



Digitization And Prediction Of The Number Of Tourist Visits In The Bali Province

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Abstract—The development of information technology forces all sectors to develop and adapt. It is the same with the tourism sector in Bali which is starting to experience a fairly rapid development of technology adoption. This research aims to (1) explore the role of social media and online travel applications in current Bali tourism and (2) predict the number of foreign tourist visits to Bali Province. This study uses a quantitative approach using the province of Bali as the research location, considering that Bali is one of the leading tourism destinations in Indonesia. The results of the analysis show that the use of information technology, especially social media, makes it easier for tourists to access information related to tourist destinations. with existing developments, it is predicted that there will continue to be an increase in the number of tourist visits every year. This must be followed by the development of the tourism supporting sector and the improvement of all related facilities. In addition, health and safety issues must be a top priority.

Keywords: forecasting; information technology; tourism; tourist visit

I. INTRODUCTION

Technological developments due to the industrial revolution occurred in almost all sectors of the economy. The industrial, agricultural, service, health, and even education sectors are starting to develop with technology, aiming to improve and grow. In the health sector, more modern treatment methods are being developed. Various studies were conducted to create a better healing method. Distance learning systems using the internet are now becoming an option in education. Moreover, with increasingly sophisticated communication tools, distance learning can be done anytime, anywhere by utilizing the internal network and smartphone applications. The same goes for developments in the tourism sector.

Social media has brought significant changes to the communication process. Companies must respond to this challenge because conventional marketing strategies are

no longer suitable in an era where consumers are more sophisticated than before (Chatzithomas et al., 2014). Social media is an internet-based application that allows creating and modifying user-generated content based on technology and the internet (Adebanjo & Michaelides, 2010; Kaplan & Haenlein, 2010). The tourism sector must apply these advances to its marketing activities to maintain the company's sustainability, success, and profitability. Consumer dominance and intense competition in the virtual world oblige companies to make strategic decisions for product presentation, pricing policies, promotion decisions, and places of sale or selection of distribution channels, known as the marketing mix. The marketing mix concept has changed due to advances in communication technology to become an e-marketing mix (Dominici, 2009; Yoo & Gretzel, 2010). Companies engaged in the tourism sector use social media for marketing campaigns (Chatzithomas et al., 2014;

Mukherjee & Nagabhushanam, 2016).

The application of ICT as a medium for tourism promotion has been carried out by other countries such as Hong Kong, Singapore, Denmark, Switzerland, Malaysia and others. In Malaysia, the application of ICT for tourism promotion media is carried out by cooperating with the Yahoo and MSN platforms to enhance the "Malaysia Truly Asia" brand. Through online advertising, the Malaysian state wants to increase the number of tourists through its official tourism website. Based on a report by The World Economic Forum (WEF), Indonesia is ranked 42nd as a global tourism destination. Based on the WEF survey, Indonesia ranks 91st in terms of ICT implementation readiness (Apriani & Irpan, 2017). This is very far when compared to other countries based on the same data. This proves that the application of ICT in Indonesia to promote tourism is still not optimal.

The Indonesian Ministry of Tourism is utilizing social media as an effort to promote Indonesian tourism which will have an impact on increasing the number of visits in Indonesia. Based on data from the Central Bureau of National Statistics, from January to December 2017, 14.04 million visits or a 21.88 percent increase in the number of foreign tourists coming to Indonesia compared to 2016 totaling 11.52 percent million visits. (Yanti, 2020) Several factors causing an increase in tourists visiting Indonesia include competitive travel costs. There are many direct flight routes to various tourist destinations in Indonesia and the promotion strategy of the Ministry of Tourism which continues to be intensified.

The rapid advancement of technology and the increasingly active use of social media in the current digital era will directly or indirectly impact the growth of the tourism sector in the Province of Bali. Research conducted by Rukmiyati & Suastini (2016) shows that social media influences tourist behavior in choosing and deciding which tourist attractions to visit. This research also found that tourists use social media to communicate during their trips. Furthermore, tourists will also share their experiences when traveling on social media. Research related to the use of social media in tourism promotion was also carried out by Andih (2018) where his research concluded that social media has a role in attracting tourists to visit the Tetempangan Hill tourist attraction in Minahasa Regency, North Sulawesi Province. Social media that play the most role in attracting tourists to Tetempangan Hill attractions is Facebook with 82 percent of

respondents, Instagram with 12 percent of respondents, and YouTube with 6 percent of respondents.

The growing use of social media and the internet in tourism promotion will increase the number of tourist visits. The increasing number of tourist visits, followed by an increase in tourist expenditure and an increase in hotel room occupancy, will increase the tourism sector's income, which will impact regional income and economic growth in the Province of Bali. Based on this, this paper aims to (1) explore the role of social media and online travel applications in current Bali tourism and (2) predict the number of foreign tourist visits to Bali Province.

II. CONCEPT AND HYPOTHESIS

Several studies related to social media and its influence on the tourism sector have been carried out by experts, including Dina & Sabou, (2012), examining the influence of social media in choosing tourist destinations. The results are that social media can change a person's behavior in determining the choice of tourist attractions, where tourists will seek more information on tourist attractions through social media. Furthermore, Madondo (2016) researched the influence of social media in promoting the tourism industry in Durban, South Africa. As a result, social media can influence tourists' final decisions in determining destinations. More specifically, Fotis (2015) examines the use of social media and its impact on consumer behavior: in the context of travel. This research shows that for active users, social media during a trip serves first as a source of inspiration and ideas for future vacations. Second, social media is used to work together among traveling members, for example, by sharing information. Third, social media provides a variety of information (such as destinations, accommodation & holiday activities) so that it plays a role in decision-making. Fourth, social media is used to express oneself before, during, or after the holidays. Fifth, social media is also used to maintain communication between tourists. Finally, social media is used as a medium of entertainment by tourists.

Research related to the prediction of the number of tourist visits was conducted by Rukini et al. (2019). Using the ARIMA method, the forecast number of foreign tourist arrivals in Bali is 5.07 million in 2019, far below the target of 8 million tourists. The number of foreign tourist visits to Indonesia was predicted by Indrasetianingsih et al.

(2017). The method used in this research is ARIMA Box Jenkins. For modeling, data on the number of visits by foreign tourists was used monthly from January 2010 to June 2017. After performing the ARIMA Box Jenkins analysis, the ARIMA model was obtained (0,1,1) (0,0,2)12. Using this model, predictions for June 2016-June 2017 are obtained with a percentage of forecasting error/MAPE (Mean Absolute Percentage Error) of 7.93 percent. Other research related to forecasting the number of tourist visits was also carried out by Adnyana et al. (2016). Prediction is made by using the transfer function. The forecast results for the number of foreign tourists visiting Bali from January 2016 to June 2016 obtained the forecast results: 343124, 352206, 46427,347478, 344469, 385457 tourists.

III. METHOD

This study uses a quantitative approach using the province of Bali as the research location, considering that Bali is one of the leading tourism destinations in Indonesia. The type of data used in this paper is secondary data obtained from sources such as the Bali Province Central Statistics Agency and Instagram social media. The secondary data used is the number of tourist visits from 2008 - 2021 with quarterly data. The method used is descriptive analysis and forecasting with a seasonal approach. Descriptive analysis is used to explain the readiness of Bali Tourism to welcome the Industrial Revolution 4.0 and explore the role of social media in tourism promotion.

Because one of the objectives of this study is to determine the number of tourist visits and their predictions, it is essential to carry out analysis and forecasting of data on the number of tourist visits. One of the analysis techniques used is a seasonal adjustment. Seasonal adjustment is a technique in which time series data is broken down into its components: trend, cycle, seasonality, and irregular. The purpose of this seasonal adjustment is to exclude seasonal influences to provide a better understanding of the behavior of a time series.

IV. RESULT AND DISCUSSION

“The Power of Social Media” in Bali Tourism Promotion

Tourism is everything related to travel, including the exploitation of tourist objects and attractions as well as related businesses in that field. Tourism is an industry that continues to

grow in the world. The emergence of social media as one of the new media has brought significant changes to the world of tourism. Social media offers a different experience for tourists in obtaining information about products and services in tourism (Rukmiyati & Suastini, 2016). Social media is often a source of information. Social media provides not only information on tourist destinations but also experiences and impressions of these tourists as a reference in making decisions and beliefs and improving the quality of travel. In addition, for product or service providers in tourism, social media is also a new means of promotion (Mahadewi, 2016).

Based on katadata.com (2022), the development of internet use in Indonesia is very rapid, growing by 51 percent in one year, with a growth rate that far exceeds the growth rate of internet users worldwide, which is 10 percent. Indonesia ranks as the second largest global internet user. More than 69 percent of Indonesians access the internet using their mobile devices. This figure also exceeds the use of the internet via mobile globally, which is 50 percent. This figure is the fourth highest in the world. With the development of internet use, the development of social media use will also increase. Data on the use of social media in Indonesia is presented in figure 1.

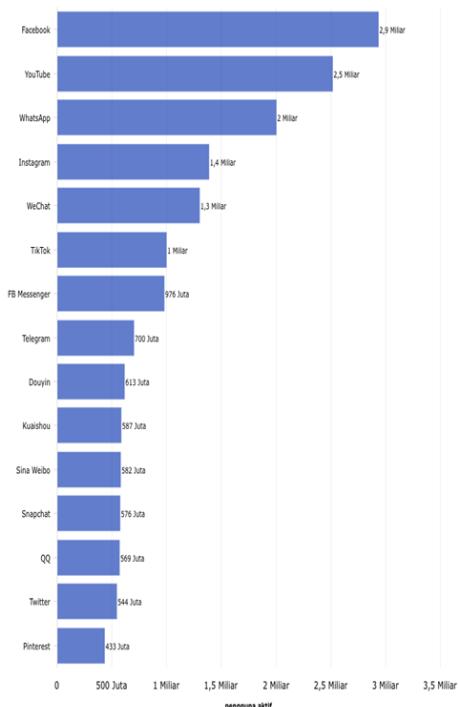


Figure 1. Percentage of Social Media Users in Indonesia 2022
(Source: katadata.com, 2022)

The results of a survey on internet users in Indonesia in the age range of 16-64 years show that there are several social media platforms that Indonesian people actively use. The platform is divided into two social media categories: social networking media and messengers. Youtube ranks first with a usage percentage of 43 percent, and Facebook ranks second with a usage percentage of 41 percent, then Whatsapp with a usage percentage of 40 percent. This shows that the use of social media has great potential for tourism promotion.

In the last five years, Instagram has become one of the most popular social media among Indonesian people, especially young people. Instagram is an effective medium for sharing information, both social and commercial. Many profit-oriented companies carry out promotions using social media, especially Instagram and social institutions. Of course, at a much lower cost when compared to other promotional media. Instagram is a smartphone application that posts photos and videos, where followers can see the posts. Captions and hashtags usually accompany these photo and video posts. Captions generally contain information (description) about uploaded images or videos, while hashtags classify themes or topics in social media. The more people post, the more hashtags they will have. What usually happens is that a post will be commented on or given a like by followers who see it. Instagram's Brand Development reveals that the most posted content by Instagram users in Indonesia is selfies, places they've visited, travel photos, family & friends, food, and so on.

Posting tourism objects on Instagram gives a Bandwagon effect on visits to related objects. This increase in visitors is positively related to increased tourist attraction hashtags on Instagram. In small discussions with several Instagram users, some interesting facts were obtained, including the behavior where before someone goes on a trip, the first thing to do is to find information about tourist objects through an Instagram account, where are the objects that are the most hits with the number of hashtags and many likes, will be the first choice. This means tourists will look for references via Instagram, whether posted by friends or by information providers (e.g., explorebali, visitbali, wonderfullbali, etc.) before traveling. Second, not infrequently posting a tourist attraction published by a friend can attract someone's interest to visit it. Third, many tourist objects that were unknown

at first became popular because they were posted on Instagram accounts, such as Pandawa Beach and mangrove forests. Several hashtags for tourism objects in Bali are presented in Table 1.

Table 1. Hashtags of Several Tourist Attractions in Bali per Regency/City

No	Regency/ City	Tourism Site	Num- ber of Hashta gs
1	Denpasar	#Pantai Sanur	22.182
		#BajraSandhi	6.824
2	Badung	#Uluwatu	861.259
		#PandawaBeach	233.916
		#PadangPadang	115.968
		#LaPlancha	77.057
		#WaterBlowBali	32.155
		#TegalWangiBeach	11.172
3		#Tegallalang	67.862
4	Gianyar	#BaliSafari	30.045
		#BaliPulina	12.914
5	Bangli	#BukitCampuhan	5.528
6		#HiddenCanyonBali	1.912
7		#AirTerjunTegenungan	1.038
8	Klungkung	#Batur	137.950
9		#Panglipuran	7.359
	Karangasem	#ToyaBungkah	2.636
		#NusaLembongan	224.016
		#NusaCeningan	75.270
	Buleleng	#Angelbillabong	17.054
		#TirtaGangga	25.640
		#Lempuyang	9.592
	Jembrana	#Lovina	32.034
		#Sambangan	3.759
		#WanagiriHiddenHill	2.835
	Tabanan	#BunutBolong	1.380
		#TanahLot	468.119
		#Jatiluwih	44.286
		#Baturiti	7.796

(Source: Instagram, processed data, 2022)

Based on Table 1, tourism objects with the most hashtags are still owned by Badung Regency. Tourism objects in this regency are dominated by beach tourism which is currently starting to develop towards beaches in the Pecatu and Uluwatu areas. In addition, beaches with sloping white sand and stunning sunset views are starting to be used as nicely packaged cafes and restaurants, also gaining popularity as tourist destinations. The regency that is starting to develop rapidly is Klungkung. In addition, the island tourism areas in the form of Nusa Penida, Nusa Ceningan, and Lembongan Islands are starting to be able to attract tourists. Likewise, Buleleng Regency relies on hilly tourists and Bangli Regency with the charm of mountains and hot springs. Meanwhile, the district that still lacks tourism objects visited is Jembrana Regency.

The Role of Online Travel Applications in Increasing the Number of Tourist Visits

Digital tourism is an effective strategy in promoting various destinations and Indonesia's tourism potential through various platforms. This means that digital tourism does not only introduce, but also spreads the beauty of tourism widely to increase the number of foreign tourists visiting Indonesia. The digital tourism trend will certainly be a big leap for the tourism sector and the creative economy in Indonesia. This is because digital tourism indirectly makes people more literate and participates in adapting to technological developments. Certainly not a difficult thing, because people's lifestyles tend to be fast and in direct contact with the internet.

Not only that, currently the tourism trend is also starting to shift towards digital. One of the proofs can be seen from the activities of tourists who start planning trips, pre-on-post journeys, which are almost entirely carried out digitally. Interestingly, it turns out that current technological developments have made the tourism industry and the creative economy one of the sectors that have experienced rapid digitization in recent years.

Travel agents produce products oriented toward tourists' wants and needs. Due to many tourist requests, establishing a travel agent business is believed to benefit individuals and groups, increasing the number of travel agents competing in selling tourism products and services. Competition among travel agents is getting tougher with advances in internet-based technology.

Various tourism information that previously could only be obtained from travel agents can now be done easily via the internet so that tourists can arrange their trips. The development of information technology via the internet can be accessed via computers and smartphones, thus speeding up and facilitating the delivery of information needed by tourists. The tendency of tourists to utilize internet-based information technology has driven the advancement of Online Travel Agencies (OTA). OTA utilizes internet-based information technology in selling tourism products. Through internet-based information technology, products sold can be updated and accessed quickly. Here are the 10 (ten) most popular online travel sites according to katadata.com (2022).

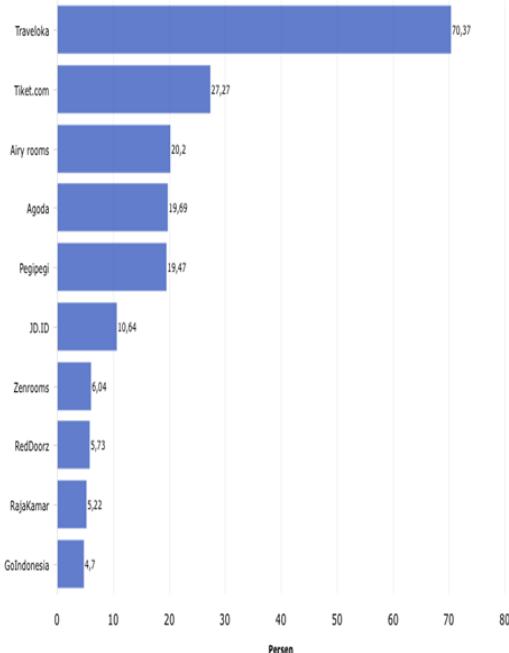


Figure 2. Most Popular Online Travel Sites 2022
(Source: katadata.com, 2022)

Research conducted by Jannah & Yusrizal, (2017) regarding the perceptions of hotel managers in Pekanbaru regarding the existence of OTA concluded that as many as 71 percent of respondents agreed that the digital marketing function, namely attract, engage, retain, learn, and relate, is beneficial for hotels as a marketing tool. Mamanua et al., (2015) also researched OTA regarding Chinese tourists' purchase of OTA products. The analysis results show that five factors influence Chinese tourists' purchasing decisions for tourism products in Bali through OTA: product factors, OTA factors, reference group factors, tourist characteristics factors, and income factors. It was found that the product factor had the most significant influence of the five factors influencing Chinese tourists on their purchasing decisions for tourism products in Bali through OTA. Based on the results of this study, travel agents maintain the four indicators that form product factors: price, packaging, guarantee, and service. Differences in price, product packaging, and guarantees and services provided are essential factors influencing Chinese tourists to purchase tourism products offered through the OTA website. These findings are the same and support the findings of previous researchers conducted by Peng et al. (2013) on the factors influencing tourists in purchasing tourism products online.

Prediction of Number of Visits by International Tourists to Bali

With its various attractions, Bali is able to attract the attention of local and foreign tourists. As many as 40 percent of foreign tourists pass through the Bali gate, so Bali contributes significantly to the number of national foreign tourist visits. According to the Central Bureau of Statistics, in 2016, the number of foreign tourist visits to Bali increased by 22.55 percent compared to 2015. The high flow of tourism to Bali must be balanced with adequate facilities and infrastructure for good security. If not matched by adequate facilities and infrastructure, an increase in the number of foreign tourist visits to Bali can reduce interest in returning to visit Bali and also impact the Balinese people's economic sector. For this reason, it is necessary to predict the number of international tourists visiting Bali every month. By predicting the number of visits by foreign tourists, it is hoped that it can assist the local government and the Bali Provincial Tourism Office in optimizing facilities and infrastructure for the safety of visiting tourists and improving the economic sector of the Balinese people and the country.

Based on published data from the Central Statistics Agency (BPS), data on the number of foreign tourist arrivals to Bali Province from 2008 to 2017 with quarterly data is shown in the following graphic plot.

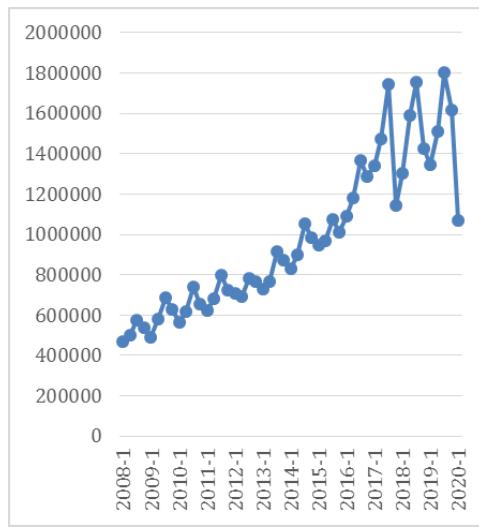


figure 3. The Plot of the Number of Foreign Tourist Visits to Bali in 2008-2021
(Source: disparda.baliprov.go.id, 2022 processed data)

Image 3 shows a plot of the number of foreign tourist arrivals to Bali Province based on quarterly data for 2008-2017. The figure shows the highest number of visits is in the third quarter, around July – September each year. The number of visits decreased slightly in the fourth quarter but was still higher compared to the first and second quarters. The plot also shows that although it is higher than in previous years, tourist arrivals in the fourth quarter of 2017 have decreased. This is due to Mount Agung, which experienced an eruption and caused a travel warning by several countries.

The prediction of the number of tourist visits in this article is carried out using a seasonal approach using the help of the Excel program. The first step is to determine the seasonal adjustment coefficient from data on the number of tourist visits. Then determine the linear equation function to get the total number of foreign tourist visits in 2019. The final step is to calculate the number of tourist visits per season. The steps to calculate these predictions are as follows.

Determining the Seasonal Adjustment of the Number of Tourist Visits

Seasonal adjustment is calculated by dividing the quarterly total by the total number of tourists. The seasonal adjustment for the number of foreign tourist visits to Bali follows

Table 2. Number of Tourist Visits

Year	Quarter (in thousand people)				Total
	1	2	3	4	
2010	563.778	616.340	739.008	657.016	2576.142
2011	624.195	679.414	800.341	722.759	2826.709
2012	710.236	690.268	782.954	765.874	2949.332
2013	727.013	766.008	912.726	872.851	3278.598
2014	831.625	896.525	1052.591	985.897	3766.638
2015	946.011	969.438	1075.364	1011.022	4001.835
2016	1090.449	1181.159	1368.082	1288.247	4927.937
2017	1340.308	1470.981	1744.450	1142.000	5697.739
2018	1303.166	1589.838	1754.035	1423.433	6070.472
2019	1343.392	1511.873	1801.550	1618.395	6275.210
Total	9480.173	9755.530	12031.101	10487.494	42370.612

The number of tourist visits based on Table 2 is the data used to calculate seasonal adjustments. The total value obtained for each season is divided by the number of tourist visits. As for the seasonal adjustment value of tourist visits, it can be calculated as follows.

$$S1 = \frac{9.480.173}{42.370.612} = 0.22$$

$$S2 = \frac{9.755.530}{42.370.612} = 0.23$$

$$S3 = \frac{12.031.101.173}{42.370.612} = 0.28$$

$$S4 = \frac{10.487.494}{42.370.612} = 0.25$$

Adjustment values for each quarter on the number of foreign tourist arrivals for quarters up to 4 are respectively 0.22; 0.23; 0.28; and 0.25. This value can later predict the number of tourist visits each quarter. The adjustment value for each quarter is different because, based on the data, there are differences in the number of tourist visits. The 3rd quarter or around July – September, and the 4th quarter around October – December, have a higher value than seasons 1 and 2 because these months are the winter period and Christmas holidays.

Determining the Equation Function of the Number of Tourist Visits

The equation function to see trends in the number of tourist visits in this article uses the chart function in excel, where the following results are obtained.

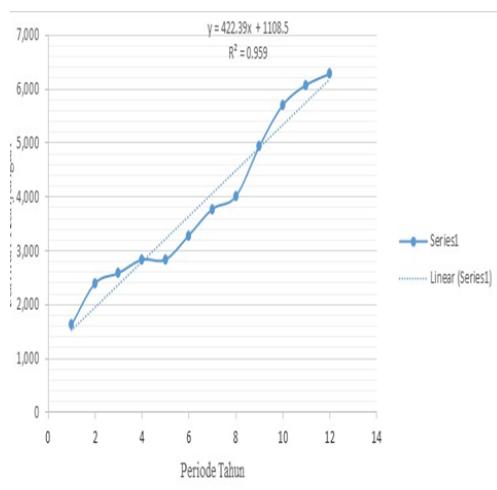


Figure 4. Number of Tourist Visits
(Source: disparda.baliprov.co.id, 2022, processed data)

Based on Image 4, it can be concluded that the function of the equation for the number of foreign tourist visits to Bali Province is as follows.

$$Y = 1108,5 + 422,39X$$

Note:
Y = number of tourist visits
(thousand people)

X = year

Prediction of Number of Tourist Visits to Bali

Based on the seasonal adjustment and the previous equation function, the number of foreign tourist arrivals to Bali Province in 2023 can be calculated as follows.

Prediction of the number of foreign tourist visits to Bali in 2023 (assuming x=16), then:

$$Y = 1108,5 + 422,39X$$

$$Y = 1108,5 + 422,39 (16)$$

$$Y = 7.866,74$$

So the prediction of the number of foreign tourist visits to Bali in 2023 is 7,866.74 thousand tourists or around 7.8 million tourists. Furthermore, the number of tourists per season can be calculated from this value.

The prediction for the number of foreign tourist arrivals to Bali in 2019 for each quarter is as follows.

S1	= 0.22	x	7.866,74	= 1.730,68
S2	= 0.24	x	7.866,74	= 1.888,02
S3	= 0.28	x	7.866,74	= 2.202,69
S4	= 0.26	x	7.866,74	= 2.045,35

The calculation results show the same pattern as the plot for the number of tourist visits in the previous year, where the highest number of visits was in the third quarter.

In December 2022, BPS reported the arrival of many tourists from Australia, India, Singapore, Malaysia, Russia, the UK, the USA, South Korea, China, and Germany to Bali. The interesting thing we can see from the data for December is the return of tourists from China after almost 3 (three) years of absence from Bali. With an increase of 105.47% compared to the previous month, BPS recorded tourist arrivals from China of 10,518 visits (bps.go.id, 2023).

Social media platforms have a fairly strong role in promoting Indonesian tourist destinations. Therefore, creating Instagramable tourist spots is one of the strategies for promoting tourist attractions for free in order to increase tourists. Because everything is completely digital, of course it must be accompanied by easy access for tourists to get to tourist

ites. Starting from ordering travel tickets, choosing transportation, determining accommodation, to finding information about the intended tourist destination, everything can be done via a smartphone.

Not only that, nowadays everything is demanded to be fast, easy and safe, including the matter of payment. Therefore, many tourism and creative economy sectors have switched to cashless payment systems, or digital payments using QRIS (Quick Response Code Indonesian Standard).

The increase in tourist visits to Bali is due to the loosening of travel bans from tourist origins. This increase in the number of tourist visits can also measure the revival of the Balinese economy, which is marked by an increase in Regional Original Income (PAD). The arrival of foreign or domestic tourists is a source of revenue for a region or country, either in the form of foreign exchange or tax and retribution revenue (Austriana, 2005). The more tourists who visit tourist objects, the more attraction entrance tickets will be sold, affecting the increase in tourist levy receipts and the tourism sector's regional original income. In addition, consumptive activities from both foreign and domestic tourists will increase revenue from the tourism sector of a region.

Therefore, the higher the flow of tourist visits, the income of the tourism sector in an area will also increase. The number of tourist visits is significant for developing the tourism industry and local revenue so that domestic and foreign tourists are attracted to visit. The large number of tourists visiting gives the tourism sector the potential to increase local revenue. As a result, the number of tourist visits positively contributes to local revenue. In this effort, the government's role is to improve tourism promotion programs and better tourist attraction facilities. The government is the foundation for accelerating regional development (Miranti et al., 2014).

V. CONCLUSION

The development of technology, especially the internet, makes it easier for people to access it today. By utilizing internet-based social media, tourism promotion is easier to do. Likewise, the development of the Bali tourism industry is currently heavily influenced by social media as a means of promoting tourism objects. The use of social media makes tourist destinations that were not developed before increasingly attractive. In addition, using an Online Travel Agency (OTA) makes it easier for tourists to book transportation, accommo-

dation, and even entrance tickets to tourist attractions with various promotions and transaction options.

The development of tourism promotion through social media is believed to increase the number of tourist visits, especially foreign tourists. It's just that the prediction of the number of tourist visits through the seasonal adjustment approach shows that the number of foreign tourist visits to Bali in 2023 is around 7.8 million tourists, with the highest number of visits being in the third quarter, namely in July - September.

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