Impact of Covid-19 on Employment in Tourism in Slovakia: Current Situation and Development Perspective

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Abstract: This research paper explores the impact of the COVID-19 pandemic on employment in the tourism industry. Through a thorough analysis of current conditions and future possibilities, the study utilizes both quantitative and qualitative methodologies to assess the extent of job losses, the resilience of tourism-related occupations, and the strategies implemented by industry stakeholders. By synthesizing real-time data and future projections, the paper provides a comprehensive overview of the challenges faced by the sector and proposes innovative solutions for recovery and growth. The research was carried out using the statistical program Statgraphics19 and the ARIMA and ETS (Error Trend Seasonality) models. The research offers valuable insights for policymakers, businesses, and academia, enabling informed decision-making and strategic planning to revitalize employment in the tourism industry in the post-pandemic era. We focused on tourism businesses in Slovakia based on available data from the Slovak Statistical Office for the period 2013-2021. The impact of the Covid-19 pandemic on employment was significantly reduced in 2020-2021. ARIMA and ETS models point to an increase in the number of employees, especially in the food service industry.

Keywords: Covid-19, tourism, employment, Slovakia

JEL Classification codes: M29; M51; Z32

INTRODUCTION

The COVID-19 pandemic has had a significant impact on the tourism industry on a global scale. Employment in the tourism sector represents a crucial tool for evaluating the importance of the sector not only in the economy of countries but also in the whole world. Tourism, due to its complexity and cross-cutting nature, has a significant impact on employment beyond the conventional understanding of this industry. This cross-cutting nature makes tourism a complex subsystem with strong interconnections. With the onset of the pandemic and the adopted anti-pandemic measures, the tourism industry reached the limits of its possibilities. A significant decline in international arrivals worldwide has caused tourism businesses to reduce their performance indicators. Employment was one of these indicators. Before the COVID-19 pandemic, tourism employment was a significant factor in economic growth in many countries. Millions of people were employed across all sectors of tourism and other industries that influenced its growth. Since the ignorance, uncertainty, and unpredictability of the further development of the pandemic hurt entrepreneurs, they were forced to reduce employment in their companies and some even closed their businesses. In this context, it is necessary to pay attention to the development of the tourism sector with an emphasis on the impact of the COVID-19 pandemic and future developments. This paper aims to identify the impact of the

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COVID-19 pandemic on the development of the number of employees in the tourism industry and to predict its future development.

1 LITERATURE REVIEW

In the period before the COVID-19 pandemic, tourism was one of the most important sectors of the world economy, as it accounted for 10% of world GDP and more than 320 million jobs (Behsudi, 2020). The key role of tourism is solving many problems, especially regional unemployment, and regional disparities (Kusugal, 2014). Tourism has been one of the most affected sectors in the world since the declaration of the COVID-19 pandemic by the World Health Organization.

Working in the tourism industry is constantly associated with customer interaction, indicating that people continue to prefer personal contact when using tourism services over the technological innovations that replace it (Marrero Rodriguez et al., 2020; Holloway and Humphreys, 2022). The tourism industry is characterized by a high degree of seasonality (Corluka, 2019), which also affects the level of employment in this industry. Seasonality in the economic understanding represents a state in which income was not achieved due to the limitation of business activity in a certain period (Grobelna and Skrzeszewska, 2018). According to the available literary sources, we encounter two sources of seasonality, natural and institutional (Butler, 1998; Goulding et al., 2004), while the tourism industry is primarily affected by natural (natural) seasonality. Natural factors of seasonality are determined by the geographical location of the destination and include the temperature zone, sunshine, rain, and snow (Grobelna and Skrzeszewska, 2019; Witt and Mountinh, 1995), as well as the availability of the sea or mountains. From the institutional factors that affect the seasonality of tourism, we can define primarily: holidays, vacations, and time off (Commons and Page, 2001) and travel habits and motivations (Goulding et al., 2004), which significantly affect the level of employment in the tourism industry.

Tourism employment is defined by the UNWTO (2024) as the number of persons employed in tourism industries in any of their occupations, whether it is their main employment or as the number of jobs in tourism industries. According to Page and Connel (2020) and Gúčik (2000), tourism does not only affect primary employment, in businesses and organizations that directly satisfy the needs of visitors in the industry, but due to the multiplier effect, they also create indirect employment and, finally, they also affect induced employment. Job creation in the tourism industry is considered one of the most beneficial effects of the industry (Liu and Wall, 2005). The Slovak Republic has a suitable potential for the development of tourism, thanks to which the number of employees in this industry is increasing (Pachingerová et al., 2013).

The OECD (2020) assumed that tourism performance will drop by up to 80% in 2020. As a result of the impact of the COVID-19 pandemic, the economic growth and development of tourism businesses have decreased (Jackson et al., 2021). The negative impact of this period had an impact on GDP, wages, and termination of employment in the tourism industry (Syaifudin et al., 2022). Tourism is among the sectors of the economy most affected by the situation caused by the COVID-19 pandemic (Romagosa, 2020; UNWTO, 2023). Extensive restrictions, especially at the international level, have fundamentally affected attendance in the tourism industry (Hogenová, 2020a; 2020b). The forecasts of UNWTO (2020a) indicated various scenarios that they envisage with a decrease in international arrivals at the level of 58-80%, but the socio-economic consequences will be significantly higher. According to UNWTO (2020b), the probability of losing half a million jobs in the tourism industry during the pandemic period was eight times higher than during the 2008 economic crisis.

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Forecasting the development of indicators in the tourism industry plays a significant role in the current situation of the restart of this industry. Some publications use the ARIMA model to predict future developments. In his studies, Vafin (2020) used the ARIMA model to predict the development of macroeconomic indicators (employment and inflation) in selected countries of the world. The results of this study pointed to expectations of a decrease in the employment rate and inflation in these countries in the period 2020-2024. In her studies, Baldigara (2020) predicted the development of employment in the hotel industry in Croatia. The Box-Jenkins method using neural networks was used in this study. In this study, the author considered the seasonality of tourism through the SARIMA model.

2 METHODOLOGY

The paper aim is to identify the impact of COVID-19 on the development of the number of employees in the tourism industry and to predict its future development.

2.1 Data

The primary data were data on the number of employees in the tourism industry in the Satellite. Account of the Slovak Republic for the period 2013-2021. We focused only on the number of employees, so we excluded the area of entrepreneurs from the research (tab. 1). Professional literature was drawn from professional publications, which served us as a basis for conducting research. Scientific methods such as abstraction, deduction, comparison, and synthesis were also used.

Figure 1 Data for prognosis and research

Year	Sectors of tourism	Accommodation services	Catering services	Travel agencies other reservation services
2013	127 733	12 812	54 097	2 253
2014	137 048	13 996	59 176	2 341
2015	139 180	14 681	58 695	2 252
2016	142 763	15 427	58 926	2 727
2017	149 581	15 903	63 026	2 641
2018	153 776	16 351	65 221	2 843
2019	159 498	16 827	69 027	2 934
2020	147 863	14 825	65 388	2 104
2021	141 759	14 235	62 252	1 963

Source: own processing according to the SR Satellite Account, 2013-2021

We also applied the Normality test in the Statgraphics19 program for selected tourism industries. Shapiro-Wilk test and Kolmogorov-Smirnov Test were applied. Subsequently, the results of the normality test were processed into plot graphs.

2.2 Modely

Forecasting the development of the number of employees was carried out using two methods, the ARIMA model (Auto Regressive Integrated Moving Average) and the ETS model. The

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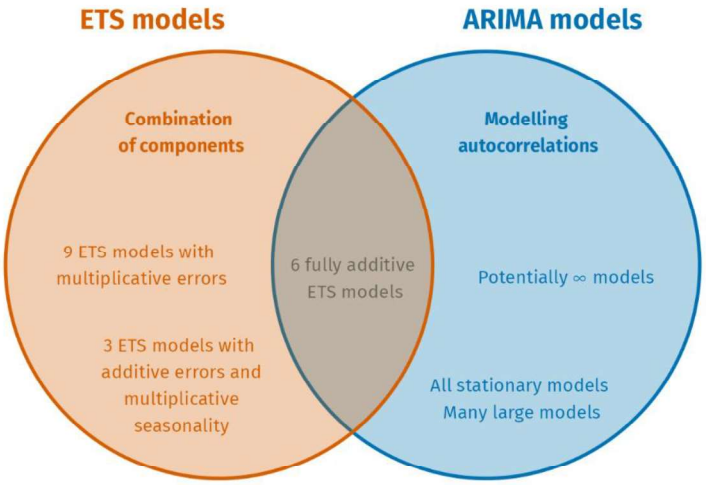
differences between the two models are in the seasonality of the data (Fig. 1). The ARIMA model was implemented in the statistical program StatGraphics19 Centurion and the ETS (Error Trend Seasonality) model was calculated and executed in MS Excel. Conceptually, ARIMA and ETS are born from different lines of motivation: ARIMA is based on modeling autocorrelations, either in the process itself (AR) or in errors (MA), while ETS is based on m time series (level, trend, seasonal).

Figure 2 Differences between ETS model and ARIMA model



Source: Tibshirani, R. (2023), p. 10

The ETS model was processed in MS Excel using the FORECAST.ETS () function with estimated parameters for forecasting. The FORECAST.ETS function in Excel is used to forecast data using the exponential smoothing method (ESM). ESM is used in statistics to smooth time series data by assigning weights exponentially to future values over time. The syntax of the FORECAST.ETS function is as follows.

```
=FORECAST.ETS (target_date,values,timeline,[seasonality], [data_completion], [aggregation])
```

In the paper was applied the evaluation of the used models as follows:
(A) Random walk
(B) Random walk with drift = 1743,75
(C) Constant mean = 144277,
(D) Linear trend = 132618, + 2331,86 t
(E) Quadratic trend = 114553, + 12185,6 t + -985,37 t^2
(F) Exponential trend = exp(11,7949 + 0,0165241 t)
(G) S-curve trend = exp(11,939 + -0,195562 /t)
(H) Simple moving average of 2 terms
(I) Simple exponential smoothing with alpha = 0,9999
(J) Brown's linear exp. smoothing with alpha = 0,2026
(K) Holt's linear exp. smoothing with alpha = 0,9999 and beta = 0,1574
(L) Brown's quadratic exp. smoothing with alpha = 0,0228
(M) Winters' exp. smoothing with alpha = 0,2002, beta = 0,0009, gamma = 0,0826
(N) ARIMA(2,1,1)x(2,0,0)2
(O) ARIMA(2,0,1)x(2,0,0)2 with constant
(P) ARIMA(2,0,0)x(2,2,0)2

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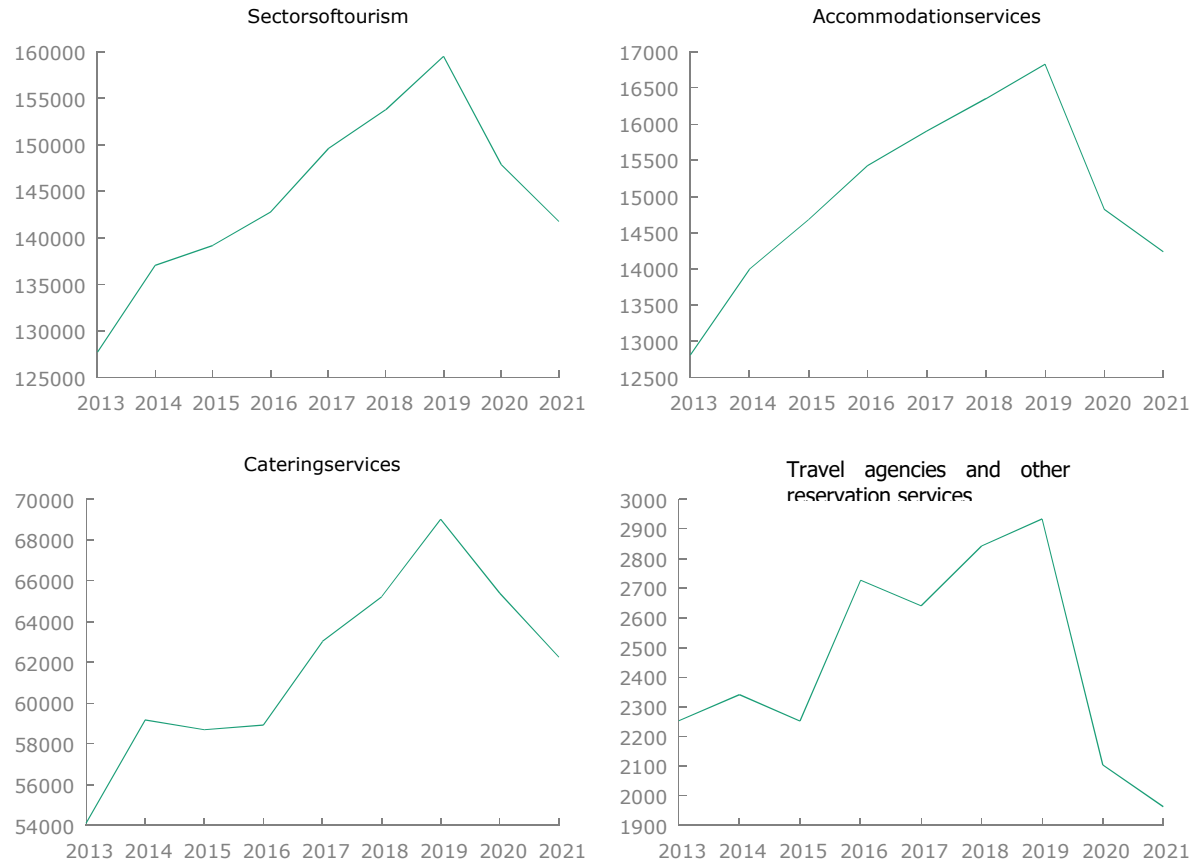
(Q) ARIMA(2,0,0)x(2,0,1)2 with constant
(R) ARIMA(2,1,0)x(2,0,1)2

3. RESULTS AND DISCUSSION

The following graphs (graph 1) show the development of employment in tourism sectors in Slovakia in the period 2013-2021. In the Employment graph, we see a rising curve, which means that the tourism industry employs a higher number of employees every year. The highest number of employees in the tourism industry was in 2019 when 159,498 employees were employed. In 2019, the highest number of employees was in the catering services industry at 69,027. The lowest number of employees is in the industry of travel agencies and other reservation services.

Graph 1 Development of sectors of the tourism industry in Slovakia (2013-2021, in thousand)



Source: authors' own processing in the statistical program R based on the SR Satellite Account 2013-2021

The normality test was applied to the studied tourism industries. Chart 2 shows the results of several tests run to see if accommodation services can be adequately modeled using a normal distribution. The Shapiro-Wilk test (p-value: 0.975812) is based on comparing the quantiles of the fitted normal distribution to the quantiles of the data. Since the smallest P-value among the tests performed is greater than or equal to 0.05, we cannot reject the idea that accommodation services come from a normal distribution with 95% confidence.

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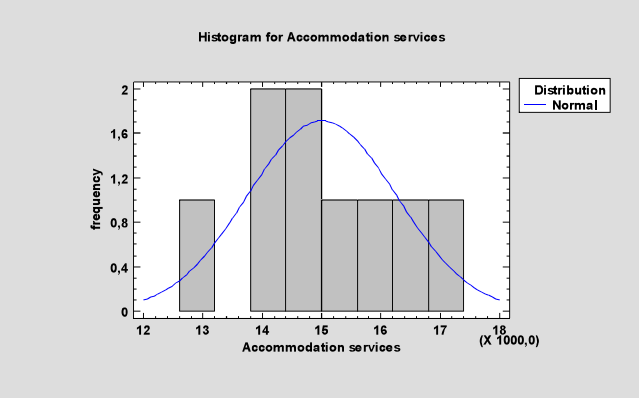
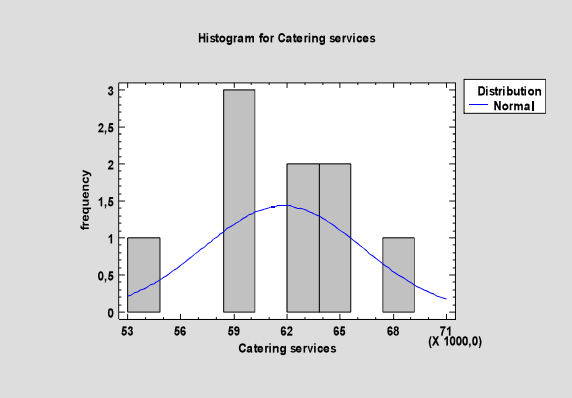
The Shapiro-Wilk test for food services (p-value: 0.911714) indicates that, Since the smallest P-value among the tests performed is greater than or equal to 0.05, we cannot reject the idea that Catering services come from a normal distribution with 95% confidence. Shapiro-Wilk test for Travel agiencies and agencies (graph 4), other reservations, and related services (p-value: 0.539421) points out that since the smallest P-value amongst the tests performed is greater than or equal to 0.05, we cannot reject the idea that Travel agencies other reservation services comes from a normal distribution with 95% confidence. The Shapiro-Wilk test for tourism industries (graph 5), (p-value: 0.996434) points out that since the smallest P- value among the tests performed is greater than or equal to 0.05, we cannot reject the idea that the Sectors of tourism industry comes from a normal distribution with 95% confidence.

Graph 2 Normality test for Accommodation services



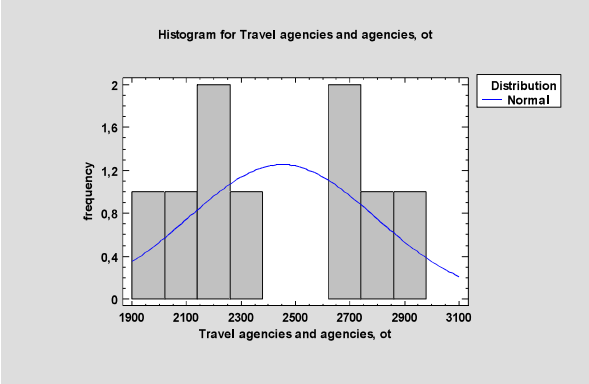
Source: own processing in StatGraphics19

Graph 3 Normality test for Catering services



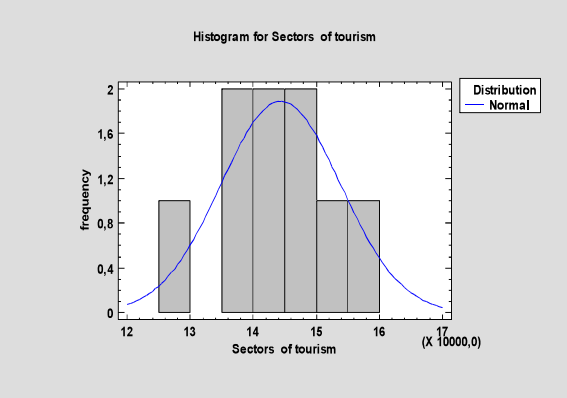
Source: own processing in StatGraphics19

Graph 4 Normality test for Travel agencies and other reservation services



Source: own processing in StatGraphics19

Graph 3 Normality test for Sectors of tourism



Source: own processing in StatGraphics19

Based on data processing and the execution of the Unite Root Test - Augmented Dickedy Fuller test, we examined forecasts of the development of the number of employees in selected sectors of the tourism industry. Forecasts for accommodation services point to a stable development in the coming years (chart 1). The gray colors show us the upper and lower levels, and the blue part is the median. The blue dot in the graph is the mean, where the average number of employees should be in the following period. The mean is worth 14,825 in 2027. The ARIMA model mentioned does not include seasonality. Therefore, in the following

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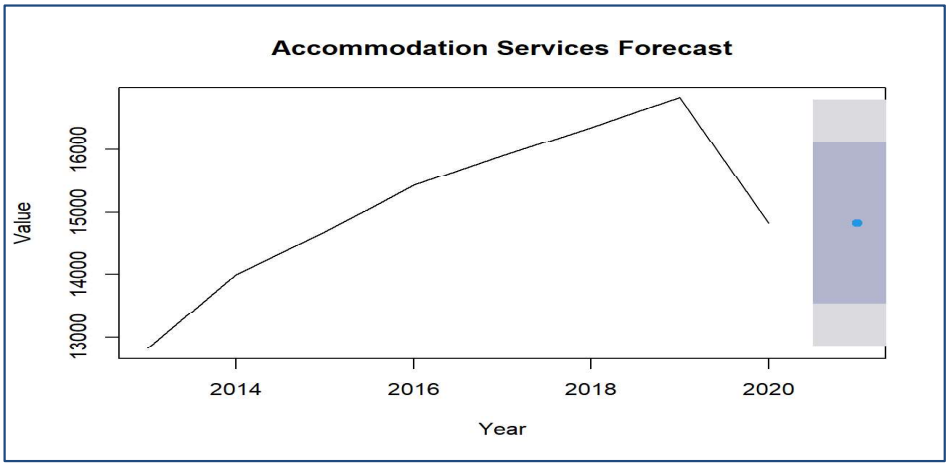
steps, we decided to apply seasonality, the ETS model, as the selected industries are seasonal and heterogeneous.

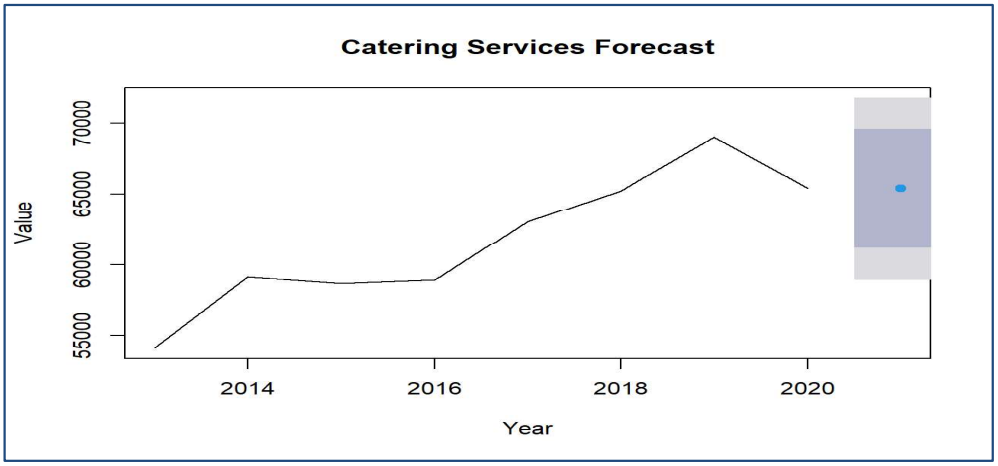
Graph 3 Forecasting of accommodation services in Slovakia (2013-2027)



Source: own processing in StatGraphics19

By 2027, the catering services sector will, like accommodation services, employ an average number of employees, without a large increase or decrease. According to the forecast of the ARIMA model, we assume that in 2027, the food service industry will employ approximately 65,388 employees (Chart 2). The time series covers the years 2013 to 2020 with a frequency of 1 (assuming annual data). A residual of 54.09697 means that the predicted value for the first year was lower by 54.09697 units compared to the actual observed value. In 2019, the value of the residue was 3806. As we can see, even the Covid-19 pandemic did not stop the increase of employees in catering services, and their increase is still expected.

Graph 4 Forecasting of catering services in Slovakia (2013-2027)



Source: own processing in StatGraphics19

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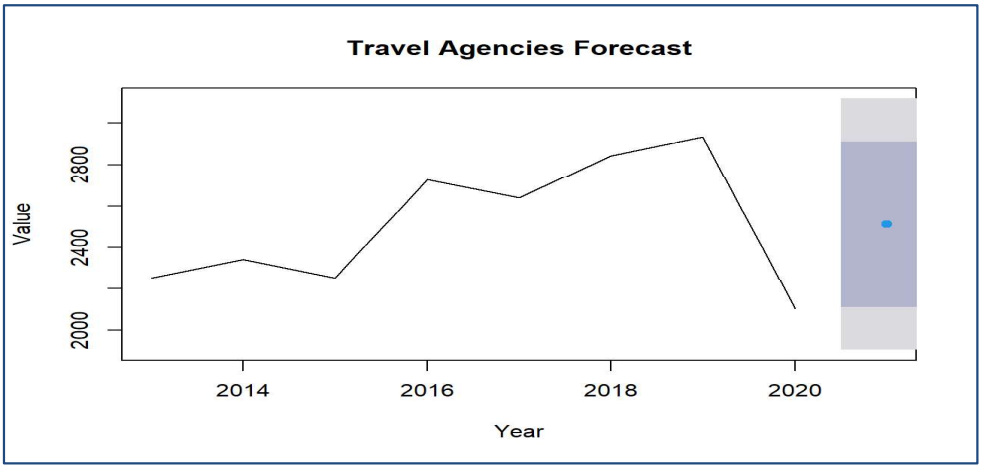
The industry of travel agencies and other reservation services will employ 2,512 employees by 2027 (chart 4). In 2019, the mentioned industry employed 2934 employees, and after the COVID-19 pandemic, the number of employees decreased by almost 34% compared to 2021.

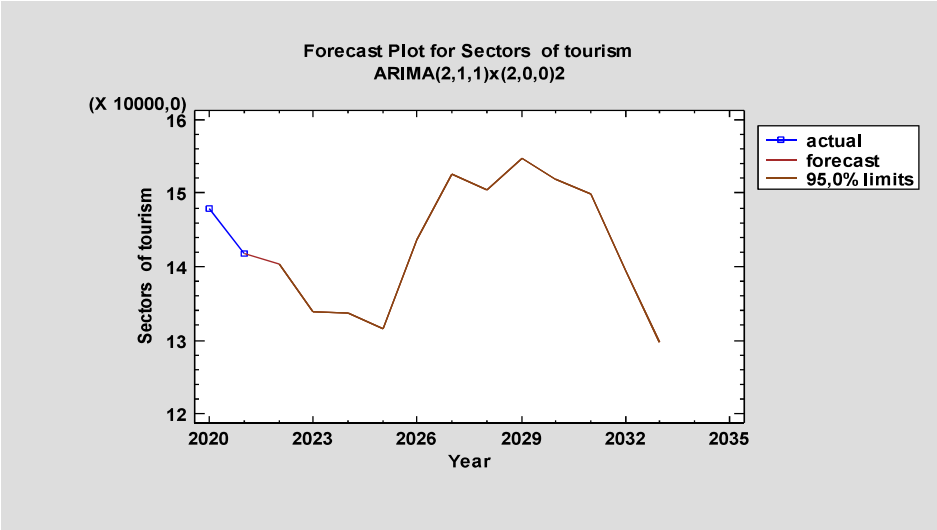
Graph 5 Travel agencies and other reservation services forecast (2013-2027, in thousands)



Source: own processing in StatGraphics19

The ARIMA model, with the addition of the seasonality factor (graph 5), showed us the forecast for the development of the number of employees in the tourism industry until 2034. It is assumed that the number of employees will decrease in 2024 and 2025.

Graph 6 Forecast Plot for Sectors of development of employees in tourism industry (2013-2034, in thousands)



Source: own processing in StatGraphics19

The following tables 2 and 3 will calculate the preliminary number of employees in the tourism industry until 2033. ARIMA (2,1,1) represents the non-seasonal part of the model. It has an autoregressive order of 2 (AR=2), a differentiating order of 1 (I=1), and a moving average order of 1 (MA=1).

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(2,0,0) $_2$: This represents the seasonal part of the model. It has a seasonal autoregressive order of 2 (SAR=2), no seasonal differentiation (SI=0), and no seasonal moving average (SMA=0). The 2 at the end indicates that the seasonality has a period of 2. A value of 0 in the Residual column indicates that the forecast exactly matched the observed data. Small values close to zero indicate that the model provided accurate predictions. Negative or positive values represent the direction and magnitude of the forecast error. For the year 2019, the residual is approximately -6.87e-8, which is very close to zero. This suggests a negligible difference between the forecasted and actual values for that year.

For 2020, the residual is approximately -6.98e-10, which is also extremely close to zero.

Table 1 ARIMA model (2,1,1) x (2,0,0)2: forecasting of development of employees in the tourism industry (2013-2021, in thousands)

Period	*Data*	*Forecast*	*Residual*
2013	127733,		
2014	137048,	137048,	0,0
2015	139180,	139180,	0,0
2016	142763,	142763,	0,0
2017	149581,	149581,	0,0
2018	153776,	153776,	0,0
2019	159498,	159498,	-6,87141E-8
2020	147863,	147863,	-6,98492E-10
2021	141759,	141759,	0,0

Source: own processing in StatGraphics19

Table 2 shows forecasts from 2022 to 2033. According to the ARIMA model, the highest number of employees will be 152,548 employees in 2027. Each year has a forecast value along with a 95% confidence interval. The consistency of the width of the confidence intervals indicates the stability of the forecast accuracy over the entire forecast horizon.

Table 2 ARIMA model (2,1,1) x (2,0,0)2: forecasting of development of employees in the tourism industry (2012-2033, in thousands)

Period	*Forecast*	*Lower 95% Limit*	*Upper 95% Limit*
2022	140391,	140391,	140391,
2023	133847,	133847,	133847,
2024	133656,	133656,	133656,
2025	131622,	131622,	131622,
2026	143679,	143679,	143679,
2027	152548,	152548,	152548,
2028	150363,	150363,	150363,
2029	154672,	154672,	154672,
2030	151805,	151805,	151805,
2031	149987,	149987,	149987,
2032	139525,	139525,	139525,
2033	129744,	129744,	129744,

Source: own processing in StatGraphics19

Model validation testing was performed in Statgraphics 19. Tab 3. shows us the results of the used models: (A) Random walk, (B) Random walk with drift = 1743,75, (C) Constant mean = 144277, (D) Linear trend = 132618, + 2331,86 t, (E) Quadratic trend = 114553, + 12185,6 t

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+ -985,37 t^2 , (F) Exponential trend = exp(11,7949 + 0,0165241 t), (G) S-curve trend = exp(11,939 + -0,195562 /t), (H) Simple moving average of 2 terms, (I) Simple exponential smoothing with alpha = 0,9999, (J) Brown's linear exp. smoothing with alpha = 0,2026, (K) Holt's linear exp. smoothing with alpha = 0,9999 and beta = 0,1574, (L) Brown's quadratic exp. smoothing with alpha = 0,0228, (M) Winters' exp. smoothing with alpha = 0,2002, beta = 0,0009, gamma = 0,0826, (N) ARIMA(2,1,1)x(2,0,0)2, (O) ARIMA(2,0,1)x(2,0,0)2 with constant, (P) ARIMA(2,0,0)x(2,2,0)2, (Q) ARIMA(2,0,0)x(2,0,1)2 with constant, (R) ARIMA(2,1,0)x(2,0,1)2

Table 3 Testing of models for prognosis

Model	*RMSE*	*RUNS*	*RUNM*	*AUTO*	*MEAN*	*VAR*
(A)	7332,19	OK	OK	OK	OK	OK
(B)	7663,39	OK	OK	OK	OK	OK
(C)	10292,7	**	OK	OK	*	OK
(D)	8304,95	OK	OK	OK	OK	OK
(E)	4742,76	OK	OK		OK	OK
(F)	8429,49	OK	OK	OK	OK	OK
(G)	6471,71	OK	OK	*	OK	OK
(H)	9706,37	OK	OK	OK		
(I)	7332,44	OK	OK	OK	OK	OK
(J)	10820,6	OK	OK	OK	OK	OK
(K)	8068,59	OK	OK	OK	OK	OK
(L)	10624,9	**	OK	OK	*	OK
(M)	12194,6	OK	OK			
(N)	3,96742E-8	OK	OK		OK	***
(O)	9,44874E-7	OK	OK		OK	***
(P)	0,0					
(Q)	0,00000266515	OK	OK		OK	***
(R)	0,00000491809	OK	OK		OK	***

Key:
RMSE = Root Mean Squared Error
RUNS = Test for excessive runs up and down
RUNM = Test for excessive runs above and below median
AUTO = Ljung-Box test for excessive autocorrelation
MEAN = Test for difference in mean 1st half to 2nd half
VAR = Test for difference in variance 1st half to 2nd half
OK = not significant (p >= 0,05)
* = marginally significant (0,01 < p <= 0,05)
** = significant (0,001 < p <= 0,01)
*** = highly significant (p <= 0,001)

Source: own processing in StatGraphics19

Subsequently, we performed ETS models in the MS Excel program, where we calculated the development of employees in selected sectors of the tourism industry until 2033. Up to 2021, real data from the Satellite Account of the Slovak Republic are presented. From 2022, we implemented the ETS model. The differences between the ARIMA model and ETS models are not highly differentiated. If we look at the column Sectors of tourism, the year 2027, the ARIMA model forecasts that the number of employees will be 152,548, while the ETS models forecast 138,866 employees (tab.3). As we mentioned in the methodology, ETS models explicitly model seasonality, while ARIMA models need variances to handle it. Seasonality in our data is not well captured by differences, so ETS models provide better predictions.

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Table 4 ETS model for forecasting the development of employees in the tourism industry

Year	Sectors of tourism	Accommodation services	Catering services	Travel agencies and other reservation services
2013	127 733	12 812	54 097	2 253
2014	137 048	13 996	59 176	2 341
2015	139 180	14 681	58 695	2 252
2016	142 763	15 427	58 926	2 727
2017	149 581	15 903	63 026	2 641
2018	153 776	16 351	65 221	2 843
2019	159 498	16 827	69 027	2 934
2020	147 863	14 825	65 388	2 104
2021	141 759	14 235	62 252	1 963
2022	144 096	14 458	64 045	1 978
2023	144 971	14 592	65 092	1 945
2024	144 977	15 141	65 707	2 022
2025	144 197	15 248	66 567	1 963
2026	141 067	15 355	65 645	1 914
2027	138 866	15 417	66 538	1 862
2028	137 309	15 482	66 474	1 811
2029	138 405	15 546	67 173	1 759
2030	137 713	15 610	67 768	1 707
2031	136 556	15 673	68 342	1 655
2032	134 364	15 762	68 901	1 603
2033	133 251	15 850	69 449	1 550

Source: own processing in MS Excel

It is clear from the forecasts that the COVID-19 pandemic affected the development of employment in the tourism industry in Slovakia. The surveyed industries, such as accommodation services, food services, and travel agency service and other reservation services had a reduced number of employees in 2020 and 2021. However, the ETS and ARIMA models project a renewed increase in the following years, which may be due to an increase in the opening of tourism enterprises. The fewest employed will be in the Travel Agencies and other reservation services where employment is around 2,000. The highest number of employed will be in the catering services sector, up to around 67,000. The impact of the COVID-19 pandemic was significant, as according to the predicted forecasts we can see a reduction of the number of employees in selected industries. The decrease was recorded from 2020 when the pandemic arrived, and anti-pandemic measures were implemented. Since then, the selected industries have not been secure for potential employees in terms of long-term employment, resulting in a decrease in the number of employees.

CONCLUSION

The COVID-19 pandemic has had an unprecedented impact on the tourism industry. Strict pandemic measures to contain the spread of the virus have brought international travel to an almost complete halt. Uncertainty among entrepreneurs in the tourism sector has also led to a decrease in the number of employees. Tourism impacts direct, indirect and induced

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employment, which points to its cross-sectional character. The forecasts of world organizations in connection with the pandemic assumed that during this period the performance of the tourism industry will decrease at the level of up to 80%, according to the type of indicator. Tourism was one of the most dynamic industries in the world in 2019. This year, tourism performance reached one of the highest values in the history of monitoring. With the onset of the COVID-19 pandemic, a decrease in the number of employees is recorded in the monitored sectors of tourism in the Slovak Republic. According to forecasting of the development of employment in selected sectors of tourism in the Slovak Republic, the highest employment will be reached in 2027, while the sector with the highest number of employees will be food services. On the contrary, according to the forecast, the lowest number of employees will be reached in the travel agency and other reservation services.

The lack of comprehensiveness of data on employment in the tourism industry in all years of the COVID-19 pandemic is a limitation of this study. As the values in the achieved employment in this period can affect the overall forecast of the development of this indicator in the Slovak Republic. Another of the identified limits is the regularity of the publication of the Tourist Satellite Account, as these forecasts could be modified and supplemented during its more regular (annual) publication. This fact creates space for future investigation of this issue with an emphasis on considering the impact of the pandemic on employment after the data for all pandemic years have been compiled. In the future, it is also possible to analyse the factors that influenced the development of employment in this period, while it is possible to consider delayed time effects and shocks in the time horizon t+1.

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