

Data Analysis of Online Food Delivery Operations Using Business Intelligence Techniques

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Introduction

The online food delivery has adapted to become part of the modern city life. Many people will be placing online orders of food instead of visiting the restaurants. As a result of this transformation, the firms can obtain a significant amount of data concerning the processes of delivery, as well as customer behaviour and the level of the services. It is this information that is analyzed which will help a company to learn trends and work more efficiently. According to researchers, the online food delivery platform confronts online logistics, technology, and consumer behaviour to build an efficient system of services, in response to the customer demand (Shankar et al., 2022). This information is, however, important to know to improve on operational efficiency and satisfaction of customers.

The report is directed to the discussion of an order of food deliveries dataset using the methods of business intelligence. The information is recorded on data regarding the workers who deliver products, the weather, the traffic congestion, the vehicles and the nature of the orders. The variables are extremely beneficial in comprehending how the delivery services work in different settings. The current body of literature proves that the analysis of the statistics on deliveries can show the trends that influence the quality of services, the delivery speed, and customer loyalty (Shankar et al., 2024). The report targets the cleaning of data, description statistics, trend analysis

and statistical interpretation with the objective of obtaining an insight on the performance of delivery performance.

The key purpose of the analysis is to compare the trends in operation and the challenges, which might influence the results of delivery. Company business intelligence tools, Excel and SPSS, will allow the analysts to operate with the massive data volumes and reach the significant conclusions. The tools will help organizations make evidence-based decisions that will improve the quality of the services and the efficiency of work. As academics note, when it comes to customer expectations and improving the digital service systems of food delivery platforms, the data analysis that involves the use of technology is required (Sabilaturrizqi and Subriadi, 2024).

Data Cleaning and Preparation

It is the task of one to clean and prepare the databank before any analysis can be done. The data cleaning is also used to ensure that the information is right, consistent and fits the type of analysis. This study has used Microsoft Excel, which highlights lack of values, incorrect entries, and wrong formatting. Some datasets may have lack of blank cells, text used unequally and irregularly in numerical values, thus, uneven. These issues are answered through cleaning up the analysis to remove the issues with calculations of statistics.

The first analysis was that of the missing values. Some entries were also missing in a variable, in this case, the rows will be removed to maintain the accuracy. Some cases of missing values were also small but significant, and the mean substitution has been used to replace the missing values with the mean of the same variable. This strategy helps to maintain the structure of the dataset without tampering with the findings. Scientists emphasize that proper data preparation is crucial to improve the quality of the results of the analysis, any, as well as to feel more confident in their interpretation (Mohamadabadi et al., 2024).

Another step was also the test of the inconsistency in categorical variables. One of them would be the weather condition or the kind of ship to be used which must be uniform. Differences such as sunny and sunny became standardised too and the appropriate classification has been realized. In line with that, certain numerical variables such as age of a driver or the rating were examined in unrealistic values. This preparation process will not presuppose the presentation of the descriptive statistics that will represent the true state of the delivery system. It is important to take into account the quality of the insights brought about during data analysis and is usually seen as an important process in business intelligence operations due to the fact that inappropriate data preparation will have a direct bearing on the results (Ma et al., 2024).

Descriptive Statistics and Summary

The summarizing of the main characteristics of the data is done with the help of the descriptive statistics. They provide a summary on quantitative values in terms of averages, minimum, maximum values and range of the values. The two significant numerical variables in this data will be age of delivery driver and delivery ratings. The variables will provide an insight into the workforce characteristics and the services performance.

Table 1: Descriptive Statistics of Numerical Variables

Variable	Mean	Minimum	Maximum	Standard Deviation
Delivery_person_Age	29.52	15	50	5.79
Delivery_person_Ratings	4.63	1.0	6.0	0.34

The delivery driver's average age is approximately 29.5 years old, which implies that most of the delivery drivers are young adults. Adolescent drivers are more aware of the online platforms and the mobile GPS models that are used in deliveries. It has also been shown that younger people

in the gig-economy are more likely to utilize the delivery services since the employment offers a flexible solution and income within urban areas (Lu et al., 2022).

The mean rating of delivery is actually high at 4.63. It implies that the customers are not exposed to overall bad experiences with delivery services. Some of the things that have been associated with high ratings involve quick service, good service and proper order handling. As per the research findings of the food delivery service providers, the assurance of the services has a direct impact on customer satisfaction and desire to use digital ordering applications again (Ma et al., 2025).

Table 2: Weather Condition Distribution

Weather Condition	Frequency	Percentage
Sunny	1975	17.3%
Windy	1948	17.1%
Sandstorms	1878	16.5%
Cloudy	1861	16.3%
Stormy	1811	15.9%

Weather conditions are somewhat evenly distributed in a category. The hot weather is slightly higher; however, other types of weather are also common such as windy clear sky, overcast and stormy weather. This balance distribution indicates that the data is representative of various environmental situations with regards to deliveries. The environmental factors may influence the operations of this industry by influencing the speed of delivery, the route used, and driver safety (Shan and Yao, 2024).

Table 3: Road Traffic Density Distribution

Traffic Density	Frequency	Percentage
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Low	3881	34.1%
Jam	3503	30.7%
Medium	2751	24.1%
High	1110	9.7%

Traffic density is another important factor of operation. Low traffic is the most common in 34 percent of deliveries. However, it is also caused by traffic jams which are common as well. Such traffic can reduce the speed of the delivery process and make the operation rather costly. Among the issues that are raised in the transport study, the researchers state that the issue of traffic congestion is among the most crucial challenges which urban delivery systems are facing (Wang et al., 2025).

Table 4: Vehicle Type Used for Delivery

Vehicle Type	Frequency	Percentage
Motorcycle	6609	58.0%
Scooter	3817	33.5%
Electric Scooter	950	8.3%
Bicycle	23	0.2%

Motorcycles are the most commonly used vehicles of delivery of the dataset. They make approximately 58 percent of the deliveries. Among others, the use of motorcycles is widespread because they can beat the traffic and the costs of their operations are low. The electric scooters are also reflected by the dataset although their usage is not common compared to the traditional motorcycles.

Table 5: Type of Order Distribution

Type of Order	Frequency	Percentage
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Drinks	2920	25.6%
Buffet	2870	25.2%
Snack	2815	24.7%
Meal	2794	24.5%

The distribution of types of orders is even. The percentage of the beverages of the other category is comparatively greater; however, the demand of the food is balanced. Balanced demand means that the customers do not demand one type of food all the time in the course of the day but different types. The reason is that the product demand variations, given the consumer behaviour research, can be a source of ensuring constant volumes of transactions during the time of the food delivery resources (Gao et al., 2024).

Table 6: Overall Dataset Summary

Indicator	Value
Total Deliveries	11,400
Average Driver Age	29.5 years
Average Rating	4.63
Most Common Weather	Sunny
Most Common Traffic	Low
Most Used Vehicle	Motorcycle
Most Ordered Item	Drinks

The number of deliveries is now a hundred and forty thousand four hundred and five hundred. The sample size is extremely huge with high statistical validity in proceeding to determine patterns and operational trends.

Trend Analysis and Visual Interpretation

The trend analysis helps in extracting the trends in the data either over time or under different conditions. Regarding the delivery operations, the trends may tell the fact that weather, traffic or the type of vehicle may influence the effectiveness of the service. Some of the Excel charts include line charts and bar charts that enable the analysts to visualize the relationship between the operational variables.

One of the relationships is made up of weather conditions and delivery times. Less favorable weather conditions such as storms or sandstorms will slow down the speed of delivery due to unsafe conditions and the road. The logistics system entails environmental factors that tend to assist in the planning of routes and time schedule of delivery. It has been proved that the influence of environmental variability can be significant regarding the performance of the food distribution system in efficiency and the organization of deliveries (Shan and Yao, 2024).

The other trend is that of traffic density and delivery performance. Traffic jams may lead to increased number of minutes spent on travel and increased use of fuel. Advocacy of motorcycles or scooters as an easy vehicle to navigate congested urban areas is therefore popular among delivery companies. Good selection of the vehicles eliminates the flexibility in operation and also reduces the delays during the peak hours.

It also plays a key role with the customer satisfaction trend. Rating of delivery higher implies that the customers are satisfied with the delivery of services. The good customer experiences are accompanied with reliability of customer service, adequate delivery of their orders and good experiences of their customers when using drivers. People use online food delivery applications repeatedly, it has been argued, due to the customer loyalty that results out of a good service performance (Ly, 2025).

Statistical Analysis Using SPSS

The statistical analysis provides a more high-level information about the relationship between variables. Of course, under SPSS, the analysts can test the hypotheses and quantify the relationships involving a large number of factors within the data. One of such tests is the comparison of delivery ratings on different weather conditions. It should make use of T-test to assist in proving whether weather can exert major influence on customer ratings.

When the statistical test does not show that there was any significant difference in terms of weather conditions, it will be possible to conclude that the delivery services will be able to guarantee the same quality of the services delivered without being subjected to any environmental issue. The issue of reliability means that customers have a question of trust in different situations. In accordance with the findings of consumer research, the reliability perception is also an important factor in choosing to make a purchase within the delivery system of online food (Maalouf et al., 2024).

The relationship between the variables such as driver age and delivery ratings can also be tested using the correlation analysis. The low amount or the weak correlation would signal that the quality of services is not very strong, affected by the age of drivers. Instead, it can be more important in training, experience or use of technology.

The regression analysis can be used to determine the predictors of delivery performance. Traffic density can influence such metrics as distance and delivery time as an example. The regression models help the managers to learn the aspects that influence the operational results to the highest level. The analytical models have been a trend in logistics planning to maximize the delivery routes and improve operational effectiveness (Isma et al., 2025).

Insights and Recommendations

The analysis has presented some useful ideas which can be employed in the improvement of delivery operations. Firstly, the information indicates that motorcycles are the best vehicle that can be applied in urban delivery settings. To ensure sustainable logistics, firms should go further to invest in fleet based on motorcycles and bear in mind electric cars as well.

Second, traffic jams are also visible on a regular basis and could also influence the delivery time. Delivery platforms ought to make use of routing optimization algorithms and real time navigation systems in order to minimize delays. Complex routing models can bring more efficiency and reduce the cost of operations in delivery.

Third, the customer ratings are at the all-time high and it is reflected on the good service performance. To maintain this quality, one has to watch managerial behaviour of drivers, service quality and customer relations at any point of time. According to scientists, the most crucial factors in determining the degree of customer loyalty to digital food delivery markets were quality of services and customer trust (Siew Chein Teo et al., 2024).

Finally, companies should also include business intelligence tools such as Excel and SPSS as tools which should be used in tracking the trends in operations. Data driven decision making benefits include the fact that it assists organizations to become more efficient, fulfill customers' expectations and compete effectively in the dynamic online food delivery marketplace.

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