the cost for eat, the better the rating given. From the scatterplot patterns below, it can be seen that restaurants with an average, good, very good, and excellent rating category are restaurants with average cost for two people is ranging from IDR 50,000 to IDR 150,000.

Figure 7b shows the review and rating has a positive relationship with a correlation coefficient of 0.288. The number of reviews given by customers will improve restaurant ratings. In general restaurants in Bandung have a medium to high level of satisfaction. From 3,291 restaurants in Bandung, there are two restaurants that have the most extreme reviews and based on Figure 8, it can be seen that the 2 branches of the Gyu-Kaku Japanese BBQ Restaurant, both in Riau and Sukajadi are the restaurants that have the most reviews and both have very high ratings. This indicates that Gyu-Kaku Japanese BBQ Restaurant is the most popular restaurant in Bandung with a very high level of customer satisfaction.

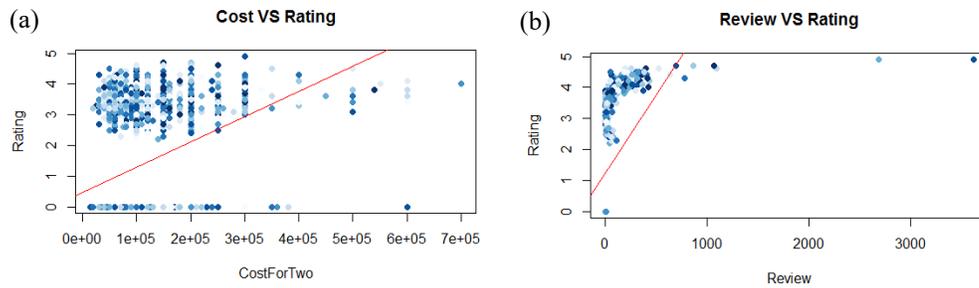


Figure 7. Restaurants rating. a) Cost through rating b) Review through rating

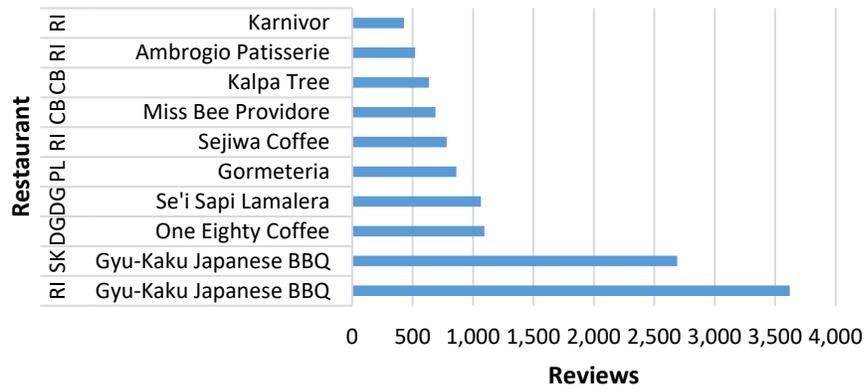


Figure 8. The top 10 restaurant reviews

### 5.6 Restaurant Facilities

Next is to analyze how the influence of the facilities owned by restaurants on restaurant ratings and food costs on Zomato. The first is seating facility towards cost and restaurant rating. From 3,291 restaurants in Bandung on the Zomato marketplace, there are 3,049 restaurants that include an indoor and / or outdoor facility information. There are 72.71% restaurants with indoor seating, 6.07% with outdoor seating, and 21.22% indoor and outdoor seating. Most restaurants in Bandung have indoor seating theme because Bandung is a densely populated area, while outdoor restaurants theme require a wider area. In addition, in contrast to restaurants in Western countries, restaurants in Indonesia do mostly have indoor seating theme. Figure 9 shows the many restaurants with indoor, outdoor, and indoor and outdoor seating advertised on Zomato don't have ratings.

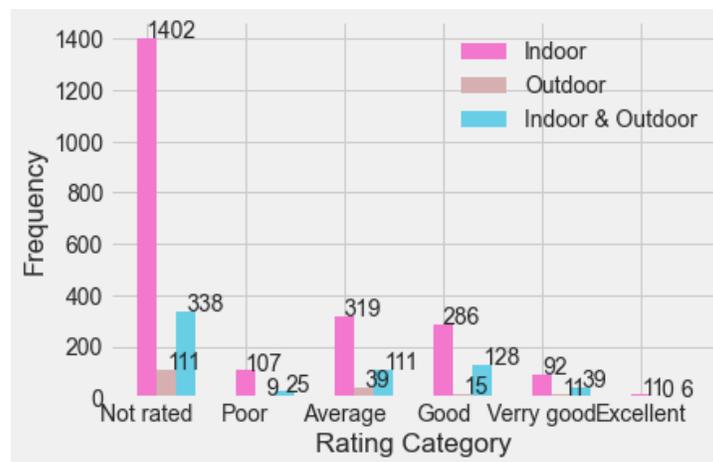


Figure 9. Comparison of restaurant seating facility

Second, dining options towards cost and restaurant rating. People can choose dine-in or takeaway. Dine-in data is taken from takeaway availability information and takeaway data is taken from takeaway only information. We assume that restaurants that have takeaway availability information are dine-in restaurants which are can serve takeaway. Whereas restaurants that only have takeaway information are restaurants that only serve takeaway. From 3,291 restaurants in Bandung on the Zomato marketplace, there are 2,712 restaurants that include dining option information. There are 94.91% of dine-in restaurants and 5.09% are only takeaway. Figure 10 shows many dine-in and takeaway restaurants that advertised on Zomato don't have ratings.

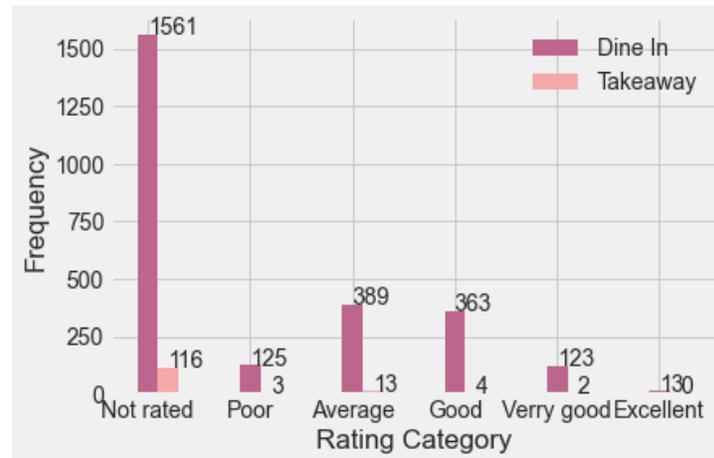


Figure 10. Comparison of restaurant dining options

In an era of sophisticated and busy activities like now, takeaway is the best choice to save time. No need to get dressed up and no need to wait for waiters. But as quoted by Fantozzi (2020) from Matt Brown, chief revenue officer at Vixxo, while convenience is critical in our fast-paced society, dining remains one of the few curated opportunities to connect with others outside of technology. Restaurants that cater to those great in-house dining experiences allow us to pause from the digital world and engage with our other senses. There are customers still looking for an in-person experience over the convenience of takeout.

Either dine-in or takeaway dining options have advantages. Restaurants that only serve takeaway don't need to spend investment in the form of a restaurant building. While dine-in serves the atmosphere of eating at the place. The cost of food for dine-in restaurants is more expensive than restaurants that only applies takeaway. This can happen because the investment in buying / leasing buildings and the cost of maintaining the restaurant building affects the cost of food to be more expensive.

Third, online food delivery facility towards cost and restaurant rating. From 3,291 restaurants in Bandung on the Zomato marketplace, there are 89.79% of restaurants don't have online food delivery service, both deliveries provided by a third-party service or delivery provided by own restaurant. CEO of Ordermark, Canter (2019) on Quora sites, said there are a host of reasons why some restaurants decide not to pursue online ordering:

- Operators believe that their menu items won't package or travel well.
- Operators are concerned that delivery can't capture the overall appeal of their brand and experience.
- Operators are concerned about the profitability of using third party ordering services.
- Operators think that online ordering is a temporary fad.
- Operators don't understand how online ordering works and it seems difficult to them.
- Some operators feel they are "busy enough" and don't wish to increase order volume.

Figure 11 shows that many restaurants that don't have online food delivery advertised on Zomato don't have a rating. Many restaurants still don't understand the impact of changing their business strategy with online food delivery facility. Operators not keeping up with consumer demand for technology. Whereas the sophistication of the online delivery system can make it easier for customers to get their food needs quickly. This will increase the order volume, which means making more money. With the online delivery restaurant platform system, the restaurant can create a database

that can capture various information from customers, such as email addresses. This information can be used as a restaurant communication tool with customers in promoting companies to make repeat orders. So, the challenges are teaching employees how to use it, getting familiar with the technology and training staff in its use, and cost and getting staff and customers to buy in (National Restaurant Association and Technomic 2019).

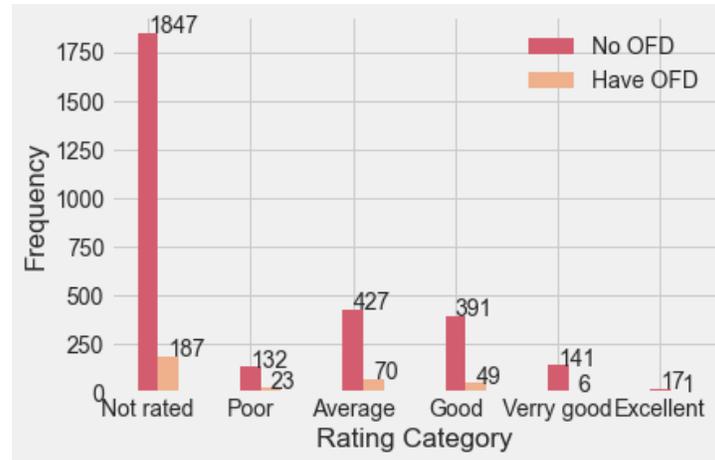


Figure 11. Comparison of restaurant online delivery facility

Figure 12 shows restaurants that have online delivery facilities tend to have lower food prices than restaurants that don't have online food delivery facilities. Restaurants that have online food delivery are usually restaurants with affordable food prices, and most are fast food and heavy food that is easily served. Restaurants that have high prices are restaurants that pay attention to way of serving the food, so it cannot be brought home. An example is hot plate cuisine. In addition, foods that cannot be taken for delivery are foods that pay attention to freshness factors such as ice cream and liquid food such as soup, ramen, noodle, etc, it's better to eat on the spot. So there are three reasons why restaurants don't use online food delivery, which are the problem of operator expertise, way of serving the food, and type of food.

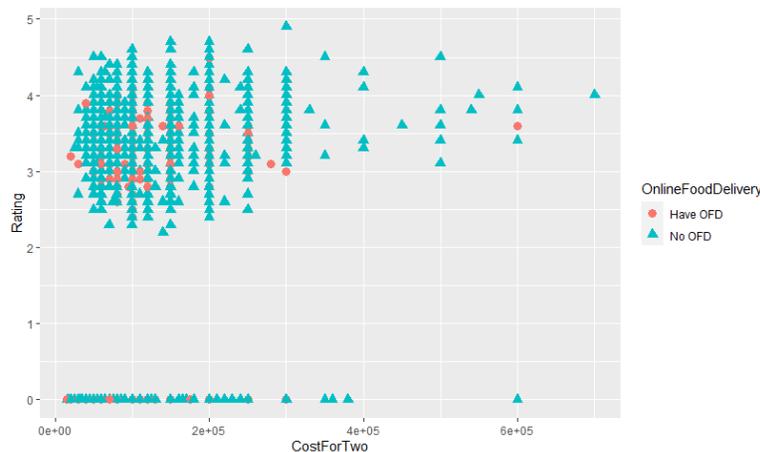


Figure 12. The relationship between online food delivery facility towards rating and cost

Fourth, Wi-Fi facility towards restaurant rating. From 3,291 restaurants in Bandung on the Zomato marketplace, there are 90.25% of restaurants don't have Wi-Fi facilities. Figure 13 shows that many restaurants that don't have the Wi-Fi facility advertised on Zomato don't have ratings. One of the factors that influence restaurants don't have provide Wi-Fi facility is can be seen from the results of the analysis of type of restaurant, mostly restaurants in Bandung are quick bites. Quick bites are a type of fast food restaurant. So, in general it's not a suitable place for hangouts. People who visit quick bites restaurants mostly just buy and then go home.

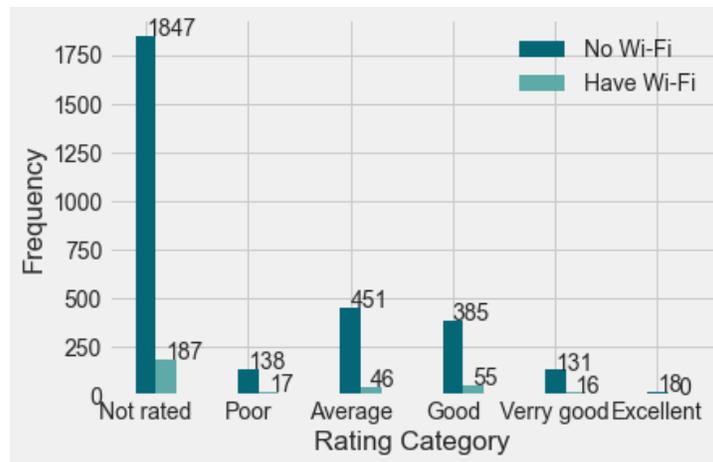


Figure 13. Comparison of restaurant Wi-Fi facility

There are many pros and cons of restaurants with Wi-Fi facility. One of the cons of providing Wi-Fi facility is restaurant ambience could take a hit. Restaurants, cafes, bistros, coffee shops, these are all social settings where people chat face-to-face. But many of these establishments have transformed from social spaces to quiet places, with people silently typing away on their laptops (Krook 2020). Therefore, many restaurants, especially high-class restaurants that don't provide Wi-Fi facility in an effort to restore the strength of connections between people. Another cons is that customers tend to spend more time in the restaurant just to hang out for hours using the Wi-Fi restaurant facility.

However, anti-social nowadays due to the use of the internet on devices has become a trend. Providing Wi-Fi service in a restaurant is a predictor of the likelihood of customers returning to a restaurant. The cost of Wi-Fi access at a restaurant increases, customers are less likely to return to that restaurant. Wi-Fi service should be offered to customers either free of charge or restaurants may use a business model where they do not charge for Wi-Fi service but may require a purchase to allow free access to Wi-Fi (Cobanoglu et al. 2012). So the restaurant can still meet the customer needs for Wi-Fi and can still support the connections between people by limiting the use of Wi-Fi.

## 6. Conclusion

There are several findings from the results of online restaurant data analysis on the Zomato marketplace. Riau as a tourist center in Bandung is an area that has the highest number of restaurants. While the smallest number of restaurants is in the Cibiru area. Restaurants in Bandung are dominated by quick bites, with quick bites is the most mushrooming type of cuisine in Bandung. The highest cost of eating at restaurants in Bandung is in Buahbatu, which is Rp 700,000 for two people and the lowest is in the Cicendo area Rp 15,000 for two people. The higher the cost, the better the rating given. Restaurants that have a average, good, very good, and excellent rating category are restaurants with average cost for two people is ranging from IDR 50,000 to IDR 150,000. The number of review given by customers will improve restaurant ratings.

Most restaurants in Bandung are indoor-themed restaurants. Indoor-themed restaurants tend to have more expensive food prices than outdoor-themed restaurants. There are many restaurants dine-in rather than takeaway. The cost of food for dine-in restaurants is more expensive than restaurants that only applies takeaway. Online food delivery system is not widely applied by restaurants in Bandung. Restaurants that have online delivery facilities tend to have lower food prices than restaurants that do not have online delivery facilities. Many restaurants with indoor seating, a few restaurants that apply online delivery, and many restaurants with dine-in dining options signify that overall restaurants in Bandung are exclusive restaurants, which are concerned with privacy and the warmth of togetherness, as well as restaurants that care about the way of serving the food and the freshness of food. Many restaurants in Bandung do not have Wi-Fi facility. This can be caused because most restaurants in Bandung are quick bites, which are generally not for hangouts. Restaurants with Wi-Fi facility tend to have lower costs than restaurants that have Wi-Fi facility. This can happen because many restaurants besides quick bites, especially high-class restaurants does not provide Wi-Fi facility in an effort to restore the strength of connections between people. But this will impact on the restaurant rating because nowadays anti-social has become a trend.

In dealing with the Coronavirus pandemic as it is today, restaurant owners who have dine-in restaurant facilities can make up for the loss of dine-in revenue by offering food that can be made quickly to serve dine-in or food that can be brought home by the customer. As we can learn from Japan, they have a variety of instant foods that are incredibly cheap, fast, and delicious. Restaurant businessman can innovate to create various instant foods as social distancing solutions. Even so, Plumlee (2020) said, not all dishes work well to carry. Some foods are not easily packaged, and certain foods will lose heat or texture on the way. The restaurant has adapted to the problem by making hot dishes and eating. These plates can be frozen or refrigerated, prepared in bulk beforehand, and sold through shipping or luggage. They are a great solution for restaurants that never consider takeout when planning their menus. Next for the restaurant that has an indoor-theme, has a higher risk of transmitting the virus. But this risk can be minimized by making proper ventilation and social distancing by making the distance between the tables. Today's restaurant entrepreneurs also need to be aware of the importance of online food delivery facilities to facilitate customers in getting their food needs in the midst of this pandemic. Online delivery operator training needs to be considered as well.

Competition in the food industry is getting tougher, even more, nowadays online food marketplace is growing so fast day by day in the world. The restaurant businessman must make sure to get the updates about the latest conditions of the restaurant. With the information obtained from Big Data, it is expected to be the basis for investors who want to start a restaurant business and for restaurant owners are expected to become better restaurants. As Anna et al. (2019) said, proper management steps need to be taken so that entrepreneurs can manage business and marketing processes effectively so that they can meet customer demands. Besides being able to meet existing market trends, entrepreneurs can also comply with government regulations during a pandemic.

This study is limited to the survey website on the Zomato marketplace in Bandung, Indonesia, with the analyzed variables are types of restaurants, types of cuisine, restaurant facilities, cost, review, and rating. The future studies can use other online food platforms for the data scraping. It is expected to try scraping data on an online food platform mobile app. The future studies can also do scraping for sentiment analysis to analyze the customer opinions about the restaurants. Study can also be implemented on other online retail services.

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## References

- Anna, I. D., Cahyadi, I., and Yakin, A., An integrated approach based on ANP and goal programming to determine the best marketing strategy, *International Conference on Mechanical Engineering Research and Application*, vol. 494, pp. 1-6, 2018.
- Callegaro, M. and Yang, Y., *The Role of Surveys in the Era of "Big Data"*, Palgrave Macmillan, Cham, 2018.
- Canter, A., Why aren't More Restaurants Taking Advantage of Online Ordering? Available: <https://www.quora.com/Why-arent-more-restaurants-taking-advantage-of-online-ordering>, June 12, 2020.
- Cobanoglu, C., Bilgihan, A., Nusair, K. K., and Berezina, K., The impact of wi-fi service in restaurants on customers' likelihood of return to a restaurant, *Journal of Foodservice Business Research*, vol. 15, no. 3, pp. 285–299, 2012.
- Fantozzi, J., Trend Watch: Trend Watch: Why Customers Still Choose to Dine In Instead Of Takeout; How Snacks Can Transform Your Menu, Available: <https://www.restaurant-hospitality.com/trends/trend-watch-why-customers-still-choose-dine-instead-takeout-how-snacks-can-transform-your>, January 22, 2020.
- Hayo Wisata Indonesia, 5 Gastronomy Destination in Indonesia, Available: <https://www.hayo.travel/about-us>, March 17, 2021.
- Hillen, J., Web Scraping for food price research, 58<sup>th</sup> Annual Conference, Kiel, Germany, German Association of Agricultural Economists, Kiel, Germany, September 12-14, pp. 3350-3361, 2018.
- Krook, D., The Pros and Cons of Restaurants with Wifi, Available: <https://www.touchbistro.com/blog/the-pros-and-cons-of-restaurants-with-wifi/>, June 2020.
- Mandinach, E., Honey, M., Light, D., and Brunner, C. A conceptual framework for data-driven decision-making, *Data-Driven School Improvement: Linking Data and Learning*, pp. 13-31, 2008.
- Mitchel, R. *Web Scraping with python*, America: O'Reilly Media, Inc., 2015.
- National Restaurant Association and Technomic, Harnessing Technology to Drive Off-Premises Sales, Available: [https://restaurant.org/downloads/pdfs/research/research\\_offpremises\\_201910.pdf](https://restaurant.org/downloads/pdfs/research/research_offpremises_201910.pdf), June 2020.
- Plumlee, M., 10 Top Takeout Innovations During Coronavirus, Available: <https://www.qsrmagazine.com/outside-insights/10-top-takeout-innovations-during-coronavirus>, July 2020.

- Provost, F. and Fawcett, T., Data science and its relationship to big data and data-driven decision making, *Big Data*, vol. 1, no. 1, pp. 51-59, 2013.
- Rallis, S. and MacMullen, M., Inquiry-minded schools: Opening doors for accountability, *Phi Delta Kappan*, vol. 57, no. 10, pp. 1-13, 2000.
- Redalkemi, Importance of Online Advertising, Available: <https://www.redalkemi.com/blog/post/importance-of-online-advertising>, July 2020.
- Web Scraper*<sup>a</sup>, Link Selector, Available: <https://webscraper.io/documentation/selectors/link-selector>, January 2020.
- Web Scraper*<sup>b</sup>, Text Selector, Available: <https://webscraper.io/documentation/selectors/text-selector>, January 2020.
- WowShack, Top 5 Indonesian Foods Officially Set by The Ministry of Tourism, Available: <https://www.wowshack.com/top-5-indonesian-foods-officially-set-by-the-ministry-of-tourism/>, July 2021.
- Zomato, Annual Report Fy19, Available: <https://www.zomato.com/blog/annual-report-19>, June 2020.

## Biographies

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**Teguh Siswanto** is a Lecturer on Industrial Engineering Department of Atma Jaya Yogyakarta University, Indonesia. He earned Bachelor of Education in Mechanical Engineering from Yogyakarta State University, Master in Industrial Engineering and Management from Bandung Technology Institute and Doctor in Ergonomics - Work Physiology from Udayana University, Bali. Dr. Teguh has been serving as the Dean of Faculty of Industrial Technology since 2014. He is in the field of Ergonomics, Product Design and Occupational Safety and Health. In 2012, He presented his research of assessment for hand tools design on Southeast Asian Network of Ergonomics Societies (SEANES) Conference in Langkawi, Malaysia. He is member of Indonesian Ergonomics Association (PEI) and International Ergonomics Association (IEA).

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