

Modelling of Demand Determinants for Full-Time Bachelor's Degree Programs in Hospitality and Catering: The Case of Ukrainian Higher Education Institutions

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Abstract

The aim of the study is to model demand for full-time Bachelor's Degree Programs in Hospitality and Catering, taking into account the influence of the main determinants in the COVID-19 pandemic. The research used methods of algorithms, correlation and regression analysis, ANOVA, graphical method, deduction and induction, abstraction, etc. It was found that the demand for full-time Bachelor's Degree Programs in Hospitality and Catering is price elastic. It has been argued that it is useful to consider both price and non-price determinants when modelling demand for full-time Bachelor's Degree Programs in Hospitality and Catering. It is proved that the main determinants of demand for full-time Bachelor's Degree Programs in Hospitality and Catering are full-time tuition fee, maximum government order, license volume and Consolidated Ranking of a higher education institution (HEI). In this case, the applicant decides to enrol in a full-time Bachelor's Degree Program in Hospitality and Catering, guided by the optimal ratio of tuition fee and the prestige of the HEI.

Key words:

Demand, Determinant, Hospitality and Catering, Model, Price, Coefficient.

1. Introduction

The rapid development of the world market for tourism services in the XXI century has been a catalyst for tourism infrastructure. The tourism infrastructure is above all the hospitality and catering industry, whose advancement is in constant need of professionals. Therefore, the professional training of future professionals with higher education in the hospitality and catering is a key factor for the strategic development of tourism.

The COVID-19 pandemic has become a major challenge to the overall tourism industry. Thus, according to the World Tourism Organization, the loss of export revenues to international carriers in 2020 will be about 1.3 trillion US dollars, 11 times greater than the losses during

the Great Recession of 2007–2009 [1]. In the conditions of a coronavirus pandemic, quarantine measures have been implemented by governments around the world throughout 2020–2021 in order to limit large gatherings, with devastating consequences for the hospitality and catering industry. There is also a need to determine how the pandemic has affected applicants' decision to enrol in full-time Bachelor's Degree Programs in Hospitality and Catering. As predict forecast the end of the pandemic by the end of 2022 [2], an oversupply on the labour market can be foreseen precisely in the field of hospitality and catering. The determinants of demand, i.e. the main components of the applicant's decision to enrol under COVID-19 conditions, are particularly relevant for HEIs that shape the supply in the higher education market for the training of hospitality and catering professionals.

Recent research on educational programmes in hospitality and catering includes the following: the problems of tourism, hospitality and catering in a COVID-19 environment and their impact on education have been explored in [3]–[5]; an analysis of the quality of training in tourism, hospitality and catering in different countries has been carried out in [6]–[9]; the impact of higher education on the development of hospitality and catering is discussed in [10]–[13]. Also, our research is based on the works [14]–[19]. However, the problems of modelling the determinants of demand for full-time Bachelor's Degree Programs in Hospitality and Catering have been overlooked by researchers.

The main purpose of this article is to investigate the market conditions for training services of full-time Bachelor's Degree Programmes in Hospitality and Catering in the context of demand modelling under the COVID-19 pandemic.

2. Theoretical Consideration

Investigating the main determinants of demand for full-time Bachelor’s Degree Programs in Hospitality and Catering is a complex process that requires detailing the main steps. The specific case of the study is that many HEIs provide Bachelor’s Degree Programs in Hospitality and Catering. In other words, a competitive environment has been created in which both universities and applicants cannot influence the price of the service.

In the case of Ukraine, pricing in the higher education market has recently been regulated by the state, represented by the Ministry of Education and Science of Ukraine [20]. Of course, it is price that is the key determinant of demand for any service. It is therefore necessary to investigate the stochastic connection between the demand for bachelor training in hospitality and catering on a full-time basis and the price of such services. If the stochastic connection is found to be statistically insignificant, the non-price determinants of demand must be taken into account to ensure the objectivity of the study (Figure 1).

At the start there is a monitoring of the HEIs that were recruiting applicants for full-time Bachelor’s Degree Programs in Hospitality and Catering during the last admission campaign. The main source of information is the Unified State Electronic Database on Education [21].

It is also necessary to generate data arrays:

- (i) the number of applicants enrolled in the first year of full-time Bachelor’s Degree Programs in Hospitality and Catering in all Ukrainian HEIs;
- (ii) the one-year price of full-time Bachelor’s Degree Programs in Hospitality and Catering in all Ukrainian HEIs [21].

Based on the statistical data of the above indicators, a demand curve is constructed as a pairwise dependence of the number of persons enrolled in full-time Bachelor’s Degree Programs in Hospitality and Catering on the price of one year of study. Statistical criteria determine the statistical significance of the resulting model.

In the event that the price pattern of demand for full-time Bachelor’s Degree Programs in Hospitality and Catering proves to be statistically significant, it is decided that price is the key determinant of demand. Based on this result, conclusions are drawn and the study is completed.

The statistical insignificance of the obtained price demand model indicates that in addition to the price determinant, non-price determinants influence the demand for full-time Bachelor’s Degree Programs in Hospitality and Catering, which must necessarily be evaluated, so the study continues.

Thus, the price elasticity of demand for full-time Bachelor’s Degree Programs in Hospitality and Catering is first determined according to the formula [22]:

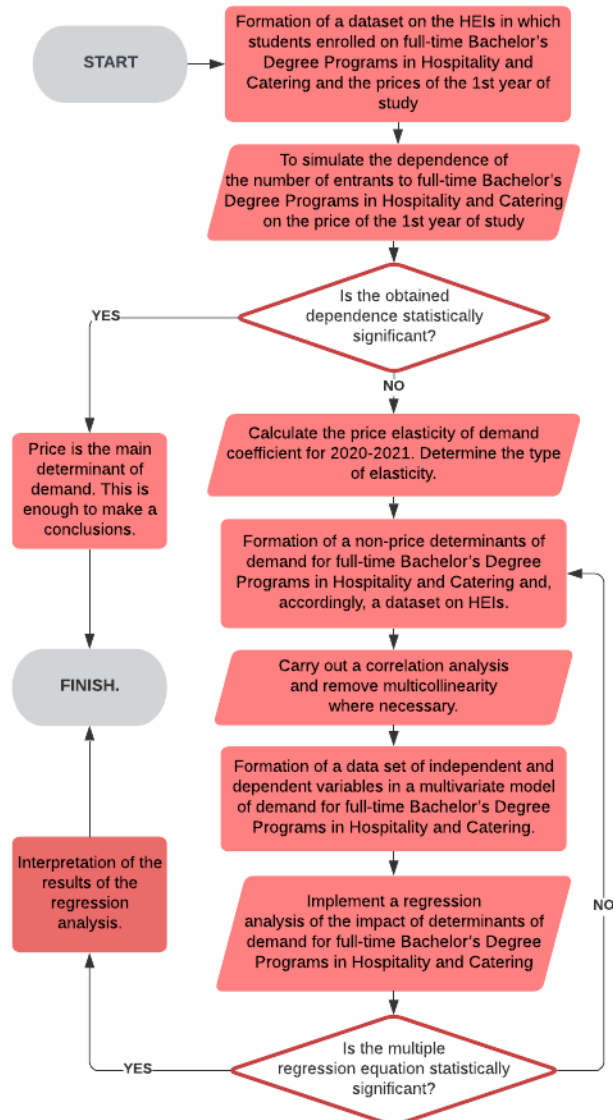


Fig. 1 Algorithm of modelling the main demand determinants for full-time Bachelor’s Degree Programs in Hospitality and Catering
 Source: Authors’ elaboration with Lucidchart.

$$E = \frac{\overline{Q}_{2021} - \overline{Q}_{2020}}{\overline{Q}_{2020}} / \frac{\overline{P}_{2021} - \overline{P}_{2020}}{\overline{P}_{2020}}, \quad (1)$$

where E is the elasticity of demand for full-time Bachelor’s Degree Programs in Hospitality and Catering, i.e. how much the number of full-time enrolments in Bachelor’s Degree Programs in Hospitality and Catering would change if the price of tuition increased by 1%;

$\overline{Q}_{2020}, \overline{Q}_{2021}$ is the average number of applicants per HEI enrolled for full-time Bachelor’s Degree Programs in Hospitality and Catering in 2020 and 2021 respectively;

P_{2020}, P_{2021} the average price of full-time Bachelor’s Degree Programs in Hospitality and Catering in 2020 and 2021 respectively.

Depending on the value of the indicator calculated by Formula (1), we determine what the price elasticity of demand is in our case. The decision is then made to identify, describe and quantify the non-price determinants of demand. It is well known that the demand for educational services is formed by applicants, while the supply is formed by HEIs. Therefore, the identification of the main determinants of demand takes place through the awareness of what exactly influenced the decision to enrol in HEIs.

An empirical analysis of the conditions under which applicants decide to enrol in HEIs is conducted for the 2021 admission campaign compared to the 2020 admission campaign. Both entry campaigns took place in the context of the COVID–19 pandemic, which needs to be taken into account in the study to ensure the validity of the results.

The objective circumstances of the applicants’ professional orientation in COVID–19 conditions through lockdowns and quarantine measures were:

- i) increasing unemployment;
- ii) increase in freelancing, remote work, and part-time work;
- iii) decrease in the population’s income;
- iv) suspension of business activities primarily in the tourism and hospitality sectors through the closure of borders between countries;
- v) panic in the population due to the coronavirus hysteria in the mass media;
- vi) lack of alternatives to study abroad;
- vii) deterioration of external independent assessment results of school leavers through pandemic distance learning, etc.

Based on the realities of life under the COVID–19 pandemic, applicants aimed to win the government’s tuition fees and therefore made their decision to enrol in higher education based on this information:

- i) the maximum number of government places in the Hospitality and Catering specialty;
- ii) price of contracted full-time education;
- iii) passing score for the Hospitality and Catering specialty in 2020;
- iv) licensed training volume of full-time students in the Hospitality and Catering specialty;
- v) prestige of a HEI;
- vi) convenience, accessibility and informativeness of the HEI website;
- vii) the distance of the HEI from the applicant’s permanent place of residence, etc.

So, on the basis of the given circumstances of professional orientation of applicants in COVID–19 conditions and the peculiarities of their decisions on

admission to HEI, the identification of the determinants of demand for full-time Bachelor’s Degree Programs in Hospitality and Catering basis in HEIs was carried out (Table 1).

Table 1: Determinants of the demand for full-time Bachelor’s Degree Programs in Hospitality and Catering

Indicator	Calculation methodology and source of information	Indicator designation
Full-time tuition fee	The HEI-approved price for full-time Bachelor’s Degree Programs in Hospitality and Catering [21]	<i>FTF</i>
Maximum government order	Publicly disclosed maximum government order for full-time Bachelor’s Degree Programs in Hospitality and Catering [21]	<i>MGO</i>
Average ranking score of all enrolments in 2020	Ratio of the sum of ranking scores of enrolled applicants to the number of enrolled applicants for full-time Bachelor’s Degree Programs in Hospitality and Catering [21]	<i>ARE</i>
License volume	Total number of full-time Bachelor’s Degree Programs in Hospitality and Catering study places according to the licence [21]	<i>LV</i>
Consolidated Ranking of a HEI	Rank of the HEI according to the Consolidated Ranking* [23]	<i>CR</i>
World Webometrics Ranking of a HEI	Rank of the HEI according to the World Webometrics Ranking* [24]	<i>WWR</i>

* the level of HEI ranking is a disincentive, i.e. the lower value of indicator, the higher HEI rank.

Source: Developed by the authors according to [21], [23], [24].

In addition to the non-price determinants of demand for full-time Bachelor’s Degree Programs in Hospitality and Catering, Table 1 also shows the price determinant. This is only done when the impact of price on demand is statistically insignificant. After identifying the determinants of demand, all HEIs providing such services in 2020–2021 are searched for. A dataset is then generated with the demand determinants shown in Table 1 for each HEI as of 2021 according to the Unified State Electronic Database on Education [21]. A correlation matrix is generated from the statistical data of the demand determinants array and multicollinearity, if any, is eliminated. Multicollinearity between demand determinants (independent variables) is established when the value of the pairwise correlation coefficient is greater than ± 0.6 ($r \notin [-0.6; 0.6]$), indicating a strong stochastic connection [25]. This situation is unacceptable in modelling, as it leads to unreliable and inaccurate results. Therefore, to eliminate multicollinearity, only those demand determinants (independent variables) with pairwise correlation coefficients between them of less than 0.6 should be kept.

In the next stage of the study, those demand determinants that remain after the elimination of multicollinearity are assumed to be independent variables. The dependent variable is the number of enrolled for full-

time Bachelor's Degree Programs in Hospitality and Catering in 2021. A multiple regression equation of the form is constructed from the data set of independent and dependent variables:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n, \quad (2)$$

where y is the dependent variable (or predicted variable); x_1, x_2, \dots, x_n is independent variables (or predictors) in multifactor linear regression; $\beta_1, \beta_2, \dots, \beta_n$ is the regressors (parameters), which show by how many units the dependent variable will change if the independent variable increases by 1 unit; β_0 is a constant that shows the value of the dependent variable when all independent variables are 0.

The final stage of the study is to assess the statistical significance of the resulting regression model on the basis of such statistical indicators:

i) multiple correlation coefficient R :

$$R = \sqrt{1 - \frac{\sum_{i=1}^m (y_j - \bar{x}_i)^2}{\sum_{j=1}^n (y_j - \bar{y})^2}}, \quad (3)$$

where y_j is the actual value of the j -th dependent variable, $j = 1, 2, \dots, n$;

\bar{x}_i is the average value of the i -th independent variable and $i = 1, 2, \dots, m$;

\bar{y} is the average value of the dependent variable;

ii) R square:

$$R^2 = 1 - \frac{\sum_{i=1}^m (y_j - \bar{x}_i)^2}{\sum_{j=1}^n (y_j - \bar{y})^2}; \quad (4)$$

iii) t -statistic:

$$t = \frac{R}{\sqrt{1-R^2}} \cdot \sqrt{n-m-1}, \quad (5)$$

where n is the number of values of the observed indicators; m is the number of independent variables in the model;

iv) F -statistic:

$$F = \frac{R^2}{1-R^2} \cdot \frac{n-m-1}{m}; \quad (6)$$

v) Durbin-Watson statistic (DW):

$$DW = \frac{\sum_{t=2}^n (e_t - e_{t-1})^2}{\sum_{j=1}^n e_j^2}, \quad (7)$$

where e_t and e_{t-1} are respectively, the adjacent points of deviation of the actual values of the dependent variables from those calculated by the regression equation [26]–[28].

After proving the statistical significance of the multivariate regression model, the results of the regression analysis are interpreted.

3. Experimental Consideration

The proposed algorithm of modelling the main demand determinants for full-time Bachelor's Degree Programs in Hospitality and Catering (see Figure 1) needs to be implemented.

First of all, a sample of Ukrainian HEIs that recruited applicants for full-time Bachelor's Degree Programs in Hospitality and Catering in 2020 and 2021 was made (Appendix A). For example, in 2020 in Ukraine, 56 HEIs from 21 regions and Kyiv Capital City were enrolling in full-time Bachelor's Degree Programmes in Hospitality and Catering. A total of 2,291 students entered the admission competition. In terms of HEIs, the Classical Private University (Zaporizhzhia region) recruited only 1 student; Lviv University of Business and Law (Lviv region) recruited 3 students; Kamianets-Podilskyi Ivan Ohiienko National University (Khmelnysk region) and National University of Water and Environmental Engineering (Rivne region) recruited 4 students each. The rest of the universities recruited more than 5 students and the most: O. M. Beketov National University of Urban Economy in Kharkiv (Kharkiv region) and Poltava University of Economics and Trade (Poltava region) recruited 110 students each; International Humanitarian University (Odesa region) recruited 150 students; Kyiv National University of Trade and Economics (Kyiv capital city) recruited 335 students – sector leader.

In 2021 4 more HEIs have licensed for full-time Bachelor's Degree Programs in Hospitality and Catering, a total of 60 HEIs from 21 regions of Ukraine and Kyiv capital city have enrolled. The number of applicants who won the admission competition decreased by 582 (–25.4 %). Thus, in 2021 there was a reduction in demand for full-time Bachelor's Degree Programs in Hospitality and Catering, 45 % of which fell to 3 HEIs: International Humanitarian University (–70 students or –46.7 %), Poltava University of Economics and Trade (–79 students or –71.8 %), Kyiv National University of Trade and Economics (–113 students or –33.7 %). The largest increase in demand was recorded at Lviv University of Trade and Economics (+17 students or +23.9 %) and National University of Food Technologies, Kyiv (+49 students or +67.1 %). Also, the National

Technical University “Kharkiv Polytechnic Institute” recruited 26 students for the first time. In addition, another 20 students were recruited from the HEIs for the first time: Open International University of Human Development “Ukraine”, Kyiv city (+10 students), Ukrainian Engineering and Pedagogical Academy, Kharkiv region (+7 students), and Ukrainian State University of Chemical Technology, Dnipropetrovsk region (+3 students).

Based on the data in Appendix A, demand pricing model for Ukrainian full-time Bachelor’s Degree Programs in Hospitality and Catering (Figure 2) are generated for 2020 and 2021 in COVID–19 conditions.

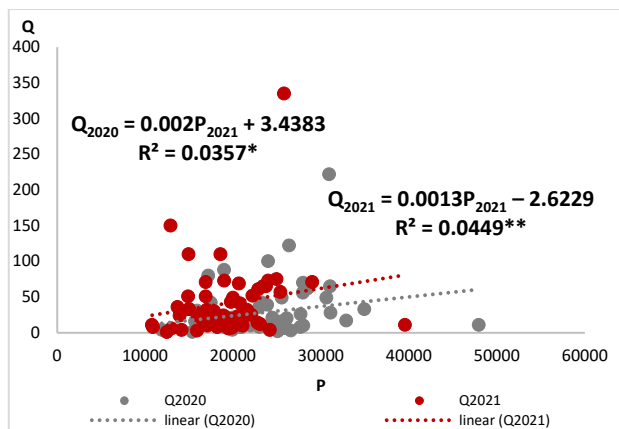


Fig. 2 The demand pricing model for Ukrainian full-time Bachelor’s Degree Programs in Hospitality and Catering

* $F = 2.04 < 4.02 = F.INV(0.95;1;55)$

** $F = 2.77 < 4.01 = F.INV(0.95;1;59)$

Source: Formed and calculated by the data in Appendix A, using Excel, formulas (4) and (6).

The demand curves in Figure 2, show a direct correlation between the demand for full-time Bachelor’s Degree Programs in Hospitality and Catering and the price of tuition. Both demand pricing model are statistically insignificant, because the current values of the F-statistics are less than the normative (critical) values. Therefore, guided by the proposed algorithm (see Figure 1), the process of modelling the main demand determinants for full-time Bachelor’s Degree Programs in Hospitality and Catering is continued.

Thus, according to the Formula (1) the price elasticity of demand for full-time Bachelor’s Degree Programs in Hospitality and Catering is:

$$E = \frac{28.5 - 40.9}{40.9} / \frac{23,559.7 - 19,204.6}{19,204.6} = -1.34. \quad (8)$$

The formula (8) shows that price elasticity of demand for full-time Bachelor’s Degree Programs in Hospitality and Catering is –1.34 %. This means that if the price increases by 1%, the demand for full-time Bachelor’s Degree

Programs in Hospitality and Catering decreases by 1.34%, i.e. it is elastic. That is, the demand for the studied service has a high sensitivity to price changes, which may indicate the existence of substitute services or the high cost of the service to the consumer, or its low value in COVID–19 conditions.

The next stage of the research is realized taking into account low statistical significance of price influence on demand (see Figure 2), high elasticity of demand (see formula 8), as well as non-price determinants of demand (see Table 1). This step, which consists of a correlation analysis, is a necessary preparation for modelling because it involves identification of the independent variables and the dependent variable, as well as identifying and eliminating multicollinearity between the independent variables (Table 2).

Table 2: Correlation matrix of demand determinants for full-time Bachelor’s Degree Programs in Hospitality and Catering

	FTF	MGO	ARE	LV	CR	WWR	EFT
FTF	1						
MGO	0.433	1					
ARE	0.387	0.557	1				
LV	0.353	0.555	0.309	1			
CR	-0.364	-0.272	-0.659*	-0.089	1		
WWR	-0.230	-0.103	-0.380	0.030	0.701*	1	
EFT	0.212	0.610	0.403	0.585	-0.335	-0.199	1

* multicollinearity ($r \notin [-0.6; 0.6]$).

Source: Formed and calculated by the data in Appendices A and B.

Table 2 summarizes the pairwise correlation coefficients between all variables of the model of demand determinants for full-time Bachelor’s Degree Programs in Hospitality and Catering. We can see that the value of the pairwise correlation coefficient between the Average Ranking Score of All Enrolments in 2020 and the Consolidated Ranking of a HEI was –0.659, and between the Consolidated Ranking of a HEI and the World Webometrics Ranking of a HEI was 0.701. Obviously, there is multicollinearity between the pairs of independent variables mentioned above, and to get rid of it we need to take some variable out of the model.

After excluding the Average Ranking Score of All Enrolments in 2020 and the World Webometrics Ranking of a HEI from the model of demand determinants for full-time Bachelor’s Degree Programs in Hospitality and Catering, a new correlation matrix was generated (Table 3).

Table 3: Correlation matrix of selected demand determinants for full-time Bachelor’s Degree Programs in Hospitality and Catering

	FTF	MGO	LV	CR	EFT
FTF	1				
MGO	0.433	1			
LV	0.353	0.555	1		
CR	-0.364	-0.272	-0.089	1	
EFT	0.212	0.610	0.585	-0.335	1

Source: Formed and calculated by the data in Appendices A and B.

As can be seen from the data in Table 3, there is no multicollinearity between the selected independent

variables, because the values of the pairwise correlation coefficients belong to the interval $r \in [-0.6; 0.6]$.

So, all the steps undertaken were preparations for the main part of the study, the multivariate modelling of the demand determinants for full-time Bachelor’s Degree Programs in Hospitality and Catering in COVID–19 conditions. The results of the multifactor modelling are shown in Figure 3.

SUMMARY OUTPUT						
Regression statistics						
Multiple R	0.727387093					
R Square	0.529091983					
Adjusted R Square	0.494844127					
Standard Error	25.71908836					
Observations	60					
ANOVA						
	df	SS	MS	F	Significance F	t
Regression	4	40876.05049	10219.01262	15.44890827	1.5757E-08	7.861019849
Residual	55	36380.93285	661.4715063			
Total	59	77256.98333				
	Coefficients	Standard Error	t Stat	P-value	Lower 95 %	Upper 95 %
Intercept	51.40096369	19.0519433	2.697938099*	0.009246007	-13.2200161	89.58191127
FTF	-0.001253577	0.000678944	-1.846362204*	0.070223254	-0.002614212	0.000107058
MGO	2.078954158	0.623265539	3.335583356*	0.001529775	0.829902106	3.32800621
LV	0.197049464	0.054082216	3.643516805*	0.000596751	0.08866628	0.305432647
CR	-0.060841106	0.02334946	-2.605675069*	0.011773364	-0.10763447	-0.014047742

* critical value of t-statistics is ± 1.67 ($=T.INV.2T(0,95;58)$ in Excel) $\Rightarrow t \notin [-1.67; 1.67]$.

Fig. 3 Results of modelling the demand determinants for full-time Bachelor’s Degree Programs in Hospitality and Catering

Source: Calculated by the authors according to Appendices A and B using Excel.

The data in Figure 3 show that the parameters of the linear multiple regression are statistically significant, as their t-statistics values are not within the critical interval $t \notin [-1.67; 1.67]$. Given the statistical significance of the parameters, a four-factor regression equation was generated based on formula (2):

$$EFT = 51.4 - 0.001FTF + 2.1MGO + 0.2LV - 0.06CR. (9)$$

The formula (9) shows that:

- i) an increase in the full-time tuition fee by 1 thousand UAH leads to a decrease in the number of students enrolled by 1 person in COVID–19 conditions;
- ii) increase in Maximum government order by 1 place leads to an increase of 2 enrolment to the full-time Bachelor’s Degree Programs in Hospitality and Catering in COVID–19 conditions;
- iii) the increase in the license volume by 10 places is accompanied by an increase in enrolment by 2 persons in COVID–19 conditions;
- iv) a 100-point increase in the Consolidated Rank of a HEI results in a decrease of 6 applicants in COVID–19 conditions.

Statistical coefficients are calculated using formulas (3)–(7) and a comparative analysis by normative (critical) levels contains Table 4.

The actual values of the multiple correlation coefficient R, R square, t-statistic and F-statistic in Table 4 exceed their normative (critical) values, indicating that the regression model is statistically significant. The actual value of the Durbin-Watson statistic approximated to 2, indicating no

autocorrelation. Consequently, the regression equation in formula (9) described in Figure 3 is statistically significant, logical and adequate, and it reliably describes the influence of the main determinants on demand for full-time Bachelor’s Degree Programs in Hospitality and Catering in COVID–19 conditions.

Table 4: Statistical coefficients of the four-factor regression model of demand determinants for full-time Bachelor’s Degree Programs in Hospitality and Catering

Statistical coefficient	Critical value	Actual value
1. Multiple correlation coefficient R	0.7	0.73
2. R square	0.5	0.53
3. t-statistic	1.67	7.89
4. F-statistic	2.54	15.45
5. Durbin-Watson statistic (DW)	2	1.82

Source: Formed and carried out calculations according to the data given in Figure 2 and [26]–[28].

The final stage of the algorithm of modelling the main demand determinants for full-time Bachelor’s Degree Programs in Hospitality and Catering consists in interpreting the results of the regression analysis. To do this, partial elasticity coefficients of the independent variables of the multiple regression model are calculated using the formula:

$$\varepsilon_{x_i} = \beta_i \frac{x_i}{y}, \quad (10)$$

where ε_{x_i} is the partial elasticity coefficients of i -th independent variable;

β_i is the parameter of i -th independent variable;

x_i is the average value of i -th independent variable;

y is average value of the dependent variable.

The values of partial elasticity coefficients of the independent variables calculated by formula (10) are shown in Figure 4.

Figure 4 shows actual values of the partial elasticity coefficients of independent variables of the model of demand determinants for full-time Bachelor’s Degree Programs in Hospitality and Catering. They are the main result of regression analysis, and their interpretation in COVID–19 conditions is as follows:

- i) a 1 % increase in the maximum government order leads to a 0.43 % increase in enrolment in full-time Bachelor’s Degree Programmes in Hospitality and Catering;
- ii) a 1 % increase in the license volume leads to a 0.49 % increase in enrolment in full-time Bachelor’s Degree Programmes in Hospitality and Catering;

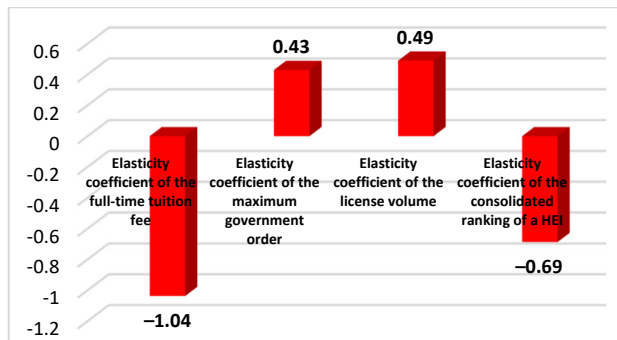


Fig. 4 Partial elasticity coefficients of independent variables in four-factor regression model of demand determinants for full-time Bachelor's Degree Programs in Hospitality and Catering

Source: Formed and calculated by the data in Appendix A–B, using Excel and formula (10).

- iii) a 1 % increase in the consolidated HEI ranking score leads to a 0.69 % decrease in enrolment in full-time Bachelor's Degree Programmes in Hospitality and Catering;
- iv) a 1 % increase in the full-time tuition fee leads to a 1.04 % decrease in enrolment in full-time Bachelor's Degree Programmes in Hospitality and Catering.

Consequently, the main determinants of demand for full-time Bachelor's Degree Programs in Hospitality and Catering are tuition fees and the prestige of the HEI in COVID–19 conditions.

4. Conclusion

Thus, in modelling the determinants of demand for full-time Bachelor's Degree Programs in Hospitality and Catering, the following results were obtained.

Firstly, the algorithm of modelling the main demand determinants for full-time Bachelor's Degree Programs in Hospitality and Catering has been developed and implemented.

Secondly, the demand pricing models for Ukrainian full-time Bachelor's Degree Programs in Hospitality and Catering that show a direct correlation are statistically insignificant.

Thirdly, the demand for full-time Bachelor's Degree Programs in Hospitality and Catering is price elastic. Therefore, the services studied are expensive or not valuable enough for consumers, and have substitutes.

Fourthly, the multivariate model of the demand determinants for full-time Bachelor's Degree Programs in Hospitality and Catering, derived from the correlation and regression analysis performed is statistically significant, logical and appropriate.

Finally, the key factors in an applicant's decision to enrol in a full-time Bachelor's Degree Programs in Hospitality and Catering in the COVID–19 conditions were the tuition fee the lower and the prestige of the HEI the higher.

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Appendix A

Input data for the demand pricing model and elasticity for full-time Bachelor's Degree Programs in Hospitality and Catering (by Ukrainian HEIs)

Higher education institution	Enrolled for full-time, persons		Full-time tuition fee, UAH	
	Q ₂₀₂₁ [*]	Q ₂₀₂₀	P ₂₀₂₁	P ₂₀₂₀
Alfred Nobel University	33	52	34,950	22,228
Bohdan Khmelnytskyi Cherkasy National University	21	32	24,500	17,000
Cherkasy State Technological University	13	18	21,240	17,900
Classical Private University	1	1	15,400	12,480
Dmytro Motomyi Tavria State Agrotechnological University	10	24	19,200	13,950
Dnipro Humanities University	16	36	15,700	13,700
International Humanitarian University	80	150	17,200	12,900
Ivan Franko National University of Lviv	62	65	28,500	23,748
Kamianets-Podilskyi Ivan Ohienko National University	4	4	19,950	14,150
Kharkiv State University of Food Technology and Trade	8	23	27,680	20,570
Kherson State Agrarian and Economic University	21	33	20,000	15,000
Kherson State University	14	19	25,850	19,990
Khmelnitskyi National University	21	33	20,000	15,000
Khmelnitskyi Cooperative Trade and Economic Institute	4	14	25,200	22,800
King Danylo University	8	24	21,000	18,900
Kyiv National University of Culture and Arts	11	11	47,950	39,550
Kyiv National University of Technologies and Design	39	49	23,900	20,000
Kyiv National University of Trade and Economics	222	335	30,950	25,810
Kyiv Professional College of Tourism and Hospitality	14	20	24,690	19,500
Kyiv University of Culture	42	71	17,500	29,000
Kyiv University of Tourism, Economics and Law	5	12	25,200	23,100
Lesia Ukrainka East European National University	12	17	23,100	21,000
Luhansk Taras Shevchenko National University	5	6	16,000	13,000
Lutsk National Technical University	8	13	19,000	18,000
Lviv State University of Physical Culture	42	41	23,300	20,800
Lviv University of Business and Law	5	3	24,900	15,900
Lviv University of Trade and Economics	88	71	19,000	16,900
Mukachevo State University	14	10	24,700	21,090
Mykhailo Tuhan-Baranovskyi Donetsk National University of Economics and Trade	22	30	17,850	17,850
Mykolaiv National Agrarian University	11	21	21,180	20,640
National Technical University "Kharkiv Polytechnic Institute"	26	0	27,700	0
National University of Food Technologies	122	73	26,400	24,000
National University of Life and Environmental Sciences of Ukraine	70	61	27,980	22,880
National University of Water and Environmental Engineering	10	4	28,000	24,200
O. M. Beketov National University of Urban Economy in Kharkiv	100	110	24,000	18,590
Odesa National Academy of Food Technologies	65	75	31,050	24,950
Odesa National University of Economics	28	57	31,100	25,400
Oles Honchar Dnipro National University	17	25	32,900	22,100
Open International University of Human Development "Ukraine"	10	0	22,000	0
Pavlo Tychna Uman State Pedagogical University	13	11	19,000	10,800
Poltava University of Economics and Trade	31	110	15,930	14,950
Rauf Abliazov East European University	4	8	11,900	10,900
Simon Kuznets Kharkiv National University of Economics	56	69	27,950	20,671
Taurida National V. I. Vernadsky University	8	7	23,000	19,900
Ternopil Ivan Puluj National Technical University	10	18	20,300	16,730
Ternopil Volodymyr Hnatiuk National Pedagogical University	2	6	25,080	19,482
Ukrainian Engineering and Pedagogical Academy	7	0	25,790	0
Ukrainian State University of Chemical Technology	3	0	26,600	0
Uman National University of Horticulture	8	19	20,760	16,490
University of Customs and Finance	49	65	30,635	23,436
Uzhhorod National University	15	24	20,000	16,000
V. N. Karazin Kharkiv National University	49	43	25,550	19,760
Vasyl Stefanyk Precarpathian National University	36	73	23,000	19,000
Vynnytsia National Agrarian University	21	29	18,000	14,000
Volodymyr Dahl East Ukrainian National University	6	10	25,930	17,100
West Ukrainian National University	20	32	26,105	21,600
Zaporizhzhia Polytechnic National University	23	51	19,100	14,900
Zaporizhzhia National University	16	8	25,534	18,204
Zhytomyr Ivan Franko State University	11	18	16,000	19,200
Zhytomyr Polytechnic State University	18	51	20,200	16,900
On average	28.5	40.9	23,559.7	19,204.6

* Indicator designations taken from formula (1).

Source: Formed and calculated by the data in [21].

Appendix B

Non-price determinants of demand for full-time Bachelor's Degree Programs in Hospitality and Catering (by Ukrainian HEIs) in 2021

Higher education institution	MGO*	ARE	LV	CR	WWR
Alfred Nobel University	0	147.19	50	311	7,215
Bohdan Khmelnytskyi Cherkasy National University	5	148.29	50	155	6,672
Cherkasy State Technological University	5	153.41	60	301	14,815
Classical Private University	0	116.89	30	586	16,296
Dmytro Motomyi Tavria State Agrotechnological University	5	140.65	55	364	4,890
Dnipro Humanities University	0	133.12	40	587	24,422
International Humanitarian University	5	134.73	80	396	25,108
Ivan Franko National University of Lviv	13	167.10	85	26	3,606
Kamianets-Podilskyi Ivan Ohienko National University	5	145.74	50	395	11,835
Kharkiv State University of Food Technology and Trade	5	143.78	45	455	15,686
Kherson State Agrarian and Economic University	5	139.29	50	462	8,160
Kherson State University	5	138.77	25	290	5,623
Khmelnytskyi National University	5	151.74	60	258	8,552
Khmelnytskyi Cooperative Trade and Economic Institute	0	133.29	10	600	24,918
King Danylo University	0	137.36	30	489	22,012
Kyiv National University of Culture and Arts	23	158.74	350	332	11,705
Kyiv National University of Technologies and Design	5	136.16	50	183	3,427
Kyiv National University of Trade and Economics	42	166.56	390	175	4,179
Kyiv Professional College of Tourism and Hospitality	25	138.43	50	600	30,897
Kyiv University of Culture	0	139.28	210	502	30,897
Kyiv University of Tourism, Economics and Law	0	125.50	150	600	20,643
Lesia Ukrainka East European National University	5	151.20	25	111	3,768
Luhansk Taras Shevchenko National University	5	148.52	100	367	4,365
Lutsk National Technical University	5	139.03	30	309	5,397
Lviv State University of Physical Culture	5	151.41	75	392	13,702
Lviv University of Business and Law	0	144.07	20	437	22,205
Lviv University of Trade and Economics	0	144.54	90	312	10,311
Mukachevo State University	5	134.21	30	526	15,777
Mykhailo Tuhan-Baranovskyi Donetsk National University of Economics and Trade	8	137.15	61	415	18,804
Mykolaiv National Agrarian University	5	148.13	60	402	6,376
National Technical University "Kharkiv Polytechnic Institute"	0	140.11	40	118	2,331
National University of Food Technologies	11	150.98	125	154	4,221
National University of Life and Environmental Sciences of Ukraine	5	144.75	70	122	2,424
National University of Water and Environmental Engineering	5	143.27	20	234	4,373
O. M. Beketov National University of Urban Economy in Kharkiv	12	156.37	100	229	3,715
Odesa National Academy of Food Technologies	14	149.58	100	244	4,771
Odesa National University of Economics	10	152.19	70	262	11,080
Oles Honchar Dnipro National University	5	152.14	40	84	2,874
Open International University of Human Development "Ukraine"	0	132.00	15	470	8,438
Pavlo Tychyna Uman State Pedagogical University	5	139.74	30	438	9,552
Poltava University of Economics and Trade	0	139.16	250	399	11,776
Rauf Abliazov East European University	0	132.18	30	600	19,094
Simon Kuznets Kharkiv National University of Economics	5	151.16	275	199	11,364
Taurida National V. I. Vernadsky University	11	160.90	50	169	30,897
Ternopil Ivan Puluj National Technical University	5	153.11	30	276	3,304
Ternopil Volodymyr Hnatiuk National Pedagogical University	5	139.55	15	208	11,062
Ukrainian Engineering and Pedagogical Academy	0	130.90	50	453	14,087
Ukrainian State University of Chemical Technology	0	132.34	20	249	4,202
Uman National University of Horticulture	5	142.52	25	482	14,799
University of Customs and Finance	5	153.17	59	433	13,213
Uzhhorod National University	5	155.53	60	110	2,981
V. N. Karazin Kharkiv National University	14	164.74	50	33	2,549
Vasyl Stefanyk Precarpathian National University	5	142.56	80	104	4,495
Vinnitsia National Agrarian University	5	141.92	30	449	14,329
Volodymyr Dahl East Ukrainian National University	5	148.84	25	299	5,403
West Ukrainian National University	5	146.72	40	146	3,441
Zaporizhzhia Polytechnic National University	5	136.50	30	268	3,947
Zaporizhzhia National University	5	154.56	36	176	3,842
Zhytomyr Ivan Franko State University	5	159.58	30	319	5,664
Zhytomyr Polytechnic State University	5	152.73	40	224	4,782

* Indicators designations taken from Table 1.

Source: Formed and calculated by the data in [21], [23], [24].



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