Forecasting the number of foreign tourists visiting Indonesia during the Covid-19 Pandemic

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Abstract

Purpose: This study aims to predict the number of foreign tourists who come to Indonesia during the pandemic.

Research Methodology: Forecasting using the Holt-Winters Multiplicative method and secondary data, namely the number of foreign tourists visiting Indonesia obtained from the website of the Central Statistics Agency.

Results: Based on the forecast, in November and December 2021, the number of foreign tourists visiting Indonesia will increase because it coincides with the Christmas and New Year holidays. However, from January-October 2022, the visit rate continued to decline. The possibility of an increase in confirmed cases of COVID-19 due to the December forecast, namely the increased mobility of people to tourist destinations to spend the holiday, could be due to the global economic crisis due to COVID-19 cases.

Limitations: The number of foreign tourist visits data on the Central Bureau of Statistics website is only available from early 2017 to October 2021.

Contribution: Forecasting results can be used as a reference for the Indonesian government in formulating policies in anticipating the arrival of foreign tourists during the pandemic so that the recovery of the economic sector can be maximized.

Keywords: Covid-19 pandemic, Forecasting foreign tourists, Indonesian tourism, Lockdown

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1. Introduction

The Covid-19 disease is currently hitting the whole world. Covid-19 is a disease caused by the Coronavirus and can infect humans and infect the respiratory system. This outbreak stems from a local case first discovered at the animal and seafood market in Wuhan, China, in December 2019. The intense social interaction and mobility of people in the region caused a massive chance of transmission, so the Covid-19 spread to several provinces in China and foreign tourists who are visiting because this virus is transmitted from human to human so that its spread is increasingly widespread throughout the world, including Indonesia.

The World Health Organization (WHO) in March 2020 finally determined the status of Corona Virus Disease 2019 (Covid-19) as a Pandemic (Dinkes.gorontaloprov, 2020). The determination of Covid-19 as a pandemic is due to its exponential rate of spreading globally, where the Covid-19 has spread in 118 countries and infected more than 121,000 people in Asia, Europe, the Middle East, and America (Dzulfaroh, 2021). To slow down this transmission rate, many countries have adopted lockdown procedures and travel restrictions to reduce the spike in confirmed cases and death rates (Gegung, 2021).

In Indonesia, the entry of the Covid-19 was only detected and confirmed in March 2020. In 1.5 years, Indonesia has faced a surge in confirmed cases of Covid-19 in the first wave with the addition of weekly cases of 89,902 confirmed Covid-19 and in the second wave with the addition of weekly cases 125,396 people (Qodar, 2021). To suppress the spike in cases and the high death rate among cities and provinces throughout Indonesia, the government has also implemented policies to limit people's mobility by implementing social distancing. The implementation of enforced social distancing is the Large-Scale Social Restrictions (PSBB) and the Enforcement of Restrictions on Community Activities (PPKM). As of April 2, 2020, the Indonesian government has implemented a policy of closing access for foreigners who enter or transit to Indonesia, which means that no tourists are visiting Indonesia. However, foreigners with specific criteria are still allowed to enter Indonesia, such as all newcomers/travelers to enter Indonesia. They must fill out and submit a Health Alert Card to the Port Health Office before arriving at the entrance to the Indonesian International Airport and show the card or certificate that they have received the vaccine covid-19 and negative RT-PCR test results.

Throughout 2020, the number of foreign tourists entering Indonesia was around 4,052 million people, only about 25% of the number of tourists entering in 2019 (Kemenparekraf, 2021). The drop in the number of foreign tourists coming to Indonesia is confirmed due to the Covid-19 pandemic that hit Indonesia and the ban on visiting Indonesia, which made foreign tourists reluctant to vacation in Indonesia. The closure of tourist destinations also supports this policy to overcome the spike in confirmed Covid-19 cases. This policy will undoubtedly impact economic and trade aspects, especially in the tourism sector, as a contributor to foreign exchange for Indonesia (Soehardi, Siddha, Hardiyono, Siswanti, & Hardipamungkas, 2020). The severe impact of Covid-19 has also caused a decrease in the rate of world economic growth. The International Monetary Fund (IMF) has stated that the world economy will decline by 0.1-0.2% to 3.3% in 2020.

The rules for implementing restrictions on community activities (PPKM), which were previously strictly enforced, gradually began to be lowered in line with the implementation of the new normal imposed by the government, which was marked by an increasing Covid-19 recovery rate. Community activities are slowly returning, and economic recovery is, of course, a priority. The Ministry of Tourism and Culture establishes policies related to recovery in the tourism sector by slowly reopening existing tourist attractions by adapting to the pandemic and remaining guided by the Covid-19 protocol. The government has also reopened entry access for foreign tourists to Indonesia, which has opened international flights to Bali with strict entry procedures. This decision was made to restore the tourism sector during the pandemic.

Because the government has decided to reopen international flights, forecasting foreign tourist arrivals during the pandemic plays an important role. Because the pandemic period is full of challenges and uncertainties, the arrival of foreign tourists needs to be predicted so that based on the predicted numbers obtained, it can be used for planning, policymaking, and budgeting by the government and related parties. The accuracy of a forecast can contribute to the government's careful policy planning during the Covid-19 pandemic so that it will not cause a spike in Covid-19 cases due to the reopening of entry access for foreign tourists to Indonesia and the hope that the recovery of the economic sector can be maximized.

Several previous studies on forecasting the number of foreign tourists visiting Indonesia have been carried out. Previous research was by Supriatna, Subartini, Hertini, & Riaman (2017) predicts foreign tourists visiting West Java through the entrance of Husein Sastranegara Airport and Muarajati Airport using the SARIMA method. This method is considered good in producing short-term predictions, and the most significant arrival prediction occurred in April 2017. Previous research by Thira, Mayangky, Kholifah, Balla, & Gata (2019) predicted foreign tourist visits to Indonesia using the Fuzzy Time Series. The forecasting results explain that using the Fuzzy Time Series in forecasting data on foreign tourist visits to Indonesia has outstanding results. The forecast results for January 2018 were 1,259,000 foreign tourist visits to Indonesia. Previous research was by Rukini, Arini, & Nawangsih (2015) predicted the number of foreign tourist arrivals to Bali using the ARIMA method with predictions of the number of foreign tourist arrivals to Bali amounting to 5.07 million in 2019. Furthermore, Darma, Gunawan, &

Sutramiani (2020) also predicts foreign tourists visiting Bali using the Triple Exponential Smoothing method. The forecast results explain that in November and December 2017, there was a decrease in the number of tourist visits to Bali. Regarding forecasting research during the Covid-19 pandemic, Rahmawati, Eltivia, Riwajanti, & Wahyuni (2021) predicts the number of foreign tourists visiting Jakarta using exponential smoothing method. The prediction results explain a decline in the third and fourth quarters of 2020 and the first quarter and second quarter of 2021. Still, there is an increasing trend in the 4th quarter of 2021 because airlines are operating again, and the DKI Provincial Government opens tourist attractions that remain compliant with the Covid-19 protocol.

Much research has been done on forecasting the number of foreign tourist visits, but forecasting the arrival of foreign tourists to Indonesia during the Covid-19 pandemic is still little. This study aims to predict the number of foreign tourists who came to Indonesia during the pandemic using the Holt-Winters Multiplicative method. The Holt-Winters Multiplicative method can handle seasonal factors with repeated patterns contained in the data because the number of foreign tourist arrivals is influenced by weather and holidays (Makridakis, Wheelwright, & Mcgee, 1999), so this method was chosen and suitable for use in this study to predict the number of foreign tourists visiting Indonesia during the Covid-19 pandemic.

2. Review of related literature
Indonesia Tourism
Tourism activities can run if there is interaction from tourists with tourist objects that are supported by supporting facilities and infrastructure that exist in tourist objects. Foreign tourists are people who visit a country other than their country of residence for a maximum of 12 months (Utami & Kafabih, 2021). According to Konarasinghe (2016), tourism is an activity, service, and industry that provides travel experiences, including transportation, accommodation, food and beverage businesses, retail shops, entertainment businesses, activity facilities, and other services offered to individuals or groups traveling far from their destination. From tourism activities, various types of products and tours are offered, ranging from nature tourism, cultural tourism, historical tourism, artificial tourism to different special interest tours (Aliansyah & Hermawan, 2019). Tourism provides job opportunities in tourist areas such as the souvenir handicraft industry, tourist transportation services, food and drink services.

In Indonesia, the tourism sector is one sector that has a strong influence in contributing to an increase in foreign exchange apart from the oil and gas sector (Santoso, 2021). Indonesia is well-known abroad with stunning landscapes and fascinating cultural tourism, from Aceh to Papua. It can be said that Indonesia is a country with 1001 charms ranging from nature, culture, culinary to various arts and customs. Besides the beauty of the landscape, the culture of greeting each other, cooperation, and respect for elders is also a magnet so that foreign tourists always visit and feel at home in Indonesia. Its beauty can enchant tourists who come so that Indonesia is nicknamed as one of the most beautiful countries along with ten other countries by an online travel guide page from England, namely Rough Guides Ltd (Indonesia.go.id, 2019). Some examples of tangible evidence can be seen from the existence of the Borobudur Temple, located in Magelang, Central Java, and designated as a cultural heritage by Unesco, which is estimated to be around 12 centuries old. Komodo Island in East Nusa Tenggara was once selected as one of the seven wonders of the world according to the New7Wonders organization in 2011, and Bali Island, with its scenic and cultural charms, attracts foreign tourists to come to Indonesia.

Indonesia has many beautiful natural charms that are able and have the potential to attract foreign tourists to visit. Previous research was by Tangian, Polii, & Mengko (2019) examined the possibility of Manado City's tourist attraction to bring in tourists, where the potential attractions assessed were landforms, beach forms, and sea forms. The assessment criteria are based on attractiveness, socioeconomic conditions, community services, level of relationship or accessibility, accommodation, infrastructure, and supporting facilities. The evaluation results obtained are tourism objects located in the Bunaken National Park area (Bunaken Island, Manado Tua, Siladen, and Tongkaina Village) for land-based tourism objects, which have a value of 83.25% and sea by 87.09%. In comparison, Malalayang Beach by 86.83%, Mount Tumpa by 84.65%, Kima Waterfall by 84.22%, and Boulevard

Beach has the highest score of 96.82%. So it can be concluded that tourism objects in Manado City can attract tourists to visit.

Astiti (2016) evaluated the application of the ecotourism concept to the Arborek tourist village in Raja Ampat, whose assessment is based on the perception of visiting tourists. The results state that local culture, natural scenery, underwater beauty that can be seen by snorkeling, coral reefs that can be witnessed by diving, and attractions of manta rays in Arborek Village get a score of 7 which means very good. Tourist facilities in the form of existing facilities, information facilities, entertainment, cleanliness, security, and village management services scored 6, which means good and homestays and places of worship got a score of 7. So it can be said that tourists recognize the beauty of the Arborek tourist village in Raja Ampat and assess the management. The community has a concern and responsibility to maintain the sustainability of tourism activities in Arborek village.

Setyasih (2021) also explains the beauty and potential of Maratua Island tourism objects, including flora and fauna, mangrove forests, natural panoramas, marine tourism, diving and snorkeling spots, and culture. Of the six criteria used to analyze the tourism potential of Maratua Island, it is explained that the island is worthy as a tourism destination with an index of 84%. The elaboration of the assessment results of the six criteria includes attractiveness of 94%, accessibility of 75%, socioeconomic conditions of 83%, accommodation of 83%, supporting facilities and infrastructure by 80%, and availability of clean water by 87%.

The world economic crisis during the covid-19 pandemic

WHO has declared Covid-19 a global pandemic because it has spread worldwide. Almost all countries worldwide have the same problems due to Covid-19 related to public health and the global economy. The economies of most countries in the world grew negatively and even went into recession. Throughout 2020, the Covid-19 pandemic has caused economic crises worldwide. Coronavirus is estimated to cost the global economy at least 6 trillion dollars (Nasir & Ahsan, 2020). *The International Monetary Fund (IMF) states that world economic growth will decline by 0.1-0.2% to 3.3% in 2020* (Tanjung, 2021). The head of the Organization for Economic Cooperation and Development (OECD), Laurence Boone has also predicted a slowdown in world economic performance due to the reduced supply chains and falling demand for commodities. The World Bank, in its re, the port on Global Economic Prospects in June 202,1 projects that by 2022 the world economy is expected to slow down (Purwanto, 2021). The world's production chain is not only disrupted, but it is also even cut off because many countries choose to implement a lockdown policy to contain the rate of Covid-19 cases. For example, Previous research was by (Yahaya, Montiliat, & Salahudeen, 2020) states that the lockdown policy implemented by the state of Kaduna Nigeria caused many businesses to be destroyed and some to be closed, so that many people had to struggle to provide for their families. Supply/production disruptions also spread to the demand side, consumption fell significantly, investment fell drastically, and world trade was very sluggish. The decline in economic activity and the limited mobility of goods and services, as well as restrictions on the mobility of the population, ultimately affect the company's income and impact the existing tourism sector. The impact on the tourism sector can be seen in the decrease in the number of foreign tourist arrivals. This also resulted in a decline in foreign exchange (forex) transactions through non-bank foreign exchange business activities. The tourism industry is indeed the most disadvantaged business sector.

Forecasting

Forecasting predicts what will happen in the future (Kustiawan & Hudori, 2017). The purpose of forecasting is to help reduce conditions of uncertainty that will occur, especially during the Covid-19 pandemic. The Executive Secretary of the Committee for Handling the Covid-19 and National Economic Recovery (KPPEN) (Pardede, 2020), stated that uncertainty in people's lives had occurred during the Covid-19 pandemic. Currently, the global economy, including Indonesia, is experiencing uncertainty and is leading to an economic recession due to the Covid-19 pandemic (Jannah, 2020). Mulyani (2020), as the Minister of Finance of the Republic of Indonesia, also supports the statement that the impact of Covid-19 is the uncertainty experienced in 2021 and is expected to continue until 2022, especially in the economic sector. Uncertainty in the tourism sector can be seen from previous

research by Bitok (2020) which explains that there has been a decline in the global travel and tourism market in 2020 and estimates show that 100.8 million jobs worldwide are lost. Historical data is collected, analyzed, and calculated by relating it to the predicted time so that the results are predictions that will occur in the future. Based on the period, forecasting can be divided into:

1. Short-term
   Forecasting with short term covers the period from 1 day to 1 season or can be up to 1 year.
2. Medium-term
   Medium-term forecasting covers a period from one season (quarter, quarter, or otherwise) to 2 years. This is part of the medium-term forecasting in forecasting the number of foreign tourists coming to Indonesia.
3. Long-term
   Long-term forecasting includes forecasting for a least five years.

This forecasting method uses a time series (times series) as the basis for forecasting. It takes actual past data to be forecasted to find out the required data pattern to determine the appropriate forecasting method (Sarjono & Abbas, 2017).

The importance of forecasting foreign tourists during the covid-19 pandemic
The arrival of foreign tourists plays an important role which is one sector that has a strong influence in contributing to an increase in foreign exchange apart from the oil and gas sector (Santoso, 2021). Before Covid-19, it can be seen that the number of foreign tourist visits to Indonesia in the last 11 years (2009-2019) has increased every year, with an average number of visits every year reaching 10.36 million people (Roni, H., & Iswandi, 2020). In addition to contributing to the increase in the country's foreign exchange, foreign tourist arrivals also have an essential role in the tourism sector in contributing to regional income for tourist attractions, regional development, and business, including providing considerable employment opportunities as an investment in tourist areas. But the Covid-19 pandemic that hit the whole world had a severe impact on the stability of all countries. It had especially hit the tourism industry and affected foreign exchange earnings and the overall economy of a country that relies on the tourism sector. Covid-19 has also impacted the work and lives of international tourists, attitudes towards tourism trends, and the fact that public hygiene and safety are now of great concern (Riestyaningrum, Ferdaos & Bayramov, 2020). The heaviest hit was when the Large-Scale Social Restrictions (PSBB) were enacted, limiting the number of tourists/foreign visits to Indonesia, which paralyzed tourism activities (Hartono, 2020). The enforced rules that are enforced cake economic activity disrupted and create uncertainty in economic conditions. The impact is that there is a setback in the tourism and travel business, which will directly affect MSME businesses and cause disruption to employment so. There are cases of a reduction in the number of employees and challenging job opportunities (Sugihamretha, 2020).

After discovering a vaccine and conditions moving during the new normal, people's activities slowly return to the beginning. Economic recovery is, of course, a priority, so the government, through the Ministry of Tourism and Culture, must make policies that follow existing conditions to restore the tourism sector during the pandemic. Many tourist attractions are slowly starting to reopen. Of course, the arrival of foreign tourists needs to be predicted for the sake of strategy, planning, policymaking, and budgeting by the parties involved while still complying with the existing health protocols. This step can help the recovery of the tourism sector based on the formulation of appropriate policies during the pandemic and projecting future state revenues for the industry so that the accuracy of a forecast can contribute to the government regarding marketing policies, service availability, and investment policies as well as the community and business people involved in the tourism sector in preparing decisions related to the needs of lodging, restaurants, and tourist attractions.

3. Materials and methods
This study uses forecasting to predict the number of foreign tourists visiting Indonesia. The data used in this study is secondary data from the number of foreign tourist visits to Indonesia per month from January 2017 to October 2021. This period was chosen because the availability of data presented on the Central Statistics Agency (BPS) website only covers that period. However, the amount of data is still

in the minimum data requirements category. The minimum data required for the Holt-Winter forecasting method is 4-5 per season (Lusiana & Yuliarty, 2020).

There are two kinds of Holt-Winters method: the Holt-Winters Exponential Smoothing Multiplicative model and the Holt-Winters Winter Exponential Additive method. The forecasting method used is Holt-Winter Exponential Smoothing Multiplicative (Darma et al., 2020). This method is one of the exponential smoothing methods that can only be used for data containing trend patterns and seasonal patterns with relatively increasing or decreasing variations. The data in this study has a relatively increasing pattern in certain months related to the holiday season from the period 2017 to the end of December 2019. After Covid-19 was confirmed to have entered Indonesia in March 2020, the tourist visit data decreased. This data pattern can be seen in figure 1.

This Multiplicative Holt-Winter consists of three crucial variables: smoothing elements (level), trend elements, and seasonal (seasonal). This research data contains seasonal factors, which are presented on the Central Statistics Agency (BPS) website monthly. Therefore the seasonal period s = 12 will be used, which is the number of months in one seasonal period. The steps are as follows:

Step 1. Initiate the initial value of the Ls level using equation (1)

$$L_s = (Y_1 + Y_2 + Y_3 + ... + Y_s)/s \qquad (1)$$

where,

L_s = Initialization level
Y_s = Number of foreign tourists to-s
S = Seasonal period (s = 12)

Step 2. Determine the initial value of the trend bs using equation (2)

$$b_s = (Y_{s+1} - Y_1)/s \qquad (2)$$

where,

b_s = Initialize trend
Y_{s+1} = Number of foreign tourists to- (s + 1)
s = Seasonal length (s = 12)

Step 3. Determine the initial value for the seasonal index using equation (3)

$$S_p = Y_p/L_s \qquad (3)$$

where,

S_p = Seasonal initialization
Y_p = Number of foreign tourists to – p
L_s = Initialization level
p = seasonal period in the first year (p = 1,2,3, ... 12)

After determining the initial value of the smoothing element (level), trend element, and seasonal (seasonal), then the next step is to forecast the number of foreign tourists. The multiplicative holt-winters method for each period uses three weights in the forecasting process, namely:
1. Alpha weight (α), which is a parameter used to control the level whose value is $0 < \alpha < 1$
2. Beta weight (β), which is the parameter used to control the relative smoothing to estimate the occurrence of the trend element in the forecasting process. Beta weight has a value of $0 < \beta < 1$.
3. Gamma weight (γ), which is a parameter used to control the relative smoothing to estimate the occurrence of seasonal elements. Gamma has a value of $0 < \gamma < 1$.

Determination of the value of α, β, γ is done using trial and error. The next step is to forecast the following process and equation.

Step 4. Calculating exponential smoothing (level) using equation (4)

$$Lt = \alpha \frac{Yt}{St-s} + (1 - \alpha)(L_{t-1} + b_{t-1}) \qquad (4)$$

where,

L_t = Exponential smoothing in year-t
L_{t-1} = Level in year- $t-1$
b_{t-1} = Trends in year- $t-1$
Y_t = Number of tourists visiting in year- t
α = Level weighting constant ($0< \alpha <1$)
S_t = Seasonal in year- t
s   = Seasonal length (s = 12)

Step 5. Calculate the smoothing of the trend element using equation (5)
bt $= \beta (L_t - L_{t-1}) + (1-\beta)b_{t-1}$ (5)
where,
bt   = Trends in year- 1
L_t = Exponential smoothing in year- t
L_{t-1} = Level in year- $t-1$
b_{t-1} = Trends in year- $t-1$
β = Trend weighting constant ($0< \beta <1$)
t   = Seasonal period

Step 6. Calculating seasonal smoothing using the equation (6)
$St = \gamma \frac{Yt}{Lt} + (1 - \gamma)S_{t-s}$ (6)
where,
S_t = Seasonal in year- t
Y_t = Number of tourists visiting in year- t
L_t = Exponential smoothing in year- t
γ = Seasonal smoothing weight constant ($0< \gamma <1$)
S_{t-s} = Seasonal factor smoothing
t   = Seasonal period
s   = seasonal length (s = 12)

Step 7. Furthermore, forecasting the number of foreign tourists visiting Indonesia is obtained using the equation (7)

$Y_{t+m} = (L_t + b_t m)S_{t-s+m}$ (7)

where,
Y_{t+m} = Forecasting results to- $t+m$
L_t = Exponential Smoothing in year- t
S_{t-s} = Seasonal Factor Smoothing
t   = Seasonal period
s   = Seasonal length (s = 12)
m   = Time period to be forecast
b_{t-1} = Trends in year- t

Previously the coefficient value (α, β, γ) was determined by trial and error. Then, it was determined using a solver. The best group of forecasting coefficients is selected based on the minimum Root Mean Square Error (RMSE). Root Mean Square Error (RMSE) is used to measure the suitability of the Holt-Winters Multiplicative method in predicting the number of tourist visits and forecast error.

The RMSE formula is as follows
$$RMSE = \sqrt{\frac{\sum_{t=1}^{n}(At-Ft)^2}{n}}$$

where,
At   = Actual data value
Ft   = Value of forecasting result
n   = Number of data
Σ   = Summation (Sum of all scores)

4. Results and discussion

The data used and processed in this study are sourced from the Indonesian Central Statistics Agency (BPS) from 2017 to 2021. The total data used is 58 monthly data from January 2017 to October 2021. The complete data can be seen in Table 1.

Table 1. Data on the Number of International Tourist Arrivals Visiting Indonesia

Number	Month	Years	Tourist
1	January		1.085.629
2	February		1.006.406
3	March		1.039.224
4	April		1.151.653
5	May		1.127.140
6	June		1.117.121
7	July	2017	1.351.325
8	August		1.374.634
9	September		1.232.213
10	October		1.145.037
11	November		1.040.941
12	December		1.126.645
13	January		1.037.007
14	February		1.148.185
15	March		1.306.073
16	April		1.243.351
17	May		1.182.302
18	June		1.245.963
19	July	2018	1.488.007
20	August		1.457.913
21	September		1.321.080
22	October		1.238.273
23	November		1.098.399
24	December		1.338.928
25	January		1.147.437
26	February		1.180.868
27	March		1.252.770
28	April		1.229.620
29	May		1.201.724
30	June		1.358.983
31	July	2019	1.420.992
32	August		1.464.499
33	September		1.333.421
34	October		1.298.363
35	November		1.233.373

36	December		1.320.259
37	January		1.225.074
38	February		822.165
39	March		458.360
40	April		157.441
41	May		161.194
42	June		156.061
43	July	2020	155.213
44	August		160.565
Number	Month	Years	Tourist
45	September		148.109
46	October		151.874
47	November		142.934
48	December		162.770
49	January		136.295
50	February		115.101
51	March		129.719
52	April		124.738
53	May	2021	151.677
54	June		136.468
55	July		134.729
56	August		124.180
57	September		123.500
58	October		150.385

Source: Central Bureau of Statistics (2021)

Based on Table 1, a graph is presented that can illustrate trends and seasonal patterns in data on the number of arrivals of foreign tourists visiting Indonesia. The following is Figure 1, which shows data on the number of foreign tourist arrivals visiting Indonesia each month starting from January 2017 to October 2021
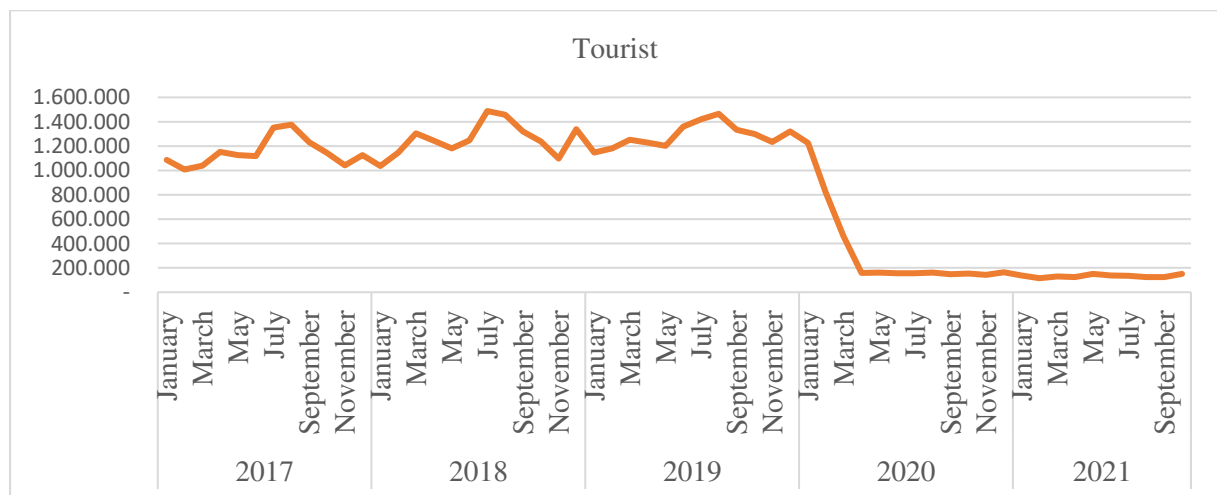

Figure 1. Data on the Number of International Tourist Arrivals Visiting Indonesia
Source: Processed Data (2021)

Based on Figure 1, which has been presented, it can be seen that every February, April, May, September, October, November in 2017-201,9 there was a decrease in the number of foreign tourist arrivals while in January, March, June, July, August, December in 207-2019 experienced an increase. It can be seen that the arrival of foreign tourists experienced an up and down trend seasonally, but starting in March 2020, there was a very drastic decline. The downward trend from March 2020 is relatively constant until the 2021 period. This is due to the government implementing a policy to limit community mobility by implementing social distancing due to the entry of the Covid-19 virus into Indonesia, which was only detected and confirmed in March 2020. Large-Scale Social Restrictions (PSBB), Enforcement of Restrictions on Community Activities (PPKM), and implementing a policy of closing access for foreigners who enter or transit to Indonesia. This means that no tourists visiting Indonesia, except tourists who meet the requirements imposed by the Ministry of Foreign Affairs, are allowed to enter. But now the government has opened access for tourists who want to visit. Holt's Winter Multiplicative forecasting method is used to predict the number of foreign tourists who come to Indonesia during the COVID-19 pandemic. The following is the process of forecasting calculations using the Holt-Winter Exponential Method.

Steps 1-3 are the initiation of the initial value of the Ls level, the initial value of the bs trend, and the initial value of the seasonal index with a period of 12 months using data for the period 1 to 12 of 2017 as shown in table 2.

Table 2 Number of International Tourists Visiting Indonesia in the period 1-12 the Year 2017

Period	Month	Tourist
1	January	1.085.629
2	February	1.006.406
3	March	1.039.224
4	April	1.151.653
5	May	1.127.140
6	June	1.117.121
7	July	1.351.325
8	August	1.374.634
9	September	1.232.213
10	October	1.145.037
11	November	1.040.941
12	December	1.126.645

Step 1 Initiate the initial value of Ls

$L_s = (Y_1 + Y_2 + Y_3 + ... + Y_s)/s$
$L_{12} = (Y_1 + Y_2 + Y_3 + ... + Y_{12})/12$
$L_{12} = (1.085.629 + 1.006.406 + 1.039.224 + 1.151.653 + 1.127.140 + 1.117.121 + 1.351.325$
$= + 1.374.634 + 1.232.213 + 1.145.037 + 1.040.941 + 1.126.645)/12$
$= 1.149.831$

Step 2 Initiate the initial value of the trend

$b_s = (Y_{s+1} - Y_1)/s$
$b_{12} = ((Y_{12}-Y_1) + (Y_{11}-Y_2) + (Y_{10}-Y_3) + (Y_9-Y_4) + (Y_8-Y_5) + (Y_7-Y_6))/12$
$= ((1.126.645-1.085.629) + (1.040.941-1.006.406) + (1.145.037-1.039.224)$
$= + (1.232.213-1.151.653) + (1.374.634-1.127.140) + (1.351.325-1.117.121)/12$
$= 9.080$

Step 3 Initial calculation of the initial value of the seasonal index can be seen in Table 3

Table 3. Initial Calculation of the Initial Value of the Seasonal Index

Period	Yp	L12	Sp = Yp / L12
1	1.085.629	1.149.831	0,944
2	1.006.406		0,875
3	1.039.224		0,904
4	1.151.653		1,002
5	1.127.140		0,980
6	1.117.121		0,972
Period	Yp	L12	Sp = Yp / L12
7	1.351.325		1,175
8	1.374.634		1,196
9	1.232.213		1,072
10	1.145.037		0,996
11	1.040.941		0,905
12	1.126.645		0,980

After determining the initial value of the smoothing element (level), trend element, and seasonality, the next step is to determine the three weights in the forecasting process, namely α, β, γ using trial and error with the condition that the value range is between 0 – 1 selected values of α = 0.1, β = 0.2, γ = 0.3.

In the previous stage, the initial value of the Ls level, the initial value of the bs trend, and the initial value of the seasonal index have been obtained. The results will be used in subsequent calculations in steps 4 to 6.

Steps 4 to 6 are used to calculate exponential smoothing (level), smoothing of the trend element, and seasonal smoothing for the 13th period.

Step 4 calculate exponential smoothing (level)

$$L_t = \alpha \frac{Y_t}{S_{t-s}} + (1-\alpha)(L_{t-1} + b_{t-1})$$

$$L_{13} = \alpha \frac{Y_{13}}{S_{13-12}} + (1-\alpha)(L_{13-1} + b_{13-1})$$

$$= \alpha \frac{Y_{13}}{S_1} + (1-\alpha)(L_{12} + b_{12})$$

$$= 0{,}1 \times \frac{1.037.007}{0{,}944} + (1-0{,}1)(1.149.831 + 9.080)$$

$$= 1.152.853$$

Step 5 calculate smoothing of the trend element

$$b_t = \beta (L_t - L_{t-1}) + (1-\beta)b_{t-1}$$

$$b_{13} = \beta (L_{13} - L_{13-1}) + (1-\beta)b_{13-1}$$

$$= \beta (L_{13} - L_{12}) + (1-\beta)b_{12}$$

$$= 0{,}2 \times (1.152.853 - 1.149.831) + (1-0{,}2) \times 9.080$$

$$= 7.868{,}443$$

Step 6 calculate seasonal smoothing

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

$$S_{13} = \gamma \frac{Y_{13}}{L_{13}} + (1-\gamma)S_{13-12}$$

$$= \gamma \frac{Y13}{L13} + (1 - \gamma)S_1$$
$$= 0{,}3 \; x \frac{1.037.007}{1.152.852} + (1 - 0{,}3) \; x \; 0{,}944$$
$$= 0{,}931$$

Then the forecasting of the number of foreign tourists visiting Indonesia is obtained using equation (7) which starts for the 14th period

$$Y_{t+m} = (L_t + b_t m)S_{t-s+m}$$
$$Y_{13+1} = (L_{13} + b_{13x1})S_{13-12+1}$$
$$Y_{14} = (L_{13} + b_{13})S_2$$
$$= (1.152.853 + 7.868{,}443) \; x \; 0{,}875$$
$$= 1.015.938$$

Description: with a value of m = 1
Then repeat the 4-6 stages for the 14th to 70th period and the 7th stage for the 15th period.

Previously the coefficient values of α, β, γ were determined by trial and error, then decided using a solver in the Microsoft Excel application with the range of each value of α, β, γ being between values 0 and 1. The best forecasting coefficient group was selected based on the minimum value Root. Mean Square Error (RMSE). Root Mean Square Error (RMSE) was calculated to determine the error value. The goal is to assess the magnitude of forecasting accuracy, so it is necessary to calculate the error value. Forecasting accuracy is outstanding in helping decision-making, and planning is effective and efficient in taking appropriate actions. Forecasting accuracy shows how far the forecasting model can explain known data (Makridakis et al., 1999). Furthermore, with the solver, the value of α = 1, β = 0.03, and γ = 0.27, and the value of Root Mean Square Error is 121.090, so there is a change in the final result from the previously calculated forecasting value. The following results for forecasting foreign tourist arrivals visiting Indonesia for November 2021 to October 2022 are presented in Table 4.

Table 4. Forecasting of Foreign Tourist Arrivals Visiting Indonesia

Number	Months	Years	Tourist	Forecasting
1	1		1.085.629	
2	2		1.006.406	
3	3		1.039.224	
4	4		1.151.653	
5	5		1.127.140	
6	6		1.117.121	
7	7	2017	1.351.325	
8	8		1.374.634	
9	9		1.232.213	
10	10		1.145.037	
11	11		1.040.941	
12	12		1.126.645	
13	1		1.037.007	
14	2		1.148.185	967.539
15	3		1.306.073	1.198.158
16	4		1.243.351	1.465.184
17	5		1.182.302	1.227.194
18	6		1.245.963	1.180.548

Number	Months	Years	Tourist	Forecasting
19	7	2018	1.488.007	1.520.367
20	8		1.457.913	1.526.009
21	9		1.321.080	1.315.918
22	10		1.238.273	1.236.188
23	11		1.098.399	1.133.555
24	12		1.338.928	1.196.085
25	1		1.147.437	1.301.689
26	2		1.180.868	1.069.676
Number	Months	Years	Tourist	Forecasting
27	3		1.252.770	1.229.311
28	4		1.229.620	1.400.166
29	5		1.201.724	1.209.580
30	6		1.358.983	1.196.865
31	7	2019	1.420.992	1.657.374
32	8		1.464.499	1.451.323
33	9		1.333.421	1.318.372
34	10		1.298.363	1.244.752
35	11		1.233.373	1.187.080
36	12		1.320.259	1.343.873
37	1		1.225.074	1.280.074
38	2		822.165	1.141.306
39	3		458.360	843.973
40	4		157.441	488.378
41	5		161.194	124.306
42	6		156.061	131.442
43	7	2020	155.213	155.500
44	8		160.565	124.028
45	9		148.109	114.650
46	10		151.874	111.443
47	11		142.934	115.467
48	12		162.770	131.217
49	1		136.295	135.212
50	2		115.101	106.328
51	3		129.719	98.478
52	4		124.738	122.309
53	5		151.677	101.173
54	6		136.468	131.248
55	7	2021	134.729	142.205
56	8		124.180	113.535
57	9		123.500	90.546
58	10		150.385	96.469
59	11			121.691
60	12			131.711

Number	Months	Years	Tourist	Forecasting
61	1			126.916
62	2			117.654
63	3	2022		106.494
64	4			101.395
65	5			82.971
66	6			66.112
67	7			60.471

Number	Months	Years	Tourist	Forecasting
68	8			41.677
69	9			19.577
70	10			1.688

Source: Processed Data (2021)
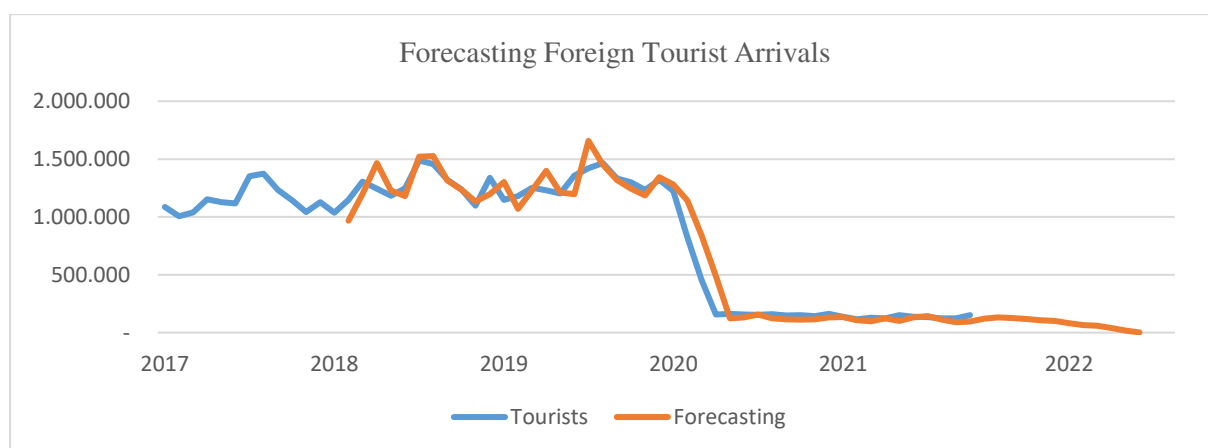
Figure 2. Forecasting graph of the number of foreign tourists visiting Indonesia
Source: Processed Data (2021)

Based on Table 2 and Figure 2, it can be seen that in November 2021, the number of foreign tourists visiting Indonesia was 121,691 people, and in December 131,711 people. The number of foreign tourist arrivals in that month seemed to have increased compared to October, with only 96,469 people. This increase in tourist arrivals can occur because the government has reopened entry access for foreign tourists to Indonesia, which has opened international flights to Bali with strict procedures. The tourism sector has slowly reopened existing tourist attractions by implementing health protocols. strict. It also coincides with the Christmas holidays and the 2022 new year so that many foreign tourists will visit to enjoy the moment of Christmas and the turn of the year. Tourist attractions that will be crowded with foreign tourists such as Bali, which is famous for its scenic charm, beautiful beaches, and culture because based on data on the number of foreign tourist arrivals from 2017 to 2019 before the Covid-19 outbreak, there was an increase, in 2017 there were 5,697,739 people, in 2018 there were 6,070,473 people, and in 2019 there were 6,275,210 people (Bali.bps.go.id, 2022).

Besides Bali, there is Borobudur Temple with its beauty and splendor, which has been confirmed as a cultural heritage by Unesco, so that it can attract tourists both domestic and foreign tourists to visit where before the Covid-19 there was an increase in visitors every year which was seen from 2015 to 2019, except in 2018 with the number of visitors in 2015 as many as 185,394 people, in 2016 as many as 200,616 people, in 2017 as many as 224 473 people, in 2018 a slight decrease with a total of 192,231, in 2019 an increase of 242,082 (Magelangkab.bps.go.id, 2022). Bunaken Island, which is located in the

province of North Sulawesi, is famous for marine tourism and also has the potential to attract tourists who come to do diving and snorkeling, and based on data from the Central Statistics Agency (BPS) recorded during January to April 2019, as many as 43 thousand foreign tourists visited North Sulawesi through the gate enter Manado's Sam Ratulangi Airport. This number is up about 10 percent compared to the same period in 2018 (Nasional.republika.co.id, 2019), and Raja Ampat, also famous for marine tourism and coral reefs, is dubbed as a tourist spot with the most beautiful coral reefs globally. This tourist spot has the potential to be revisited by foreign tourists because based on statistical data before Covid-19, the number of foreign tourist visits from 2017 to 2019 continued to increase wherein 2017, the number of foreign tourist arrivals was 18,841 people, in 2018 there were 23,099 people, and in 2019 there were 24,090 people (Rajaampatkab.bps.go.id, 2022).

However, from January to October 2022, the forecast for the number of foreign tourists visiting Indonesia will experience a continuous decline, without any increase. This continued decline may be due to the potential for a third wave of Covid-19. The trigger for the potential spike in Covid-19 cases in the third wave can be caused by forecasting the number of foreign tourists visiting Indonesia in December, increasing community mobility in welcoming the Christmas and New Year holidays by taking vacations to planned tourist destinations. Besides that, many people and tourists ignore the implementation of health protocols. Professor Sai Reddy, a professor of Systems and Synthetic Immunology at Zurich's ETH University, argues that Covid-19 in 2022, especially early January to March, has a worse chance than this year (Nurtoro, 2021). The factors that support this opinion are the emergence of the Delta variant, which shows an increase in transmission (Detik.com, 2021). Suppose the third wave of Covid-19 has been confirmed. In that case, the government will, of course, re-implement social distancing with Large-Scale Social Restrictions (PSBB), Enforcement of Community Activity Restrictions (PPKM), and a policy of closing access for foreigners who enter or transit to Indonesia, which means there are no tourists who visited Indonesia. This condition certainly impacts the tourism sector, which has slumped again and affects state revenues from the sector. This downturn is because the tourism sector relies heavily on human movement (Tanoesoedibjo, 2020).

The possibility of forecasting the number of foreign tourists experiencing a continuous decline could also be caused by the economies of most countries in the world which grew negatively due to the Covid-19 surge. The forecasting results support the World Bank's statement in its June 2021 Global Economic Prospect report, which projects that in 2022 the world economy is expected to slow down to 3.8 percent. This condition has not only disrupted the world's production chain. Still, it has even been cut off because many countries have implemented lockdown policies to stop the increase in COVID-19 cases. Supply/production disruptions also spread to the demand side, consumption fell significantly, investment fell drastically, and world trade was very sluggish (Purwanto, 2021).

5. Conclusion
Indonesia is famous abroad with 1001 charms ranging from nature, culture, culinary, and various arts and customs. Many foreign tourists become interested in visiting. Its natural beauty and uniqueness make the tourism sector have a strong influence in contributing to an increase in foreign exchange through the arrival of foreign tourists. The policy of reopening entrance access for foreign tourists who want to visit Indonesia after the trend of COVID-19 cases has decreased led to the need to predict the number of foreign tourists who come. Accurate forecasting can help maximize decision-making and be used as a reference for formulating strategies to anticipate the arrival of foreign tourists to Indonesia during the COVID-19 pandemic.

This study uses the Holt's-Winters Multiplicative method to predict tourists visiting Indonesia during the COVID-19 pandemic. With the error rate calculated by the Root Mean Square Error (RMSE) of 121,090 (α = 1, = 0.03, = 0.27), the forecast for the number of foreign tourists visiting Indonesia has increased for November and December. 2021 compared to October. This increase can occur because it coincides with the Christmas and New Year's holidays in 2022. However, from January to October 2022, the forecast for the number of tourists experienced a continuous decline, without any increase. The continued decline may be due to the slowing global economic conditions and the possibility of a

third wave of Covid-19, which is expected to occur due to a surge in people's mobility on Christmas and New Year's Day 2022.

From the results of the research that has been done, it is hoped that it can help the government determine the steps/policies to be taken in anticipating the arrival of foreign tourists visiting Indonesia after some time closing access for foreign tourists. As for policy recommendations that can be applied related to forecasting results in welcoming the policy of reopening access to foreign tourists, it is essential for the Ministry of Tourism and Creative Economy to provide support to the tourism industry, which is trying to bounce back, namely by providing incentives in the form of allocation of assistance to the tourism offices in each country. Areas that will later be allocated directly to affected tourism and creative economy business actors and make SOPs mitigate tourism disasters, including the Covid-19 outbreak. The Ministry of Tourism and Creative Economy must also emphasize information about the importance of cleanliness and environmental health of tourist destinations that must be applied and highlight the minimum standards of facilities and infrastructure that must exist during the COVID-19 pandemic, such as places to wash hands, places for health services and are prepared according to conditions and conditions. the needs of each tourist destination, in collaboration with many other ministries and institutions to conduct simulations of health, security, and safety protocols in tourist destinations.

To re-increase tourist confidence and national tourism, the Ministry of Tourism and Creative Economy, through social media or mass media, explained that it had compiled a Cleanliness, Health and Safety (CHS) protocol in the form of educational videos and handbooks aimed at tourism and creative economy entrepreneurs as well as presenting content - content related to the handling of Covid-19 that has been carried out to convince tourists not to worry about spending time off at these tourist destinations. Besides that, cooperation from tourism businesses, the community, and the Covid Task Force is also needed. Tourism business actors comply with government regulations by revamping destinations, regulating the maximum capacity of tourists who can visit, preparing risk mitigation from the Covid-19 outbreak, and providing supporting facilities. To meet adequate health protocols, safety, and comfort standards, tourists and the public can comply with the covid protocol, especially when traveling. The Covid Task Force must maximize its role in controlling Covid conditions in each region and urge the public to comply with the covid protocol. This research can contribute to reducing the impact of losses that occur if the third wave of the Covid-19 pandemic cannot be avoided, both reducing losses on the economic side because they have prepared policies/mitigations on tourism due to the Covid-19 outbreak, and people who are confirmed to be affected by Covid-19 do not as much as before because of policies that have been formed by the Ministry of Tourism and Creative Economy so that the impact will not be as significant as what happened in the previous wave, or even controllable conditions can prevent the potential third wave of spikes in Covid-19 cases and optimize the economic sector recovery plan.

Recommendations
- The limitation of this study is that data on the number of foreign tourists visits on the Central Statistics Agency website is only available from early 2017 to October 2021. Forecasting results will be more accurate if more data is used and the selected period time is longer because this study only takes data through the website so that further researchers are expected to contact the Central Statistics Agency directly to request data that is not published on the website so that the more data and the period time selected, the more accurate the forecasting calculation will be.
- This method is suitable for short-term forecasting. However, for long-term forecasting, it is recommended to use a more suitable method, such as the ARIMA model, SARIMA, and so on, so that forecasting produces a more accurate prediction of an event.

Based on the results of this study, it is hoped that it can provide an overview for the government to be able to formulate appropriate policies because it coincides with the reopening of entry access for foreign tourists to Indonesia, while the Department of culture, tourism, and sports can maximize its role by formulating policies to rearrange tourist attractions.

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