

STATISTICAL MODEL OF DELIVERY PRODUCTS AT HOME IN THE CONTEXT OF THE PANDEMIC CRISIS

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Abstract: Studies for the realization of this work were carried out during a crisis situation degenerated by a pandemic period. Throughout this process, two applications were observed for the delivery of culinary products at home, namely Glovo and FoodPanda. The purpose of this paper is to highlight the most convenient way through which you can order food at home on the days when home-state is indicated and also little contact with other people.

Key words: delivery, Glovo and FoodPanda applications, catering, mathematical model function of two real variables, polynomial interpolation

INTRODUCTION

In order to carry out this paper, the situation of home food deliveries was studied through two applications, but also the delivery through own couriers. It was observed that from a mathematical point of view a function of two real variables can be identified. [6] Two of the most used home delivery applications were taken as a standard, namely Glovo application and the Food Panda application. After the applications were established, the next step was to study with which restaurant each one collaborates. [3] The domain of definition and the codomain of the function was identified, so that after the introduction and processing of statistical data, the function describing the evolutionary model may be identified by polynomial interpolation. In addition, with the two applications, we also studied several restaurants that have their own deliver. [2]

Glovo is a marketplace that allows users to order, send and receive anything. In the application there are several predefined categories from which users can choose depending on what they want to order: Food, Shopping, Gifts or Supermarket, the category through which you can do your home shopping in a few minutes. [15]

FoodPanda offers you the opportunity to order food both through the site and through the mobile application. All you have to do is access one of the two options, search for restaurants in your area and choose your favorite option. After you have chosen your restaurant, check the menu and choose the products you want to order. You can make changes to the included ingredients, you can remove or add some components, and once you have chosen, place the order. [26]

MATERIAL AND METHODS

This method is the branch of mathematics that deals with the collection, grouping, analysis and interpretation of data on certain phenomena, as well as some predictions on the development of these phenomena in the future. It also deals with the interpretation of the data provided by descriptive statistics and using them to draw conclusions and make decisions. Without these interpretations, statistics would make little sense, with many calculations but without knowing practically what was calculated and what that number resulting from the calculation means. [7,4]

The "T test" is any statistical hypothesis test in which the student's "t" distribution takes place under the hypothesis which is followed by the test statistics of the student's data.

In simple terms, "T-tests" indicate the significant basic difference between the different types of groups that is calculated in terms of Mathematics, such as "Means/Averages" that takes place in that particular instance.

Placing an order

To place an order at one of the two applications the first step is to create your own account with your email address as follows:

- enter the e-mail address
- create a password that contains both uppercase and lowercase letters and punctuation to be difficult as possible for other people to find out.
- you will receive a code at the entered address
- the received code must be entered in the code field

After completing all the steps, you will be a Glovo / Foodpanda subscriber.

Instead, for an order directly from the restaurant with own delivery, such a subscription is not necessary, but it can be done by phone or even online without an account. [8]

Making the payment

In order to pay the value of ordered menu, we can opt for cash or card payment solution. An opinion poll also followed this aspect, considering the fact that we are in a pandemic and card payment is recommended. This survey was conducted online, on the e-mail of 20 colleagues, of which 11 were PRO card payment. [11]

RESEARCH RESULTS

For each of the two applications, it was studied which restaurant they collaborate with, what menus the restaurants offer and what their price is. After which the data were statistically processed and the mathematical model was identified that reflects the concrete study of demand and supply on the market during the state of emergency, the following resulted:

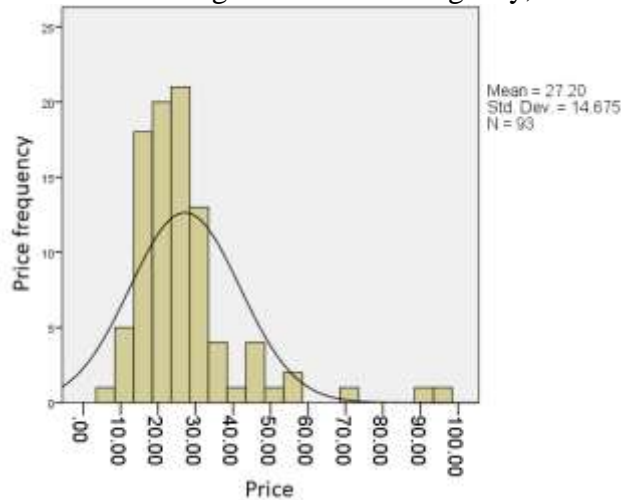


Figure 1. Frequency histogram on the prices of products distributed by application Glovo

The average price of the products distributed through the Glovo application is approximately 27 lei with a median value of 24 lei. Thus, approximately 50% of the distributed products have a price of less than 24 lei. The most common price is 23 lei.

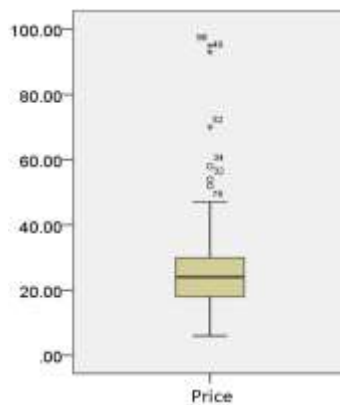


Figure 2. Boxplot diagram regarding the price frequency of the products distributed through the Glovo application

Regarding the products with the lowest price, 25% of all distributed products have a price of less than 18 lei. On the other hand, 25% of the products have a price higher than 30 lei. The respective data are indicated by the values of the quartiles in the attached table but also by the boxplot diagram. Values marked "*", "o" represent outlier values.

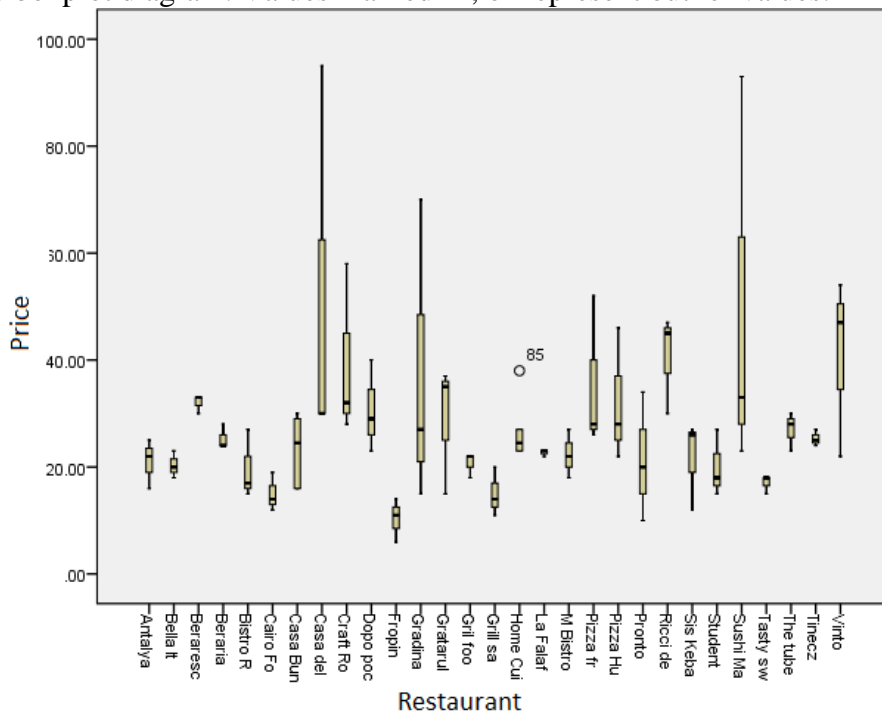


Figure 3. Boxplot diagram regarding product prices, at restaurant level, distributed through the Glovo application

The adjacent boxplot diagram indicates for each restaurant the distribution of the prices of the products delivered through the Glovo application (the values in the boxes indicate the data between quartiles 1 and 3 and the value marked inside the boxes represents the median price). The table below shows the minimum, maximum, average and median prices, respectively the price range (difference between minimum and maximum) for restaurants that distribute products using the Glovo application.

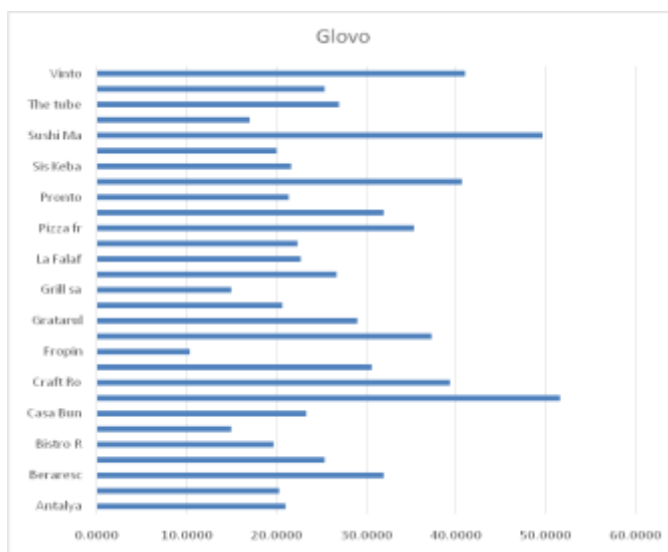


Figure 4. The average price of the products distributed through the Glovo application, of the products offered by restaurants

The graph above shows the average values of the prices products distributed by restaurants through the Glovo application.

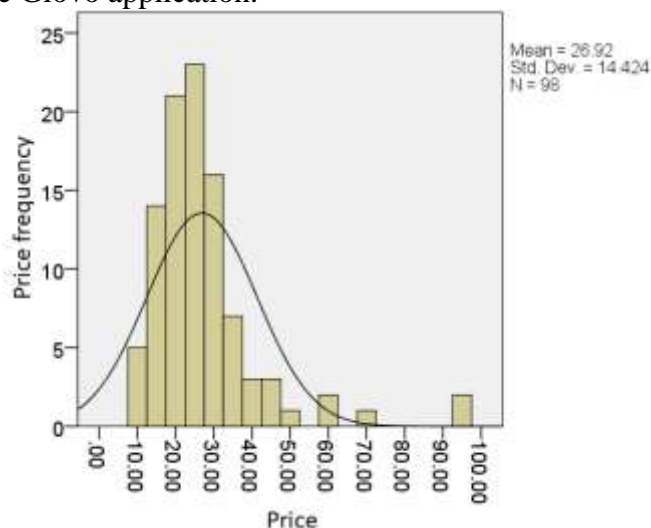


Figure 5. Histogram regarding the price frequency of the products distributed through the Food Panda application

The prices of the products distributed through the Food Panda application have an average value of approximately 26 lei and a median value of 23 lei. Thus, about half of the products are priced less than 23 lei. Following the values of the quartiles indicated in the corresponding table (but also those in the boxplot diagram) it is observed that approximately 25% of the products have a price lower than 18.75 lei while 25% of the products have a price of over 30 lei. There is also a group of products that have prices indicated as outlier relative to the values in the price series (marked in the boxplot diagram with “*, o”).

The boxplot diagrams above indicate the distribution of the prices of the products delivered by the restaurant through the Food Panda application. The median values for each restaurant, found as the lines marked inside the boxes, can provide information on their positioning in relation to each other.



Figure 6. Boxplot diagram regarding the frequency of products prices distributed through the Food Panda application

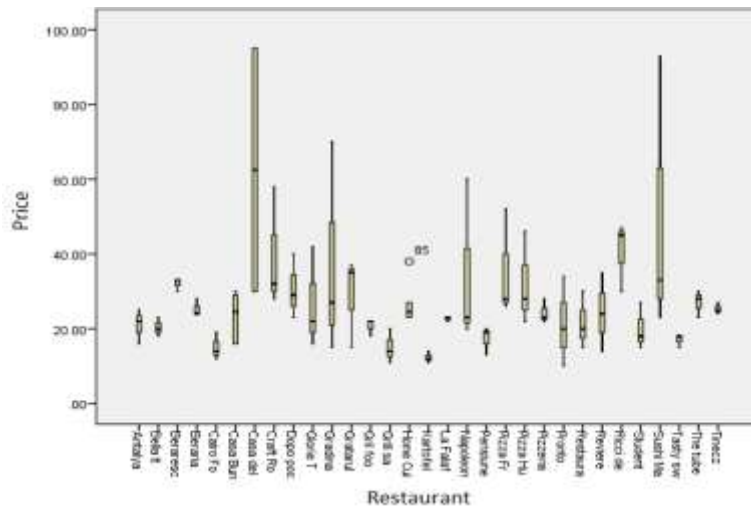


Figure 7. Boxplot diagram regarding the prices of the products, at restaurant level, distributed through the Food Panda application

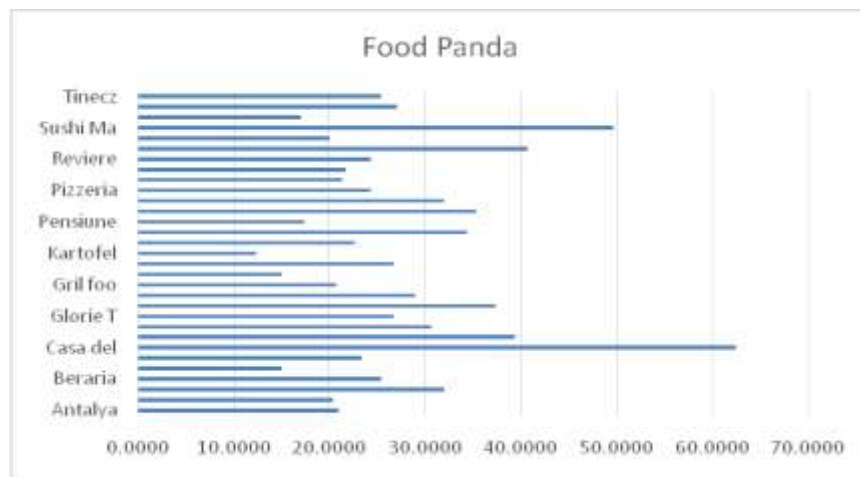


Figure 8. The average price of the products distributed through the Food Panda application of the products offered by the restaurant

The table below shows the values of average, minimum and maximum prices, respectively the median price and the amplitude, for each restaurant in relation to the products distributed using the Food Panda application. The diagram below shows the average prices for each of the restaurants, regarding the products distributed using the Food Panda application.

CONCLUSIONS

The average price of the products distributed through the Glovo application is approximately 27 lei with a median value of 24 lei.

50% of the distributed products have a price less than 24 lei.

The food product prices distributed through the Food Panda application have an average value of approximately 26 lei and a median value of 23 lei.

The two applications are not very far as the price but for a constant customer it is more advantageous to order from the restaurants offered by the Food Panda application.

We can conclude that the statistical model function that shows in the closest way the evolution of the market in a pandemic context, although is a function of two real variables, can be optimized and modeled according to the requirements and is the basis of the concrete offer provided.

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