

**IDENTIFYING PROFITABILITY DETERMINANTS IN THE HOTEL INDUSTRY PRE AND DURING THE COVID-19 PANDEMIC IN THE REPUBLIC OF NORTH MACEDONIA**

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**ABSTRACT**

*This study aims to explore the impact of the current challenges that the hotel industry is experiencing with the COVID-19 pandemic. The empirical analysis identifies the key determinants that have a significant impact on the improvement of the current situation of the hotel industry. The paper elaborates the ongoing situation of the pandemic in the global service industry; Special attention is given of the pre-pandemic and in the pandemic situation in the hotel industry in North Macedonia.*

*The present pandemic resulted in global challenges, especially affecting the economy and the healthcare system of different countries. It has also posed spillover effects on the global industries, including tourism and travel that nowadays are the major contributors to the service industry worldwide. Since tourism had a great impact on raising the economy in many countries, national economy included, this research main goal is to identify the determinants that have affected the hotel profits the most in this time of pandemic through the appropriate literature and theoretical background, and with empirical analysis. The analysis includes exploratory factor analysis, reliability analysis, and regression model. For this analysis, a data from 120 questionnaires were used. Management from different hotels from all parts of the country were interviewed.*

*Revealing the main determinants that affect the improvement of the existing situation in the hotel industry could contribute to the improvement of the decision-making process in an emerging crisis environment. It can also trigger the most affected parts of the hotel businesses and point out to segments which need the most attention. Lessons learned can contribute to better preparation for similar risks in the future.*

**Keywords:** *tourism, firm performance, exploratory factor analysis*

**JEL classification:** *L38, L25, C38*

**1. INTRODUCTION**

Hospitality is an important part of the world economy and contributes significantly to increasing economic growth and development (Gössling, et al., 2020). Due to the pandemic with the COVID-19 virus, the world economy still experiences enormous instability. Restrictions and protocols by the governments have contributed to a significantly reduced ability to travel from one country to another, and thus a ban on staying or organizing events in some of the catering facilities and hotels. The outcome was reduction of income in the hotels according to the reduced work, and thus to the reduction of the staff - the need for human capital. However, the process of returning to the same way of life as before the pandemic is slowly starting and governments are easing all these restrictions and measures, they recommend working with reduced capacity and with strict guidelines for social distancing.

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Hospitality, more specifically hotels, does face high operating costs, as their survival largely depends only on the increase in demand for their services by consumers. To find out what will make them return to the previous state great efforts and detailed research are needed on the factors that would influence the improvement of the hotel industry in the years of the pandemic.

The primary goal of this research is to identify the main factors that directly influence the profitability of the hotels, as part of the hospitality industry in Republic of North Macedonia. For better understanding of the pandemic influence, the same factors are investigated in pre-pandemic period (2019) and in the height of the pandemic (2020) by using primary data collected directly from the hotel management. The analysis results appear to have different outcomes in the pre-pandemic and in the pandemic period.

The paper is structured in the following manner: the first part of the paper gives a brief introduction into the hotel industry during the pandemic and a short explanation of the results from the analysis. The second part of the paper explores the current literature review of the similar research and their findings. The third part explains the theoretical foundations of the exploratory factor analysis. The complete analysis with description of the data, methodology, questionnaire and results from the factor analysis, reliability analysis and logistic regression models is presented in the fourth part. The last, fifth section contains discussion and the main conclusion from the research.

## **2. LITERATURE REVIEW**

The COVID-19 pandemic changed the hotel industry completely and opened a new area of research where the main determinants of profitability are to be examined to keep a sustainable growth. Great challenges were presented both to hotel managers and researchers. As the topic becomes more important, there are number of papers from research in diverse economies that explore the profitability factors. Profitability performance analysis on Malaysian hotel industry during Covid-19 pandemic is analyzed by (Said, et al., 2021). They use four variables such as leverage, liquidity, net asset turnover and size of the company for hotels listed under Bursa Malaysia. Their results confirm that leverage and net asset turnover have a positive influence on the profitability, while liquidity and company size seem to cause a decrease in the company's profit.

The impact of the pandemic shock onto the hotel industry in Taiwan has been analyzed by (Zhang, et al., 2022). Their empirical results emphasize the need for the hotel industry of Taiwan to take the rolling adjustment and optimization of financial flexibility after the COVID-19 pandemic for long-term sustainability.

Interesting approach in analysis of the hospitality industry reaction to the pandemic can be found in (Piga, et al., 2022). They investigate short-term recovery strategies during the pandemic in two environments differently hit by COVID-19, London, and Munich. They find that hotels with a more managerial approach have more proactively applied dynamic pricing strategies. Hoteliers also make use of a more streamlined booking portfolio to cope with the crisis.

To define the determinants of hotel profitability in China, (Xian, 2021) introduces new construct (variable) – Crisis Severity into a Partial Least Model. He collects data from hotel managers across the country. The conclusion was drawn the crisis severity significantly influences the hotel performance.

Non-financial factors affecting the operational performance of hospitality industry in Vietnam is analyzed by (Phan, et al., 2021). Data were collected from 346 Vietnam's hospitality companies. Using structural equation modelling they find service quality, flexibility and resource utilization have positive effect on the company's performance. Service quality had an indirect impact on the performance.

Number of papers examine the hospitality performance and its determinants. Analysis for Portuguese hotel industry performance for period 2016 to 2020 can be found in (Lima Santos, et al., 2021). The response to coronavirus pandemic from the Indian hospitality and tourism business was analyzed by (Sanjeev & Tiwari, 2021). Their state that the pandemic has prompted advances in technology, profit management, training, service blueprinting an online education. Comparison of financial performance before after pandemic in the hospitality business in Indonesia was done by (Malikah, 2021). The analysis did not seem to find a significant effect before and during pandemic by analyzing the solvency ratios.

### 3. THEORETICAL FOUNDATIONS AND POSTULATES OF EXPLORATORY FACTOR ANALYSIS

Many scientific studies are characterized using numerous variables (Rietveld & Van Hout, 2011). Examples of such research are studies using questionnaires. Due to the large amount of data obtained, the research can become very complex. But despite the great complexity brought by the huge database, one/some of the variables can measure a different aspect of the same variable (Kassambara, 2017).

The factor analysis was created to avoid such situations. Applying factor analysis requires a large set of variables, in which there is the potential for the data to be reduced or summarized, using a smaller set of factors or components (Harman, 1976). Factor analysis attempts to group interrelated variables into several sets of underlying variables (Gray, 2017). Specifically, the purpose of factor analysis is to reduce the dimensionality of the original database and to interpret the new space, covered by a reduced number of new dimensions, which should be the basis of the old ones or to explain the variance in the observed variables in relation to of the underlying latent factors. Thus, not only factor analysis offers the opportunity to gain a clear view of the data base, but also increases the possibility of using the result in subsequent analyzes (Tuan, et al., 2017).

According to the factors, factor analysis can be confirmatory and exploratory. Confirmatory factor analysis involves entering a predetermined number of factors for analysis and which variables are most likely to be correlated within each factor. It indicates clear expectations about which factors will be encountered in the analysis and which variables may influence the factors. Unlike confirmatory analysis, exploratory analysis or exploratory factor analysis aims to explore the relationships between variables and does not have an *a priori* determined number of factors. In the exploratory factor analysis, the final number of factors is determined according to the obtained data and then the factors are interpreted.

### 4. DATA AND METHODOLOGY

#### 4.1. Questionnaire

For this purpose, 43 questions have been prepared, which cover various aspects of hotel operations, in normal conditions as well as in pandemic conditions. The complete questionnaire and the calculated descriptive statistics for each question are shown in Table 1:

*Table1. Questionnaire used for the empirical analysis*

Section/question	M	$\sigma$
<b>INSURANCE AND FINANCIAL RECOVERY</b>		
1. Assess the extent of business disruption	1,80	1,135
2. Assess supply chain demand	1,97	1,045
3. Degree of cancellation of potential events during the pandemic	1,75	1,272
4. Degree of cancellation of potential accommodations, scheduled rooms for day/night stay during the pandemic	1,83	1,110
<b>SUPPLY AND GLOBAL TRADE</b>		
5. How do supply and demand react to each other during the pandemic with the COVID-19	1,78	0,963

virus specifically on the hotel you represent?		
6. Do you think that a larger number of tourists prefer private accommodation to a hotel in the Republic of North Macedonia during the pandemic?	3,15	1,241
<b>HEALTH AND WELL-BEING OF EMPLOYEES AND GUESTS</b>		
7. What is the level of communication between you as a subsidiary and foreign client (organizations, individuals) during the pandemic?	2,58	1,418
8. Do your colleagues/employees take care of their health and the health of everyone around them by wearing protective masks and using appropriate disinfectants?	4,83	0,545
9. Are your colleagues/employees enabled to use the public health system in the country?	4,78	0,611
10. Are the hotel employees who are most exposed to the virus provided adequate protection by managing their shifts, their distance from each other and the distance from guests?	4,82	0,550
<b>SKILLED STAFF AND WORKFORCE</b>		
11. Is the approach of the superiors to the employees of the hotel appropriate if one of the employees needs to be sent to home isolation or treatment?	4,88	0,434
12. What is the degree of interaction between staff and mutual aid in stressful situations?	4,41	0,815
13. What is the representation of individuals necessary for a specific job position without significant experience?	3,25	1,087
14. What is the extent of business trips, in order to acquire appropriate knowledge in or outside the country?	2,21	1,414
15. Is there a presence of a sense of hierarchy among employees (through expressions of awe, fear, tears, flattery, etc.)?	4,36	0,986
16. Degree of pleasant relationship between designated boss/manager and co-worker in a specific department:	4,43	0,886
<b>WAGES OF EMPLOYEES</b>		
17. What is generally the percentage of employees' monthly incomes according to their employment contracts during the pandemic?	3,50	1,328
18. Do the employees receive lower monthly income according to the contract, the same or additional bonuses according to the income generated by the hotel during the pandemic?	3,31	1,377
19. Is there a drastic difference between the pay of co-workers and managers?	3,98	1,202
20. Rate the extent of hotel employees leaving or employees whose contracts were not extended solely due to the current pandemic situation:	3,58	1,424
<b>ROOM MAINTENANCE</b>		
21. Is the maintenance of the rooms suggested (by you) to be double or more times during the day, according to the situation?	4,38	1,030
22. Is the maintenance of the rest of the rooms twice or more times during the day, according to the situation?	4,58	0,857
23. Placement of disinfectants throughout all rooms in the hotel (lobbies, toilets, conference rooms, rooms, corridors, terraces):	4,81	0,584
24. Placement of protective masks throughout all rooms in the hotel (lobbies, toilets, conference rooms, rooms, corridors, terraces):	3,70	1,526
25. Degree of consumption of cleaning products during a pandemic in relation to before the start of the pandemic:	4,48	0,830
<b>BRAND PROTECTION</b>		
26. If you are available on Booking, Airbnb, or a similar site for the same services, evaluate the feedback from the guests accordingly:	3,69	1,314
27. How many types of promotional materials (flyers, banners, billboards, television ads, radio ads) does your hotel have?	2,78	1,429
28. On how many social media (Instagram, Facebook, LinkedIn, Glassdoor, Hosco) is your hotel available?	2,83	1,074
29. Rate the level of customer user experience (UX - User Experience) of your website (or decency of your Facebook/Instagram profile if you don't have a website):	3,51	1,160
30. What is the degree of observance of the hotel's standards (designated in Brand Identity/Awareness) by the hotel's employees?	4,29	0,844
<b>FINANCIAL INVESTMENTS</b>		
31. Regarding 2019, how do you evaluate your investment in capital assets?	3,08	1,241
32. Regarding 2019, how do you evaluate your investment in working capital?	2,97	1,130
33. Regarding 2019, how do you evaluate your investment in human capital?	3,00	1,360
<b>RISK</b>		
34. How often do you elaborate on possible risks for your hotel?	3,73	1,130

35. How often have you been able to identify a given risk?	3,63	0,926
36. How quickly is your branch/hotel able to recover from an accident?	3,58	1,149
<b>AUTHORITY AND PROTOCOLS</b>		
37. Degree of observance of the protocols designated by the Government in terms of hygiene in the hotel:	4,77	0,546
38. Degree of observance of the protocols designated by the Government regarding the holding of events in the hotel:	4,62	0,801
39. Degree of observance of the protocols designated by the Government regarding stay in the hotel:	4,79	0,500
<b>TECHNOLOGY AND INFORMATION SECURITY</b>		
40. Do you have adequate software for processing reservation data?	4,16	1,283
41. Do you own the appropriate software for processing data and organizing events?	3,62	1,409
42. Do you have a suitable VR/360° panoramic view on your website or social media?	2,68	1,656
43. Do you have suitable digital elements (screens/totems) for displaying promotional materials, advertisements, and road signs in the hotel?	3,46	1,500

*Source: Authors' calculations*

## 4.2 Factor analysis

The correlation analysis leads to conclusion that all variables have a correlation coefficient greater than 0.3, which means that at this stage there will be no variables that would be removed from further analysis. Also, there is no correlation coefficient higher than 0.9, which means that the problem of multicollinearity between the variables does not exist.

The level of the correlation coefficients is also highly significant, which is a good indicator of forming factors in further analysis.

The value of the Kaiser-Meyer-Olkin measure of the appropriateness of the sample selection is 0.607, while it is known that a minimum of 0.5 is recommended (Kaiser, 1974), so for the conducted analysis it can be said that the measure is satisfactory, that is the sample size is adequate for a factor analysis.

The Bartlett's Test tests the null hypothesis that the source correlation matrix is a unit matrix. For the factor analysis to be successful, it is necessary to have certain relationships between the variables, and if the correlation matrix is a single matrix, then all the correlation coefficients will be zero. Hence, it is necessary to have a test that will verify that the correlation matrix is not a single matrix, which would mean that there are some dependencies between the variables that would be included in the analysis. In the example, the value of the test is 3,053.279 ( $p=0.000$ ), whereby it can be concluded that the alternative hypothesis is accepted, which states that the correlation matrix is no single, there are dependencies between the variables, so the factor analysis is appropriate.

The next part of the analysis covers the factor extraction. The first part of this process is to determine the linear components within the considered sample, or the so-called eigenvectors, by calculating the eigenvalues of the correlation matrix. It is known that there are as many components (eigenvalues) in the correlation matrix as there are variables, but most of them will not be significant. To determine the significance of a particular vector one should check the magnitude of the corresponding eigenvalue. Then, a certain criterion can be applied to determine which factor will be retained in the analysis and which will be rejected as insignificant. In the results obtained with the statistical software SPSS, and shown in the table below, a list of eigenvalues is obtained, that belong to each factor before extraction, after extraction and after rotation:

Before extraction, 43 linear components were identified in the sample. The eigenvalues calculated for each factor represent the variance explained by a certain linear component, and apart from the absolute value, the percentages of the explained variance are also found in the table (for example, factor 1 explains 15.72 % of the total variance). Often the first few factors explain most of the variance, while the remaining factors explain much smaller portions of

the total variance. In the further procedure, all factors that have eigenvalues greater than 1 are extracted, thus the number of factors that will be considered further is 13. Eigenvalues belonging to these 13 factors (expressed in absolute values and as percentages of the total variance) in the column "Sum from the extraction of the squared loadings". In the last part of the table is the column "Sum of the rotation of the squared loads", where the eigenvalues of the factors after the rotation are shown. The role of the rotation is to optimize the factor structure and in doing so equalize the relative importance of the thirteen factors. Before the rotation, factor 1 contained 15.72% of the total variance, while after the rotation this percentage was reduced to 7.52%. The factor matrix and the scree plot also show that only 13 factors should be extracted (available upon request).

After confirming the number of factors and the reliability of the model, the following results concern the rotation of the factors. The rotated factor matrix containing the factor loadings for each variable on each factor is available upon request.

The variables are ordered according to the magnitude of their factor loadings. If the rotated factor matrix is compared with the factor matrix, before the rotation, most of the variables had high loading values only on the first factor, while the values of the other factors are lower. With the rotation of the factor structure, the situation is becoming clarified.

Based on the obtained results, despite the fact that 13 factors were initially obtained in the analysis, only 8 of them can be defined in a logical factor (construct). In the proposed factor 9, the questions are significantly differ to derive a logical context, while in the proposed factors 10, 11, 12 and 13 there is only one question, which could not be interpreted as a factor which should be a set of several variables.

The most important factors that have a significant role in the hotel industry during a pandemic are the following:

- ✓ Factor 1 – Investments of the hotels;
- ✓ Factor 2 – Health care in hotels;
- ✓ Factor 3 – Social media and promotion;
- ✓ Factor 4 – Adherence to government protocols;
- ✓ Factor 5 – Cancellations of arrangements;
- ✓ Factor 6 – Salaries and income;
- ✓ Factor 7 – Hygiene and protection;
- ✓ Factor 8 – Digital equipment and promotion.

#### 4.3 Reliability analysis

A generally accepted rule of thumb says that a reliability coefficient value of 0.6 – 0.7 indicates an acceptable level of reliability, a value greater than 0.8 indicates an even better level of reliability. However, values greater than 0.95 are not always acceptable because they may indicate redundant variables in the factor (Hulin, et al., 2001). It can be seen from the table that all factors have a reliability coefficient value greater than 0.6, which indicates that there is internal consistency in the factors, that is, the groups of questions within the factors are well connected as a group:

*Table 2. Cronbach Alpha value for extracted factors*

Factors	Cronbach alpha	Number of variables
Factor 1 – Hotel investments	0,853	3
Factor 2 – Health care in hotels	0,824	4
Factor 3 – Social media and promotion	0,619	2
Factor 4 – Adherence to government protocols	0,818	3

Factor 5 – Cancellations of arrangements	0,804	2
Factor 6 – Salaries and income	0,808	2
Factor 7 – Hygiene and protection	0,637	3
Factor 8 – Digital equipment and promotion	0,703	4

*Source: Authors' calculations*

#### 4.4 Logistic regression

After the independent variables have been obtained by the exploratory factor analysis, and they have been confirmed by the reliability analysis, the next part of the analysis is determining how these factors affect the achieved financial results of the hotel operations. The independent variables are known to be shown on an interval scale, but the dependent variables used in the analysis to measure financial results – realized profit in 2019 (before the pandemic) and realized profit in 2020 (at the height of the pandemic) are shown as categorical variables, i.e., category of realized profit up to 3 million euro and category of realized profit over 3 million euro.

Logistic regression is a multiple regression where the dependent variable is a categorical variable. Due to the fact that in the research the dependent variable is categorical, logistic regression is used to determine the dependence between financial performance and the group of previously determined factors significant for operations in pandemic conditions.

Logistic regression is largely like straight-line regression, with the difference that, instead of predicting the value of the dependent variable based on the values of the independent variables, logistic regression predicts the probability that an observation will be in a particular category of the dependent variable, if known values for the independent variables for that same observation.

Two logistic regressions were carried out in the analysis, where in the first model the dependent variable is the profit made by the hotels in 2019, while in the second model the dependent variable is the profit made by the hotels in 2020. The independent variables remain the same in both models.

By comparing the obtained results, an effort will be made to explain the determinants that positively affect the financial results before and during the pandemic. It should be noted that when answering the questionnaire, some of the respondents did not give the answer that refers to the dependent variables, more precisely, 41 respondents (out of 120) did not answer the question about the profit made in 2019 and 17 respondents (out of 120) did not answer the question about the realized profit in 2020. This could be interpreted as a relative limitation of the obtained results, especially in the case of the first model.

*Table 3. Classification table for the first model (block 0)*

Observed values	Predicted values		Accuracy percentage
	Profit 2019		
Profit 2019	Up to 3 million euro	Over 3 million euro	
Up to 3 million euro	0	23	0.0
Over 3 million euro	0	56	100.0
Total percentage			70.9

*Source: Authors' calculations*

*Table 4. Classification table for the second model (block 0)*

Observed values	Predicted values		Accuracy percentage
	Profit 2019		
Profit 2019	Up to 3 million euro	Over 3 million euro	

Up to 3 million euro	82	0	100.0
Over 3 million euro	21	0	0.0
Total percentage			79.6

*Source: Authors' calculations*

The tables below show the results obtained with the statistical software SPSS, which indicate how accurately the model groups the observations into appropriate groups (categories) in the first stage of the analysis. This percentage in the first model is 70.9%, while in the second is 79.6%, which is satisfactory, considering that values of 50% and above are considered good. When performing logistic regression, groups of statistics are calculated that belong to two blocks, block 0 and block 1. Block 0 starts the analysis by first showing the classification tables, the model where only the constant is included in it and a table showing the variables not included in the model. In both models the constant is statistically significant, in the first model  $b_0 = 89$  ( $p = 0.0 < 0.05$ ) and in the second model  $b_0 = 1.362$  ( $p = 0.0 < 0.05$ ). In addition, tables are shown for the variables that are not entered in the equations of the model, where it is necessary to consider the overall statistics. This statistic tells us whether the variables not in the model are statistically significant from zero, that is, whether adding one or more of these variables to the model would significantly improve its predictive power. This statistic is also called the residual Chi-square statistic, and if the  $p$ -value is greater than 0.05 it would mean that including all variables in the model (which were previously excluded, as in the first block 0) would not cause a significant improvement in the predictive power of the model.

In the analysis, the value of the residual Chi-square statistic in the first model is 34.44 ( $p = 0.0 < 0.05$ ), while in the second model it is 35.192 ( $p = 0.0 < 0.05$ ), which indicates that the inclusion of independent variables in both models would significantly improve their predictive power.

In the same direction, that is, to determine how much better the model has more power for predicting the dependent variable, the -2 Log likelihood statistic is also used. This statistic is calculated in the section called Iteration history, and is calculated in the initial block 0, where the model is composed only of the constant, and is further calculated in block 1, where the model is expanded with all independent variables. If the model increases its predictive power by including the remaining independent variables, the value of the -2 logarithm of the maximum likelihood statistic should decrease. In the first model that takes profit in 2019 as a dependent variable, the value of the statistic -2 logarithm of the highest probability in the initial model where only the constant is entered is 95.349, while when expanding the model with eight variables this statistic decreases to 60.174 for the first iteration step, 48.14 for the second iteration step, 43.341 for the third iteration step, 41.392 for the fourth iteration step, and 40.994 for the remaining four iteration steps. In the second model where the dependent variable is the profit for 2020, the value of the statistic -2 logarithm of the highest probability in the initial model where only the constant is entered is 104.729, while with the extension of the model with the independent variables this statistic decreases to 76.523 for the first step per iteration, 68.356 for the second iteration step, 67.008 for the third iteration step, and 66.941 for the remaining three iteration steps. From the above, it can be concluded that in both models, the predictive power increases with the inclusion of the independent variables in the model.

*Table 5. Classification table for the first model (block 1)*

Observed values	Predicted values		Accuracy percentage
	Profit 2019		
Profit 2019	Up to 3 million euro	Over 3 million euro	



Up to 3 million euro	17	6	73.9
Over 3 million euro	2	54	96.4
Total percentage			89.9

*Source: Authors' calculations*

By including the independent variables in the model, the results grouped in block 1 are obtained, where, among other things, the classification tables are recalculated. From the presentation in the tables below, it can be concluded that the total percentage of correctly classified observations in both models has increased, 89.9% correctly grouped observations in the model where the dependent variable is profit in 2019 and 92.2% correctly grouped observations in the model where the dependent variable is profit in 2020. This indicates that by including the group of independent variables the models are significantly improved.

*Table 6. Classification table for the second model (block 1)*

Observed values	Predicted values		Accuracy percentage
	Profit 2019		
Profit 2019	Up to 3 million euro	Over 3 million euro	
Up to 3 million euro	82	0	100.0
Over 3 million euro	8	13	61.9
Total percentage			92.2

*Source: Authors' calculations*

The following results are of special importance because in them the scores of the coefficients of the independent variables in the models are calculated. The  $b$  values are the same parameter estimate values as in linear regression, or in logistic regression they tell the value to be substituted into the regression equation to calculate the probability that a particular observation is in one of the two groups of the dependent variable. It is known that in straight line regression the value of the parameter  $b$  shows the magnitude of the change in the dependent variable if the independent variable changes by one of its own units. And in logistic regression, the interpretation of this parameter is similar, that is, it shows us the change that will occur in the logistic function if the independent variable changes by one of its units. The value of the change in the logistic function is calculated as the natural logarithm of the odds of the occurrence of the dependent variable.

Of great importance for this interpretation is the Wald statistic, which has a Chi-square distribution and tells whether the coefficient  $b$  for a certain independent variable is statistically different from zero. If this claim is confirmed as true, then it can be assumed that the independent variable has a significant contribution to the prediction of the dependent variable.

To explain how much of the variation that occurs in the dependent variable can be explained through the estimated model, two statistics are calculated, which are equivalent to the coefficient of determination in straight line regression. These two statistics Cox and Snell  $R^2$  and Nagelkerke  $R^2$ . In the first model, the Cox and Snell  $R^2$  statistic is 0.497, while the Nagelkerke  $R^2$  is 0.710, which can mean that the explained variation in the dependent variable based on the model ranges from 49.7% to 71.0%. In the second model, the values of these statistics are lower, that is, the Cox and Snell  $P^2$  statistic is 0.303, while the Nagelkerke  $P^2$  is 0.477, indicating that perhaps additional variables would need to be included in the model.

The following results are of special importance because in them the scores of the coefficients of the independent variables in the models are calculated. The  $B$  values are the same

parameter estimate values as in linear regression, or in logistic regression they tell the value to be substituted into the regression equation to calculate the probability that a particular observation is in one of the two groups (categories) of the dependent variable. It is known that in straight line regression the value of the parameter  $b$  shows the magnitude of the change in the dependent variable if the independent variable changes by one of its own units. And in logistic regression, the interpretation of this parameter is similar, that is, it shows us the change that will occur in the logistic function if the independent variable changes by one of its units. The value of the change in the logistic function is calculated as the natural logarithm of the odds of the occurrence of the dependent variable.

Of great importance for this interpretation is the Wald statistic, which has a Chi-square distribution and tells whether the coefficient  $b$  for a certain independent variable is statistically different from zero. If this claim is confirmed as true, then it can be assumed that the independent variable has a significant contribution to the prediction of the dependent variable.

*Table 7. Estimated parameters for the model where the dependent variable is the profit (in 2019)*

Independent variable	$B$	Standard error	Wald stat.	$p$ -value	$Exp(B)$	95 % interval trust $Exp(B)$	
						Lower	Upper
Investments of the hotels	1.67	0.60	7.82	0.01	5.32	1.65	17.18
Health care in hotels	1.36	0.61	4.94	0.03	3.90	1.17	12.97
Social media and promotion	1.83	0.72	6.45	0.01	6.22	1.52	25.48
Adherence to government protocols	-3.89	1.75	4.94	0.03	0.02	0.00	0.63
Cancellations of arrangements	-1.56	0.56	7.73	0.01	0.21	0.07	0.63
Salaries and income	-1.39	0.56	6.13	0.01	0.25	0.08	0.75
Hygiene and protection	-1.54	0.93	2.74	0.10	0.21	0.04	1.33
Digital equipment and promotion	-0.30	0.64	0.23	0.63	0.74	0.21	2.57
Constant	3.02	0.99	9.23	0.00	20.46		

*Source: Authors' calculations*

The table shows the results for the first model, an attempt is made to determine the statistical significance of the group of independent variables on the financial results (profit) in the period before the pandemic (2019). The most important element to consider here is the Wald statistic and the corresponding  $p$ -values. From what is shown, it can be concluded that all seven independent variables contribute statistically significantly to the model as their  $p$ -values are less than the critical value of 0.05. Only the independent variable Digital Equipment and Promotion is not statistically significant, as its  $p$ -value is 0.63 and is greater than the critical value 0.05.

The table shows the results of the model in which the dependent variable is profit in 2020, to see if the same independent variables continue to have an impact on the financial results of hotel operations in 2020, that is, in conditions of a pandemic. From the Wald statistic and corresponding  $p$ -values, it can be concluded that the variables hotel investment, social media and promotion, adherence to government protocols, and hygiene and protection contribute statistically significantly to the model. The variables of hotel health care, arrangement

cancellations, wages and salaries, and digital equipment have no statistically significant contribution to the constructed model.

When analyzing the results in both models, there is another result that is significant for their interpretation, that is the odds ratio, which is shown in the table as  $Exp(B)$ , and for it an interval of confidence for each variable. This rate of chances if there are values greater than one means that as the independent variable increases, the chances of the hotel moving from the first group - profit up to 3 million denars to the second group - profit over 3 million denars increases. If the value of the odds ratio is less than one, the opposite is true, as the independent variable increases, the chances of increasing profits decrease. In both models, only those statistics of the variables that contribute statistically significantly to the model will be considered.

Table 8. Estimated parameters for the model, where the dependent variable is the profit (in 2020)

Independent variable	$B$	Standard error	Wald stat.	$p$ -value	$Exp(B)$	95 % interval trust $Exp(B)$	
						Lower	Upper
Investments of the hotels	1.03	0.38	7.26	0.01	2.79	1.32	5.90
Health care in hotels	0.21	0.32	0.44	0.51	1.24	0.66	2.33
Social media and promotion	1.01	0.44	5.30	0.02	2.75	1.16	6.53
Adherence to government protocols	-0.72	0.26	7.51	0.01	0.49	0.29	0.82
Cancellations of arrangements	0.05	0.35	0.02	0.88	1.05	0.53	2.09
Salaries and income	0.27	0.37	0.52	0.47	1.31	0.63	2.70
Hygiene and protection	-1.32	0.40	11.12	0.00	0.27	0.12	0.58
Digital equipment and promotion	0.51	0.52	0.99	0.32	1.67	0.61	4.59
Constant	-2.03	0.40	26.04	0.00	0.13		

Source: Authors' calculations

In conditions of normal economic development, in the period before the pandemic, with an increase in hotel investments, hotel health care and social media and promotion, the chances of increasing profits also increase (the chances increase by 5.32 times when investing in hotels, 3.9 times for health care and 6.22 times for social media and promotion). For the rest of the variables, the value of the chance rate is less than one, so an increase in these variables would mean a decrease in profits – with an increase in compliance with government protocols, the chances of increasing profits decrease by 0.02 times (this value is almost equal to zero, and taking into account that in 2019 there were no such type of protocols, the interpretation will be taken as insignificant), with an increase in cancellations of arrangements, the chances of increasing profits will decrease by 0.21 times, with an increase in wages and incomes, the odds of increasing profits decrease by 0.25 times and with increasing hygiene and sanitation, the odds of increasing profits decrease by 0.21 times (again, this measure is more significant in pandemic conditions).

In the conditions of a pandemic, the chances of increasing profits are significantly lower, which is logical, but they still exist. Namely, when increasing the investments of the hotels, it is expected to achieve higher profits by 2.79 times, and when using social media and promotion, the chances of an increase in profits increase by 2.75 times. For the rest of the variables that contribute significantly to the model, adherence to government protocols and

hygiene and protection, the odds ratio is below one, which means that with an increase in these variables, the chance of a decrease in profits increases (0.49 times and 0.27 times respectively).

## **5. DISCUSSION AND CONCLUSION**

The tourism and hospitality industry in Republic of North Macedonia marked continuous growth in the pre-pandemic period. The impact from the pandemic and its restriction caused a severe negative impact on these very important industries for the national economy. Now, the industries must search for innovative approach to attract tourists, especially from the Balkan countries and to promote regional tourism. One way is to reduce the prices of the hotel services. The profit would still be greater than the profit realized in 2020 and 2021. Increased prices would only repel the tourists, especially in time of upcoming recession. Stimulating the local tourism becomes fundamental for the Macedonian tourist industry. The help from the government has been requested in 2020. The government could implement a set of measures, such as creating a data base to follow the global supply and demand in the tourism industry. Also, government can contribute with organizing seminars where renown world specialists would share their experience with the small business from the national economy. They could teach the business how to advertise to be seen on the international market by using modern approach. Small business would benefit by this kind of initiative by the government (Bartik, et al., 2020).

The results from this research emphasize the importance of the hotel adaptation towards the digital technology. It becomes the main tool in traveling, starting from finding the appropriate transport, lodgings and their prices, information about location and tourist attractions nearby, services provided by the hotels, possibility for comparison of several hotels. Hotel management should transfer their promotional activities to their web sites and social media (Kotler, et al., 2010). Using digital technology, a real representation of the hotel and its features (rooms, restaurants, reception, lobby, conference halls and bars) can be truly achieved. This is a crucial recommendation, having in mind that only 25% of the respondents of the Macedonian hotels (located in the capital) use VR/360°, while the remaining 74% have only partial or none so ever digital representation of their hotel.

Under normal operating conditions, analyzing the pre-pandemic period, the results from this research show that hotels have achieved higher profits by continuously investing in capital (both working and human capital), working on active promotion of their hotel through all media (flyers, banners, billboards, television, radio advertising), social media and their own website, and having sanitary and health condition up to the required standards.

When the hotels operate under restrictions due the pandemic, chances for profit increase are significantly lower. The results from the research have proven that the increase in investments can contribute to increase in profits. The hotels should focus their activities on continuous and active promotion of their services, using digital and nondigital media. Special attention is to be given on the digital promotion, which increases the changes for profit. Following the government protocols for hygiene and health protection also has a positive impact on the hotel's profit.

This paper contributes to better understanding of the Macedonian hotel industry and its determinants for improved financial performance, pre and during the pandemics. It accentuates the importance of the digital technology and its implementation by the hotels, so they can achieve competitiveness and increase profit. Using the digital technology becomes essential in the post-COVID era, where the world has massively shifted to increased usage of the technology in many significant parts of the everyday life and work.

Best to author's knowledge, no similar research has been done in the Republic of North Macedonia in the previous years. It has a valuable theoretical and especially practical

implication since it points out the key determinants for the profitability in one of the most important sectors – hotels and hospitality industry.

This research also has its limitations. It was conducted on 120 representatives of hotel management from different parts of the country in the height of the pandemic. To confirm the main factors of profit, longitudinal analysis should be performed. The same questionnaire realized in current post-pandemic period could confirm the results, or new determinants of the profitability may arise.

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