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DEMAND MODELLING AND FORECASTING THE FUTURE DEVELOPMENT OF PARCEL AND EXPRESS SERVICES

Abstract. *The growth of e-commerce has significantly contributed to the increase in demand for express and parcel services. The aim of this paper is to create a price elasticity methodology and forecasting demand for express and parcel services. In that sense, to describe the dynamics of demand for parcel and express services, the Lotka-Volterra method and the Holt-Winters method were used. Then, users' preferences in the express and parcel services were investigated through a survey. Based on the results obtained, a simulation model for the price elasticity of the demand for these services was developed. The developed model of the price elasticity of demand enabled us to notice the potential to increase the revenue of the Public Postal Operator.*

Keywords*: Express, Parcel, Services, Lotka-Volterra, Holt-Winters, Forecasting, Price elasticity*

JEL Classification: L87, C53

DOI: 10.24818/18423264/57.2.23.16

1. Introduction

The demand for express and parcel services is an indirect character. The growth (increase in volume) and development (quality improvement, pricing policy, marketing activities, and other values and activities) of these services are influenced by the needs of users, the possibility of transforming needs into demand, and user preferences when choosing a specific service.

Development trends in the postal sector have in the past few decades brought into focus express and parcel services. The development of the IT sector and the e-substitution of traditional letter-post services has had an impact on diversification of activities toward the express and parcels market. Although the development of technology has led to a decline in letter-post services, express and parcel services have increased as a result of the development of e-commerce (Consult W. I. K., 2019). Analytic forecasting of a demand in express and parcel services and their price elasticity are important drivers of business decisions of postal operators and at the same time an assistance to regulatory bodies in terms of the nature and scope of changes of regulations. The directions of growth in demand for express and parcel services are the subject matter of this research. The model development methodology is proposed in four phases. Firstly, using the Lotka-Volterra method, the relationship between the individual segments of express and parcel services was simulated. Secondly, the Holt-Winters method was applied in the next step in order to determine the necessary parameters for forecasting in the future. The third phase of the methodology implies the crossing of the obtained results from the Hold Winters method with Lotka-Volterra, based on which the trend of the development of the express and parcel market in the Republic of Serbia was forecast. The previous three phases are exclusively based on the historical data on the movement of the service volume. In order to carry out a more comprehensive analysis, the attitudes expressed by and preferences of the users of express and parcel services were taken into consideration. The results obtained by researching the users' preferences through a survey questionnaire enabled the identification of the characteristics of the services pointed out by the users as crucial when selecting the type of the postal item sending service. The identified characteristics of the services were used for the development of the simulation model of demand price elasticity. The contribution the methodology made reflects in the possibility of demand modeling and forecasting its future development, taking into consideration the characteristics of the services significant for users. In the final part of the paper, the results and possibilities of applying the new methodology are discussed. The significance of the proposed methodology is reflected in the fact that, when analysing the express and parcel service market, no application of the Lotka-Volterra and Holt-Winters methods in one and the same paper, also taking into account the preferences of the users of these services, was evident in the available literature.

2. Literature Review

Based on the available literature, the views on the application of and the reasons for the selection of the Lotka-Volterra and Holt-Winters methods are systemized. One of the preconditions for the improvement of complex business processes is the application of different forecasting methods. A great number of studies focus on time series models, which are tools for the research and forecasting of various types of data (Sezer et al., 2020; Deb et al., 2017). The methods which due to their properties suit the issue under consideration are the Lotka-Volterra and the Holt-Winters.

The Lotka-Volterra method is applied in various areas: in the analysis of quarterly data relating to financial payments (online transactions) (Mao et al., 2020), in the analysis of a dynamic interaction of two competing securities markets and searching for an equilibrium point. (Lee et al., 2005), in the simulation of a complex pattern of traffic flow rate in urban networks (Assaad et al., 2020).

In reviewing a randomised n-species Lotka-Volterra competition system, it is shown that the system is stable in time average under certain conditions (Jiang et al., 2012). The Holt-Winters method is applied in numerous areas of research. Some authors use the Holt-Winters method for forecasts in various branches of transport, such as forecasting the volume of passengers during holidays (Bustami and Gamal, 2015), forecasting air transportation requirements (Dantas et al., 2017), traffic jam forecasting and control by comparing results obtained through deep learning and the Holt-Winters method (Mohanty et al., 2020), in the use of the adaptive Kalman filter for forecasting a short-term traffic flow rate (Guo et al., 2014). Authors also use this method to forecast electric power load in urban areas (Almazrouee et al., 2020), to define a transport strategic planning model that includes a network intermodal transport system defining spatio-temporal conditions of road transport networks and future traffic flows in certain time intervals (Bhattacharya et al., 2014). The method under consideration is used in the development of a methodology that would increase the precision in forecasting the number of passengers in air transportation in an uncertainty-prone era (Suh and Ryerson, 2019). In catalogue sale and mail-order business, efficiently managing the returned goods is of critical importance, and the Holt-Winters method was applied in return forecasting, as well as in other forecasts.

3. Materials and Methodology

Worldwide express and parcel services involve similar processes in delivery items. Participation in the total volume of these services varies from country to country. This situation requires that the trend of demand for these services should be determined, which is then followed by the examination of demand price elasticity. In order to apply the demand modelling and its future development forecast methodology, it is necessary to have data of the volume of express and parcel services. The proposed methodology consists of four phases:

Phase 1: Determining parameters using the Lotka-Volterra method separately for express and separately for parcel services. Express and parcel services demand modelling is the final step of phase one.

Phase 2: Determining parameters using the Holt-Winters method separately for express and separately for parcel services. Express and parcel services demand is forecast in the final step of Phase 2.

Phase 3: Crossing the results obtained by the Lotka-Volterra and Holt-Winters methods.

Phase 4: The development of the demand price elasticity simulation model.

For the purposes of this paper, a relevant publicly available database (of express and parcel services) on the Statistical Office of the Republic of Serbia web site for the period 2009 to 2022 at a quarterly level was used.

Phase 1: The parameters and results of the Lotka-Volterra method:

In case of an interaction of two competitors, the Lotka-Volterra method can be presented by a pair of differential equations:

$$\frac{dX}{dt} = a_1 X\left(1 - \frac{X}{K_1} - m_1 \frac{Y}{K_1}\right) \quad (1)$$

$$\frac{dY}{dt} = a_2 Y\left(1 - \frac{Y}{K_2} - m_2 \frac{X}{K_2}\right) \quad (2)$$

where X and Y represent two types of population competing in time t, while a_i is a linear rate of creation of the i population, K_i is the level of saturation of the i population, and m_1 and m_2 determine the impact of Y on X or X on Y respectively. The stated equations describe the dynamics of the community consisting of two populations (X, Y). The populations are interdependent; i.e., each population has an impact on the growth rate of its competitor through a reduction of its capacity K_i.

In order to apply data in discrete time, it is necessary to transform the continual Lotka-Volterra method into its discrete form (Leslie, 1958). That way, the previous equations transform into differential equations:

$$X(t+1) = \frac{\alpha_1 X(t)}{1 + \beta_1 X(t) + \gamma_1 Y(t)} \quad (3)$$

$$Y(t+1) = \frac{\alpha_2 Y(t)}{1 + \beta_2 Y(t) + \gamma_2 X(t)} \quad (4)$$

Parameters α_i and β_i are logistic parameters for the *i* population that exists in itself, whereas coefficients γ_i indicate the intensity of the impact of one population on the growth of the other. The relationship between coefficients from equations (1), (2) and equations (3), (4) is given according to (Leslie, 1958):

$$a_i = ln\alpha_i \tag{5}$$

$$K_i = \frac{\alpha_i - 1}{\beta_i} \tag{6}$$

$$m_i = \frac{\gamma_i K_i}{\alpha_i - 1} = \frac{\gamma_i}{\beta_i} \tag{7}$$

The competition coefficient sign m_i defines the competitor´s role, i.e., the interaction between two competitors is described based on the values of these coefficients, Table 1.

Table 1. Types of interaction between species (Modis, 1999)

Sign m_i		Type	Explanation
+	+	Pure competition	Occurs when both species suffer from each other's existence
+	-	Predator-prey	Occurs when one of them serves as direct food to the other
-	-	Mutualism	Occurs in case of symbiosis or a win-win situation
-	0	Commensalism	Occurs in a parasitic type of relationship in which one benefits from the existence of the other, who nevertheless remains unaffected
+	0	Amensalism	Occurs when one suffers from the existence of the other, who is impervious to what is happening
0	0	Neutralism	Occurs if there is no interaction whatsoever

The evaluation of parameters using the Lotka-Volterra method is performed by applying the method of nonlinear least squares and the Minitab 16 software. This method applies an iteration procedure called the Levenberg-Marquardt algorithm. The iteration procedure is controlled by a maximum number of iterations and a defined convergence criterion. A convergence criterion implies the value of a parameter change resulting in stopping the iteration procedure, i.e., if a parameter change is below the given value, the algorithm running is completed. The value of 0.001 is taken as the given value in this case, i. e. the procedure is stopped if the percentage of coefficient changes is less than 0.1%. The evaluation of logistic parameters is presented in Table 2.

Table 2. Evaluation of logistic parameters

Parcel services	Express services
α1=1.85379	α2=1.2597
β1=5.91727·10-6	β2=2.53131·10-8
γ1 = -6.63587·10-8	γ2 =-8.63846·10-8

Based on the coefficient relationship in differential and different equations proposed by (Leslie, 1958), the value of parameters a_i, K_i, and m_i, Table 3, can be determined. According to Lewis (Lewis, 1982), the values MAPE = 20.53 for parcel services are reasonable forecasting, while the values MAPE = 18.12 for express services are good forecasting.

Table 3. Evaluation of parameters of differential equations

Parcel services		**Express services**	
a_1	0.61723	a_2	0.23087
K_1	144287	K_2	10259509
m_1	-0.011214	m_2	-3.41264
MAPE	**20.53**	**MAPE**	**18.12**

When analysing the coefficient values of the interaction m_i (Modis, 1999), it can be seen that in the area of demand for express and parcel services in the Republic of Serbia there is a mutualism, i.e., a situation in which there is a symbiosis of the observed services. In other words, activities leading to a growth in express services also result in a growth of parcel services. On the contrary, activities leading to a decline in parcel services also cause a decline in express services. An analysis of a competitive relationship of the Lotka-Volterra method can provide information such as the equilibrium state and trajectories of changes over time. In analysing the equilibrium equations (1) and (2) equal 0 as under such conditions there are no changes in competitors over time, i. e. we are observing the equilibrium populations:

$$\frac{dX}{dt}=0 \ \frac{dY}{dt}=0 \tag{8}$$

Taking into account conditions (8) for equations (1) and (2), we obtain:

$$a_1 X\left(1 - \frac{X}{K_1} - m_1 \frac{Y}{K_1}\right) = 0 \tag{9}$$

$$a_2 Y\left(1 - \frac{Y}{K_2} - m_2 \frac{X}{K_2}\right) = 0 \tag{10}$$

By solving the equations (9) and (10) we obtain:

$$X = K_1 - m_1 Y \quad Y = K_2 - m_2 X \tag{11}$$

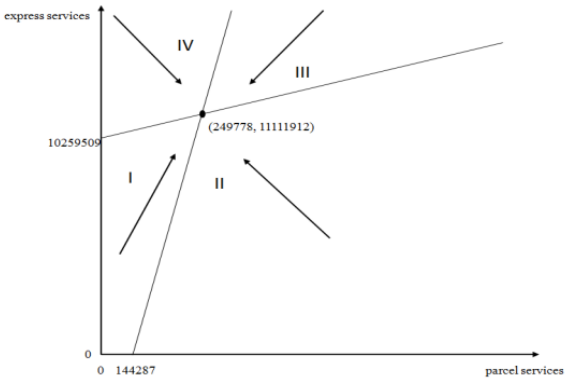

Figure 1. Market modelling by applying the Lotka-Volterra method

In the region I, where *dX/dt>0* and *dY/dt*<0, there is an increase in both parcel services and express services. In region II, where *dX/dt<0* and *dY/dt*<0, there is a decrease in parcel services and the growth of express services. In region III, where *dX/dt<0* and *dY/dt*>0, there is a fall in both parcel and express services. In the last region IV, where *dX/dt>0* and *dY/dt*>0, there is the growth of parcel services and a fall in express services. Also, based on (Graph 1), it is possible to notice the equilibrium point in the case when *dX/dt=0* and *dY/dt*=0. The presence of the stable equilibrium point indicates the fact that the successful coexistence of both observed segments is possible. Perceiving both segments with the available capacities, their values will gravitate towards the equilibrium point.

Phase 2: The parameters and results of the Holt-Winters method:

The Holt-Winters method is convenient when forecasting time series under an assumption that there is a certain trend and seasonal variation which change over time (Holt, 2004; Winters, 1960; Drašković et al., 2019). This approach comprises three smoothing equations (the level of occurrence, trend, and seasonality are smoothed). The method can be defined with the following formulae:

Level: $L_t = \alpha \frac{Y_t}{S_{t-s}} + (1-\alpha)(L_{t-1} + T_{t-1})$ (12)

Trend: $T = \beta(L_t - L_{t-1}) + (1-\beta)T_{t-1}$ (13)

Seasonality: $S_t = \gamma \frac{Y_t}{L_t} + (1-\gamma)S_{t-s}$ (14)

Forecast: $Y_{t+p} = (L_t + pT_t)S_{t-s+p}$ (15)

The smoothing parameters determining is done by minimising the MAPE (Mean Absolute Percent Error) or the RMSE (Root Mean Square Error). Demand behavior for express and parcel services for the third and fourth quarters of the year

2021 and for the first and second quarters of the year 2022 is forecast by applying the Holt-Winters method. The Holt-Winters method is applied in the Excel program using the available quarterly data for the period from 2009 through 2022. Step one of the application of this method implies the calculation of initial seasonal factors:

$$S_I = \frac{Y_i}{average\ (Y_1 Y_2 Y_3 Y_4)} \tag{16}$$

(where 'i'assumes values from 1 to 4) for the year under observation (by quarters), and the initial level (L_t) and trend (T_t) are calculated in the observed time t. The following step implies the calculation of a seasonal component in time t which is preceded by assigning the initial values to the smoothing factors (α, β, γ). Following that, a recalculation of $(L_t), (T_t)$ is made in time using the given coefficient values (α, β). Forecasting ($\hat{Y}_{t+p}$) the volume of parcel and express services is obtained as a sum of the last calculated values $(L_t), (T_t)$ multiplied by a seasonal component in time t (S_t). The final leg of this method implies the calculation of the RMSE where, using the Excel solver, we want to minimise the RMSE by changing the values of smoothing factors, where $\alpha, \beta, \gamma \leq 1$ and $\alpha, \beta, \gamma \geq 0$ using the GRG (nonlinear solving method). The obtained values of the smoothing factors ($\alpha,\ \beta,\ \gamma$), MAPE and RMSE for parcel services are given in Table 4, and for express services in Table 5:

Table 4. Parcel services parameters

α	0.100625
β	0.100104
γ	0.100159
RMSE	63623
MAPE	29

Table 5. Express services parameters

α	1
β	0.013787
γ	0.224368
RMSE	950305
MAPE	8.85

Based on the obtained values of parameters, the MAPE value for parcel services is 29 Figure 2, while for express services it is 8,85 Figure 3. Or, according to Lewis (Lewis, 1982), the MAPE value for parcel services is reasonable forecasting, whereas for express services it is *highly* accurate forecast. Based on the obtained values of parameters for the Holt-Winters method by applying Minitab 16 we developed methodology for forecasting the number of parcel and express services at the quarterly level.

The following values are obtained for parcel services:

- 2021 quarter 3 **(249077);**
- 2021 quarter 4 **(271680);**
- 2022 quarter 1 **(261419);**
- 2022 quarter 2 **(343171).**

The following values are obtained for express services:

- 2021 quarter 3 **(10049207);**
- 2021 quarter 4 **(11295351);**
- 2022 quarter 1 **(10978804);**
- 2022 quarter 2 **(11815454).**

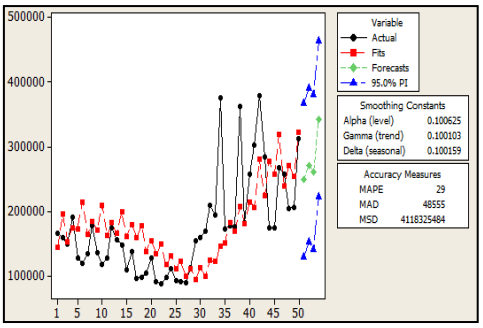

Figure 2. The Holt-Winters method applied for parcel services

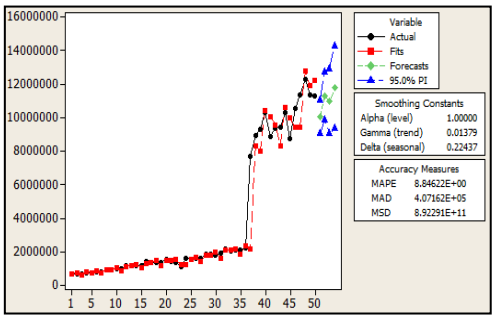

Figure 3. The Holt-Winters method applied for express services

In Figure 3, which was generated by applying the Holt-Winters method, it is possible to notice an abrupt leap in the express service volume in the period from 2018 to 2019. This trend also continued in the following years. The reason for a leap like this in the service volume may be attributed to the legal regulations in the e-commerce trade (National Assembly, 2017). This indicator shows that it is impossible to reliably forecast only based on historical data and that there is a need to directly perceive users' preferences. For that reason, research on users' preferences and the identification of the characteristics of the services that may exert an influence on the volume of the observed market segments in the future are also included in the forecast within the framework of the fourth phase of this paper.

Phase 3: Crossing the results obtained by the Lotka-Volterra and Holt-Winters methods:

Based on the forecast values obtained by the Holt-Winters method that were crossed with the results of the Lotka-Volterra method, it can be noticed that the obtained values of parcel and express services converge towards the equilibrium point Figure 4. Perceiving the current distribution of the strengths of the observed market segments, a conclusion is drawn that the activities contributing to the growth of one market segment lead to the growth of the other market segment as well, i.e. the parcel and express postal items coexist with the current capacities. The forecast values for the second phase have confirmed the assumptions established in the first phase.

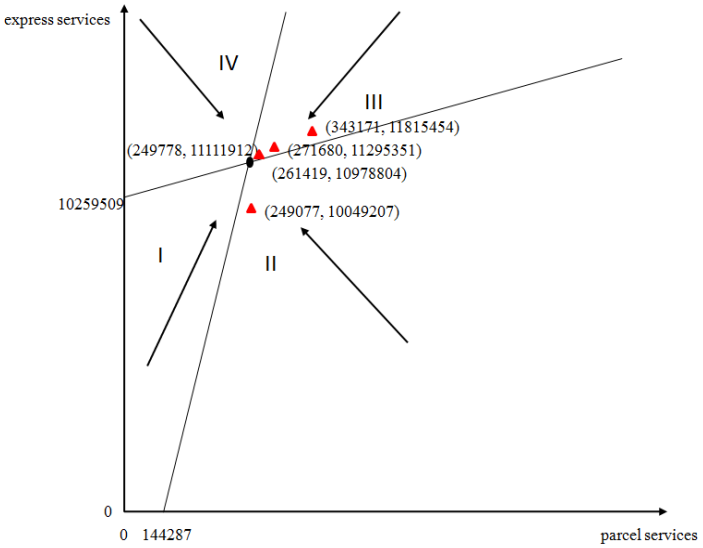

Figure 4. The forecast of the development of the express and parcel services market

Phase 4: Demand price elasticity and the characteristics of the services important for user:

In order to make a more reliable forecast of the volume of parcel and express services, financial indicators, and the improvement of the quality of the services offered by the Public Postal Operator on the territory of the Republic of Serbia, also, research in the users' attitudes and preferences was done using a survey questionnaire. The respondents' answers were collected electronically during the period from December 15th to December 25, 2022. The questionnaire was completed by 102 respondents. Service users in Serbia do not make a clear distinction between express and parcel services given the perceived quality and price. According to the research done, the vast majority of 77% of the respondents prefer express services when sending postal items. The Post of Serbia's parcel services for sending postal items a couple of times a year are used by 25% of the respondents, whereas 7% of the respondents use this service just a couple of times a week. Analysing the answers provided by the respondents, still bearing in mind the fact that express services belong in the Universal Service domain, the express service prices should be significantly higher in relation to parcel services, which is the case when speaking about the Post of Montenegro and the Post of Croatia.

In express services, the prices are defined in relation to the market environment upon consent of the NRA (National Regulatory Agency). In the parcel services that belong to the Universal Service domain, every price change calls for the consent of the Government of the Republic of Serbia. The survey results show that 64% of the respondents are ready to pay a higher postage charge if their postal items are

delivered in the shortest deadlines, whereas 36% of the respondents are not ready for that. Once processed, the survey results revealed that an increase in the service price of 5% was acceptable for 65% of the respondents; an increase of 10% was acceptable for 41% of the respondents; then, 16% of the respondents accepted an increase in the prices of 15%, while a 20% increase was acceptable for 4% of the respondents. These indicators imply that postal operators, the Public Postal Operator in this particular case, still have room for increasing the prices of both parcel and express services, taking into consideration the answers given by the respondents who find the price and delivery deadlines to be the most important factors when opting for a service type. The respondents' answers connected with delivery deadlines indicate that, in parcel services, the biggest percentage of the respondents (46% of them) said that a postal item had been delivered within 3 days, whereas 34% of the respondents said a postal item had been delivered on the following workday. As far as express services are concerned, the biggest number of the respondents (71%) said that a postal item had been delivered to them in the guaranteed deadline, and in 18% of the respondents, an express postal item was delivered one day after the guaranteed deadline. These answers are indicative of the fact that there is significant room for improving the quality of parcel and express services.

The results obtained through the research in the users' preferences via the questionnaire were used to develop the demand price elasticity model, given the fact that the questionnaire helped to establish the fact that the users found the price to be one of the more important characteristics of the services. A model demonstrating how change in prices influences demand for parcel and express services, as well as its influence on the revenue generated by the postal operator (where there is room for an increase in prices) was developed.

The elasticity concept allows us to make quantitative observations about the impact of changes in supply and demand on equilibrium prices and quantities. The demand price elasticity measures how much the quantity demanded responds to price changes. The coefficient of demand price elasticity (Ed) represents the quotient of the relative (percentage) change in the demanded quantity (Qd) and relative (percentage) change in the price (P) of the same service. The demand price elasticity is always a negative number because of the inverse relationship between the price and the quantity demanded. However, the minus sign is often ignored while writing the elasticity value (Weber, 1989; Vukadinović et al., 2017). Based on the demand price elasticity coefficient value (17), it is possible to draw conclusions on the manner in which demand will behave when price is changed (Vukadinović et al., 2017).

$$E_d = -\frac{\%\Delta Q}{\%\Delta P} = -\frac{\frac{End\ Q - Begining\ Q}{Average\ Q} * 100}{\frac{End\ P - Begining\ P}{Average\ P} * 100} \tag{17}$$

In the period from 2017 to 2021, the available data for the postal items weighing up to 500 g and for the postal items weighing over 10 kg that belong in the commercial service domain. Since the determination of demand price elasticity is

significant when determining service prices, the simulation model included the results obtained through researching the market, the attitudes, and users' preferences. According to the results achieved in the business operations carried out by the Public Enterprise Post of Serbia, the demand price elasticity coefficients for the postal items weighing up to 500 g Table 6, and the postal items weighing over 10 kg Table 7 were calculated.

Table 6. Price elasticity for postal items up to 500 g

Year	Total revenue	Price elasticity (Ed)	Interpretatiton
2017	2,023,050,000.00 rsd.	N/A	N/A
2018	3,091,600,000.00 rsd.	0.48	Inelastic
2019	4,250,250,000.00 rsd.	0.43	Inelastic
2020	5,577,600,000.00 rsd.	0.49	Inelastic
2021	7,264,600,000.00 rsd.	0.71	Inelastic

The demand price elasticity coefficients for the postal items up to 500 g indicate that demand was inelastic in the observed period from 2017 to 2021. According to the obtained coefficients, the postal operator had room for increasing the service prices that would have led to an increase in total revenue, which is exactly the aim of doing business of each operator.

Table 7. Price elasticity for the postal items weighing over 10 kg

Year	Total revenue	Price elasticity (Ed)	Interpretatiton
2017	2,311,595,000.00 rsd.	N/A	N/A
2018	3,128,400,000.00 rsd.	1.44	Elastic
2019	3,115,000,000.00 rsd.	1.07	Elastic
2020	3,440,860,000.00 rsd.	0.52	Inelastic
2021	4,056,220,000.00 rsd.	0.26	Inelastic

The obtained demand price elasticity coefficient Table 7, for the postal items weighing over 10 kg in 2018 and 2019 tells us that demand was elastic, where every percentage increase in prices would have influenced a reduction in the total revenue and a greater percentage reduction in demand for postal items. In the years 2020 and 2021, however, the coefficients show that demand was inelastic, i.e., changes in the price lead to insignificant change in demand. In this case, there is an increase in total revenue. After carrying out the analysis of demand price elasticity for the period from 2017 to 2021, the answers given by the respondents in connection with how ready they were to pay more for postage and have their postal item delivered in the shortest possible timeframe were taken into consideration. Their answers were used to develop a simulation model. The model provides us with an insight into the boundaries of percentage changes in the service prices and into how they would

influence a percentage change in the demanded quantity of the services according to the previously established demand price elasticity coefficients. Within the model, the postal operator's total revenue was also calculated based on the previously established demand price elasticity coefficients with and without change in the service prices.

In the postal items weighing up to 500 g, if the prices had been increased by 5% year after year, the same would have resulted in a reduction in demand by 2% in the period from 2018 to 2020, whereas demand in the year 2021 would have shrunk by 3% with the same increase. The total revenue generated by postal operators would have been growing constantly. In a situation that implies an increase in the price by as much as 10% in relation to the observed one, the percentagewise reduction of demand for these services would have been below 10%, Table 8.

Table 8. The price for the postal items weighing up to 500g increased by 10%

Year	**%ΔP for 10%**	**%ΔQ**	**Total revenue**
2017	N/A	N/A	2,225,355,000.00 rsd.
2018	10%	5%	3,400,760,000.00 rsd.
2019	10%	4%	4,675,275,000.00 rsd.
2020	10%	5%	6,135,360,000.00 rsd.
2021	10%	7%	7,991,060,000.00 rsd.

These data tell us that the postal operator had a chance of achieving a greater revenue in the period under observation for the postal items weighing up to 500 grams. When talking about postal items that weigh over 10 kg, a 5% increase in the price in the year 2018 would have led to a reduction in the volume of the services by 7%, whereas in the year 2019, an increase in the price of 5% would have led to an equivalent reduction in the volume of the services of 5%, which corresponds to unitary elasticity, and there was no room for increasing the service prices in this period. For the period 2020-2021, an increase in prices of 5% means a reduction in demand for services of 3% and 1%.

If the price of the postal items exceeding 10 kg had increased by 10% in the year 2018, demand for these services would have been reduced by 14%, which corresponds to elastic demand. In the year 2019, an increase in the service price of 10% would have led to a reduction in the volume in demand for the services by 10%, which corresponds with unitary elastic demand. An increase in the service prices of 10% in the years 2022 and 2021 would have led to a decrease in demand for the services of 5% and 2%, which shows that there was room for an additional increase in the service prices in 2020 and 2021. Therefore, the total revenue will increase because the percentage increase in the price is greater than the effect of decreasing the quantity demanded Table 9.

Table 9. The price for the postal items weighing over 10kg increased by 10%

Year	%ΔP for 10%	%ΔQ	Total revenue
2017	N/A	N/A	2,542,754,500.00 rsd.
2018	10%	14%	3,441,240,000.00 rsd.
2019	10%	10%	3,426,500,000.00 rsd.
2020	10%	5%	3,784,946,000.00 rsd.
2021	10%	2%	4,461,842,000.00 rsd.

4. Final Considerations and Discussion

The applied methodology allowed us to forecast the dynamics of demand for express and parcel services in the territory of the Republic of Serbia Graph 4. By processing the historical data in the first phase of this methodology, a fact was established regarding the current state on the parcel and express service market. It was determined that there was the equilibrium point, i.e., it is possible for both observed segments to successfully coexist. The second phase, in which the Holt-Winters method was used, anticipates the volume of parcel and express services in the future. What was noticed was an abrupt leap in the volume of express services in the period from 2018 to 2019, the cause of which is found in the promulgated legal regulations in the electronic business operations field. For the reason of this fact, the examination of the preferences and characteristics of the services significant for the user is also included so as to improve the reliability of the forecast and reduce a possibility of the external factors influencing the validity of the results obtained. The third phase of the methodology crosses the results of the first and second phases. The third phase confirmed the results obtained in the first and second phases. It was forecast that both market segments would grow, and the activities influencing the growth of parcel services caused the growth of express services, and vice versa. However, in the period under observation, the following factors were identified as the factors that contributed to the growth of demand for express and parcel services:

- the level of the technological development of the country;
- population solvency (GDP);
- the competition development level;
- the legal regulations relating to express and parcel operators, as well as users;
- the extent of the offer available to users;
- the level of the development of small and medium-sized enterprises;
- the limited possibilities of the population movement due to the pandemic or some other extraordinary circumstances.

Taking into consideration the foregoing examination of users' preferences in the second phase, the fourth phase encompasses the analysis of the answers received from the respondents, based on which the demand price elasticity model was developed. This model was used to analyse the business operations that have

been carried out by the Public Postal Operator so far and the relationship of the percentagewise change in the prices on the percentagewise change in demand for services, all according to the predetermined demand price elasticity coefficients for the observed year. As the conclusion of the fourth phase, a fact was established that, in the period under observation, the Public Postal Operator had had the potential to achieve greater revenues when increasing the price for the services from 5% to 20%, i.e. the Operator had not used up its potentials to the maximum. These results indicate that, in the future, postal operators should pay more attention to the analysis of price elasticity and the examination of users' needs and preferences so as to achieve the maximum business operations results and meet their users' needs. The demand price elasticity factors perceived as significant for further forecasting and planning are as follows (the availability of substitutes, the temporal aspect and the degree of market competitiveness). The mentioned factors should be included in future research studies in the analysis of the demand price elasticity model since there are a large number of the private operators doing business on the same market apart from the Public Operator discussed in this paper. It is also noticed in the territory of the Republic of Serbia that the users of parcel and express services do not make a clear distinction between the mentioned services, which is not the case in the countries of the region. The reason for this situation lies in the prices for the parcel and express services that show no significant difference for the user, which they definitely should, in Serbia. Making a clear difference in this service segment is something to which more attention should be paid in the future.

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