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Measuring Seasonality in Maldivian Inbound Tourism

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Abstract

The tourism sector of the Maldives has seen rapid growth since its inception in 1972. One significant development is the transformation of the market composition in recent years. China has surpassed traditional European markets as the single largest source market. In this regard, this study seeks to assess the seasonality in the Maldivian tourism sector using a monthly dataset of visitor arrivals from 2003 to 2019. The seasonality ratio, the seasonality indicator, the Gini coefficient and the seasonal index were used to examine the seasonality patterns. The results of this study show that there are three distinct peaks (January to April, August, and November to December) and two off-peaks (May to July and September) periods. The findings also reveal that the rise of the Chinese market has significantly lessened the seasonality of Maldivian inbound tourism. Finally, some important implications are discussed.

1. Introduction

The Maldivian tourism industry began in 1972 with only 280 beds spread over two resorts. The industry has reached 1,110 registered accommodation facilities with a total bed capacity of 56,034 scattered across the 26 atolls as of September 2021 (MOT, 2021). The tourism sector in the island nation has seen steady growth over the past 50 years. It is today a world-class service industry and the single largest driver of economic growth in the country. The country became famous for its unique tourism concept (i.e., one island, one resort), incredible clear waters, abundant undersea marine life, exquisite white sandy beaches, warm climate and luxurious resorts. Tourism in the country has evolved in recent years. Along with luxury tourism, provisions were made in 2009 for establishing guesthouses and city-style hotels in inhabited islands, allowing tourists to stay on the islands and interact with the local community. The country also introduced homestay tourism in January 2022. The significant shift in supply is targeted at the middle-income segment, particularly backpackers and budget travelers.

A record 1.7 million tourists visited the country right before the COVID-19 epidemic, bringing in USD 3.2 billion in revenue in 2019 (MOT, 2021). China (16.7%), India (9.7%), Italy (8%), Germany (7.7%), the United Kingdom (7.4%), Russia (4.9%), France (3.5%), the United States (3.2%), Japan (2.6%), and Australia (2.3%) are the top source markets in 2019 (MOT, 2019). These markets have contributed about 66 of total inbound tourism during 2019. In recent years, China has surpassed traditional European markets as the single largest source market. Tourism contributed 26.3 percent to GDP and 34.9 percent to total government revenue in 2019 (MOT, 2021). Additionally, it is the largest employer in the country, employing more than one-fifth of the country's 205,570 employed residents (ADB, 2020). However, the country's tourism sector is not without limitations

and uncertainties. Seasonality in inbound tourism is a major concern for the industry's long-term sustainability. Many scholars have focused on gaining a better knowledge of seasonality in tourism in various contexts. There are numerous pieces of research on seasonality in the literature. However, the majority of existing research has concentrated on North America, Europe, and Australia, with little attention paid to other important regions such as South America, Asia, and Africa (Amelung et al., 2007; Fernández-Morales & Cisneros-Martínez, 2019; Hadwen et al., 2011; Koc & Altinay, 2007; Li et al., 2017; Pegg et al., 2012; Tucker et al., 1988). Therefore, a study on this area is essential to uncover the seasonality in the inbound tourism of an Asian country, particularly a small island nation that largely relies on tourism as its primary source of foreign exchange earnings. According to some experts, seasonality should be examined at the national, regional, and sectoral levels (Yacoumis, 1980). This study, therefore, seeks to address these knowledge gaps by using a sample from the Maldives. The primary purpose of this study is to determine the seasonality of Maldivian inbound tourism. Additionally, this study examines changes in the overall tourism seasonality as a result of changes in market composition and generates tourism demand for three years. It is vital for tourism stakeholders to have a better understanding of seasonality in the industry. The findings of the study can assist policymakers and other relevant authorities in refocusing their attention on the seasonality issue in tourism. The findings can be especially beneficial to tourism stakeholders when developing long-term plans, preparing for successful marketing and destination promotion, and forecasting tourists from source markets. Additionally, it can aid travel companies, tour operators, and tourism establishments in developing successful strategies for increasing visitor numbers during off-peak seasons. It can also serve as a protection against underutilized resources in the Maldivian tourism sector, which

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could have long-term implications for sustainable growth.

The remainder of the paper is organized in the following manner: The following section provides an overview of the literature on tourism seasonality, including its causes, patterns and implications. The methods employed to analyze seasonality in Maldivian inbound tourism and produce demand forecasts are described in Section 3. Section 4 is a presentation of the findings and discussions. The final section of the paper brings the work to a close by noting the contributions, managerial implications, and limitations.

2. Literature Review

2.1 Seasonality in Tourism

Butler (1998) described seasonality as a temporal imbalance in the tourist phenomena that may be characterized in terms of several indicators, such as visitor numbers, highway traffic, employment, and admission to attractions. This definition references tourist demand, but seasonality can also be defined from the perspective of supply. Taking into account supply, Manuel López Bonilla et al. (2006) defined tourist seasonality as the temporary imbalance that occurs in tourism when the marketing of products for tourists is concentrated in one or more periods, connecting the meaning of marketing to the use of facilities, number of available beds, development of promotional campaigns, etc.

It has been decades since seasonality became a popular topic in tourism literature. Despite the fact that it is frequently the subject of academic research and debate, it is one of the least understood aspects of tourism (Higham & Hinch, 2002). Furthermore, seasonality analysis is frequently seen as a tough task in tourism research due to the fact that it includes identifying the causes and effects of seasonality (Ferrante et al., 2018). Despite these complexities, one group of scholars examined the causes, effects, and policy implications of seasonality in tourism (Duro, 2016; Koenig & Bischoff, 2004), while another group examined the differences in seasonality measures used in tourism research in order to understand their merits and limitations better. Numerous scholars have also offered various methods and tactics for overcoming seasonality.

2.2 Causes of Tourism Seasonality

A widely used synthetic structure identifies two major classes: natural and institutional (Connell et al., 2015; Higham & Hinch, 2002). The first category consists of climate variables in relation to some of the most prevalent forms of contemporary tourism, such as sun and beach tourism and/or winter tourism. Some scholars have argued that climate plays a role in attracting travelers who anticipate pleasant weather (Gómez Martín, 2005; Kulendran & Dwyer, 2010; Scott et al., 2004), while others have argued that it is a factor in determining whether or not potential travelers stay in their home country (Hamilton & Tol, 2007). Natural seasonality is mainly associated with unpredictable weather fluctuations, which are frequently cited as a significant factor when examining tourist behavior in the tourism business (Li et al., 2018; Li et al., 2018; Ridderstaat et al., 2014; Scott et al., 2004). The second category consists of institutional elements linked to the effects on flow caused by the precise scheduling of school and works vacation periods, national holidays, and cultural events. Institutional seasonality as a result of cultural, social, or ethnic factors also plays a significant part in defining tourist seasons (Hinch & Jackson, 2000; Rudihartmann, 1986). For instance, Ramadan, Easter and Christmas are some of the holy days celebrated by adherents of various religions in different ways and at various times. These holidays are often associated with extensive travel for sightseeing and visiting. Apart from these two primary sources of seasonality in tourism, Butler

(1998) highlighted additional seasonality causes in the form of sporting calendars, fashion, social pressure, and inertia or tradition. For instance, people engage in particular activities such as conventions and trade shows and sporting events such as the World Cup, Olympics and Commonwealth Games at particular locations and times of the year.

Recent research has suggested the significance of additional causes and accorded them considerable attention. These include the sort of tourism product the tourist destination offers (Cuccia & Rizzo, 2011; Martín et al., 2014), economic characteristics (Nadal et al., 2004), and the market structure (Fernández-Morales et al., 2016). According to Martín et al. (2014), destinations with a diversified product and less climate dependence enjoy greater annual stability. Recent research also analyzed the probable reasons for seasonality and categorized them into two broad categories: push and pull factors. There are two types of push factors: institutionalized factors, such as social pressure and public holidays, and natural causes, such as climate. Pull factors are conditions in the receiving area that attract tourists. Climate and events are examples of pull factors.

2.3 Patterns of Tourism Seasonality

Seasonality is typically characterized by a well-defined pattern, as opposed to random fluctuations, and seasonal fluctuations are determined by well-defined causes of varying origin and intensity (Granger, 1978). Consequently, one of the essential characteristics of seasonal variation is its regularity, in addition to the form of seasonal variation, which is the distribution of the event in question over a well-defined time period. Additionally, other scholars used empirical data to classify seasonal patterns. Their contributions are widely acknowledged in the literature. The seasonality literature identifies four distinct seasonality profiles in tourism. The most typical profile is characterized by a single peak season. For example, the Mediterranean coastline countries often experience a single peak (Fernández-Morales, 2003; Vergori, 2012). A second profile displays a high season and a shoulder season, or a modest peak that comes between the high and low seasons, which is typically influenced by specific tourist segments that are more inclined to visit the tourist destinations outside of the high season (Candela & Figini, 2012). A third profile is marked by two major peaks, which often correspond to the summer and winter seasons. This type of seasonality is typical of mountain resorts (Manuel López Bonilla et al., 2006; Butler & Mao, 1997) and may suggest the destination's ability to accommodate a variety of tourist needs. A fourth profile identifies sites that do not experience high seasonal peaks since their tourism-related time series tend to fluctuate very little. This is the case with a number of cultural cities, which are typically characterized by a low degree of tourism seasonality (Butler, 1998; Cuccia & Rizzo, 2011; Figini & Vici, 2012). The pattern of seasonal oscillations can also be influenced by a combination of these major categories in connection to the specific tourist goal being evaluated, the generating region, and the features of the destination.

The existing literature on tourism seasonality also discusses the methods of classifying the seasonal patterns in tourist destinations. However, only a few authors have attempted to develop methods capable of classifying seasonal patterns in tourism, despite the fact that Butler and Mao's (1997) classification still serves as the primary reference for seasonal patterns in tourism (Vergori, 2017). Despite developing numerous methods for comparing and classifying time series, the literature contains few examples of seasonal pattern classifications. For instance, Croce and Wöber (2010) used Pearson's correlation coefficient and multidimensional scaling to compare and classify seasonal patterns of bed nights for 20 European cities by establishing clusters of European cities based on seasonal pattern similarities. Manuel López Bonilla et al. (2006) have used the distribution of seasonal elements to

differentiate high season, average season, and low season in order to categorize seasonal patterns in Spanish regions as one-peak, two-peak, multiple-peak, or no-peak. Koenig and Bischoff (2003, 2004) utilized Principal Component Analysis to study seasonal patterns of occupancy data in Wales. The proposed method enabled the identification of establishing groups with comparable seasonal trends. In a similar vein, Hadwen et al. (2011) evaluated the seasonal patterns of tourist visits to protected places according to different climatic zones, thereby using an external element for identifying seasonal patterns and then comparing seasonal swings. Chen and Pearce (2012) have found six types of seasonal trends by analyzing the difference between monthly visitor arrivals and average monthly arrivals for five Asian nations during the period 2000 - 2006. Nevertheless, their method primarily depends on a visual assessment of the seasonality pattern, and the reference categories given may not be appropriate for identifying the major seasonality disparities in other spatial and temporal contexts.

2.4 Implications of Tourism Seasonality

Seasonality has a substantial impact on tourism due to capacity constraints and congestion during peak seasons, as well as inefficient utilization of tourist resources during off-peak periods (Getz & Nilsson, 2004). Seasonality in tourism also has a ripple effect on other sectors of the economy, such as agriculture, fishing, forestry and other related industries. The existing studies focus mostly on three primary elements of the effects of seasonality on tourism (i.e., socio-cultural, environmental and economic). The most significant economic impact of tourism seasonality is associated with price rises during peak periods, seasonality in the labor market, and a detrimental effect on consumer perceptions of value, particularly due to lack of quality services, slow traffic and overcrowding (Ashworth & Thomas, 1999; Ball, 1988; Lundmark, 2006). Lusseau and Higham (2004); Cuccia and Rizzo (2011); Martín et al. (2014); Ioannides and Petersen (2003)). Businesses in the tourism industry experience a decline in profits during the off-season due to inefficient utilization of facilities and resources. Tourist destinations may be forced to lay off some employees during the off-season due to the low return on invested resources. Moreover, many businesses incur losses due to increased training expenses whenever they hire new employees during the peak season. Seasonality has a number of environmental implications, the most significant of which are disruptions to flora and fauna, water supply, and waste management (Cuccia & Rizzo, 2011; Ioannides & Petersen, 2003; Lusseau & Higham, 2004; Martín et al., 2014). These issues may lead to dissatisfaction with tourists and tourism as a viable economic activity. Seasonality has a socio-cultural impact, mostly on overcrowding and resource consumption in tourist destinations by visitors (Deery et al., 2012). Several experts found several feasible ways to address seasonality in tourist destinations (Weaver & Oppermann, 2000). On the demand side, strategies include increasing demand during off-peak periods, decreasing demand during peak periods, and redistributing demand between the two periods, whereas, on the supply side, strategies include increasing supply during off-peak periods, decreasing supply during peak periods, and redistributing supply from peak to low peak periods. Additionally, some scholars have emphasized the importance of learning to live with strong seasonality in tourism (Flognfeldt, 2001), while others have emphasized the benefits of off-peak seasons (Twining-Ward & Twining-Ward, 1996). Several potential benefits are related to the environment and infrastructure of tourist destinations and the well-being of its people. The natural environment has the opportunity to regain its beauty and prosperity while infrastructure is repaired, renovated, and restored during the off-peak period. Locals also receive stress relief and can return to normal life. Cuccia and Rizzo (2011) observed that the environment and its inhabitants regain their luster during the off-season because they are not subject to the pressure of tourism and tourists.

2.5 Technology and Tourism Demand

Tourists rely on information technologies for a wide range of tasks, including preliminary research, comparison, decision-making, trip planning, communication, retrieval of information, and post-trip sharing of experiences (de Esteban Curiel et al., 2017). Tourists use a wide variety of resources, from websites to travel blogs to recommendation systems to online communities to mobile technology, to facilitate and enhance their vacations. Technology's pervasiveness across the entire process transforms the conventional co-creation setting. Information technologies open up a new co-creation area before and after a trip, where the destination, tourism providers, visitors, and networks of consumer communities all come together to shape the experience (Neuhofer et al., 2012).

The modern, Internet-enabled customer has much less patience (Rach, 1997), and as a result of increased education and experience, today's tourists are increasingly picky about the services and goods they pay for. As a result, there is a need for novel approaches from both endpoints and principles to meet these many forms of demand. The rapid growth and increasing sophistication of new tourism goods that target niche markets are major forces propelling the industry's adoption of ICT. In addition, experienced, intelligent, new and demanding travelers are increasingly looking for information on more remote locations and unique experiences, and they expect to connect with service providers to tailor their trips to their individual preferences.

In summary, seasonality research has primarily concentrated on establishing tools for quantifying and comparing seasonal variations. While some research focused on finding the reasons for seasonality, others explored and argued the good and negative implications of tourism seasonality, as well as alternative techniques for mitigating the imbalances. However, these studies concentrated on Europe, Australia, and North America, with little attention paid to other significant regions such as Asia, Africa, and South America. Despite the fact that many tourism researchers have concentrated their efforts on modelling tourism demand and analyzing the seasonality patterns of major source markets in Asia (Chen & Pearce, 2012; Untong et al., 2015) and other regions, the seasonality patterns of one of the leading tourist destinations in the world has received little attention in the existing research. Therefore, this study seeks to contribute to the current body of knowledge by focusing on Maldivian inbound tourism. Firstly, this study analyses the seasonality patterns of a leading small island tourist destination in Asia. Secondly, this study investigates the effect of the Chinese outbound market on the overall seasonality of the tourism sector of the Maldives.

3. Methodology

The Maldives was chosen for this study partly because it is a leading tourist destination and tourism is a crucial industry for the country's long-term economic development. Another reason is the availability of reliable monthly data on inbound arrivals. The most reliable source of tourist data for this study was the tourism statistical reports obtained from the Ministry of Tourism and the Maldives Bureau of Statistics. Table 1 presents the statistical description of the data, whereas Figure 1 shows inbound tourist arrivals to the Maldives and their percentage rise from 2003 to 2019. The 2020 and 2021 data were purposefully omitted due to the influence of COVID-19 on international tourism. Tourist arrivals to the Maldives from several significant markets remain below 1%, largely due to limitations imposed in the origin nations to contain the coronavirus (Rabeeu et al., 2021).

Table 1. Statistical Description of the Data

Country	Period	Data source	Mean	SD	Min	Max	Observations
Maldives	2003 - 2019 (17 years)	Ministry of Tourism (2021) (https://tourism.gov.mv/)	79,906	32,683	18,747	171,348	204
		Maldives Bureau of Statistics (2021) (https://statisticsmaldives.gov.mv/)	15,232	12,627	38	44,247	204

Note: The first and second rows present the statistical descriptions of the total inbound and Chinese arrivals, respectively.

Seasonality has been measured in a variety of ways by researchers in tourism and other significant fields. Time series analysis (González & Moral, 1996), principal component analysis (Jeffrey & Barden, 1999), financial portfolio theory (Jang, 2004), seasonality ratios, similarity ratios, coefficients of seasonal variation, amplitude ratios, seasonal range, coefficient of variation, peak seasonal factor, and concentration indices (Koenig-Lewis & Bischoff, 2005) are just a few of the methods discussed in the literature. Recently, several novel approaches have been developed and employed (Ferrante et al., 2018; Lo Magno et al., 2017). The advantages and disadvantages of these techniques are also discussed among academics and documented in the literature. The seasonality ratio, seasonality indicator, Gini coefficient, and seasonality index are all employed in this study since they are the most frequently used measures of inequality in tourist research.

Additionally, we generated tourism demand forecasts for three years (2020-2022) using the Seasonal Autoregressive Integrated Moving Average (SARIMA) model. A wide variety of methods, including econometrics, autoregressive, artificial intelligence, and linear models, have been used for tourism forecasting over the years (Syriopoulos, 1995; Papatheodorou, 1999; Shen et al., 2011; Gounopoulos et al., 2012; Teixeira & Fernandes, 2012; Gunter & Önder, 2016; Hassani et al., 2017; Assaf et al., 2019). Rabeeu et al. (2021) and Goh and Law (2002) used the SARIMA method to study the demand for inbound travel to the Maldives and Hong Kong, respectively. Their research demonstrates that the SARIMA model outperforms other well-known time series models.
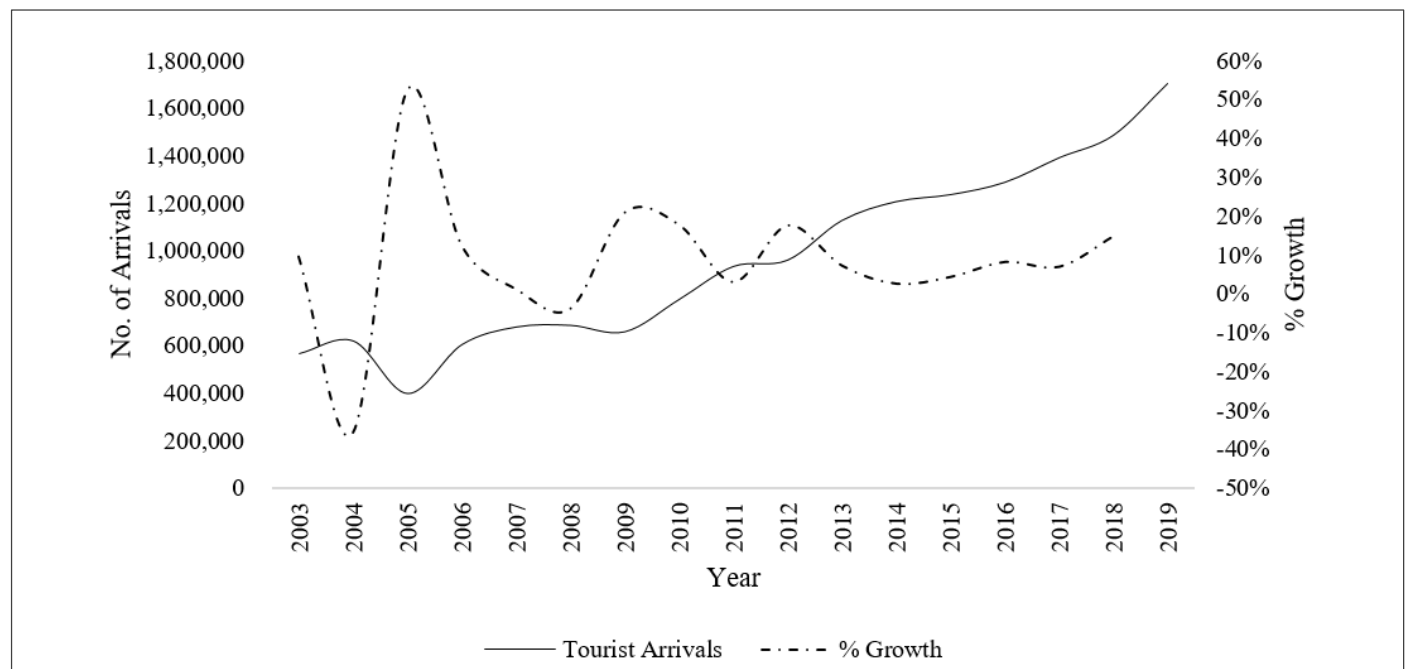
Fig. 1. Tourist arrivals to the Maldives and % growth (2003 – 2019)

4. Results and Discussion

We first created seasonality plots using R to identify seasonality in the dataset. The figures are included in the Supplementary Materials. The seasonality patterns of tourist arrivals to the Maldives are then identified using the most widely used seasonality indicators. The seasonality ratio is the first technique used to determine the seasonality pattern. Yacoumis (1980) determined the seasonality ratio and created a graph using the ratios for Sri Lankan tourism. It is evident from his study that seasonality ratios and graphs can be used to examine seasonal and regional demand, as well as demand within individual source markets. Seasonality ratios for the Maldives are shown in Table 2.

Based on Yacoumis's (1980) approach, the maximum number of visitors to the Maldives is divided by the average number of visitors to determine the seasonality ratios. The seasonality ratios of 2003 and 2019 are presented in Figure 2. The two years with varied seasonality ratios show a comparable seasonal demand structure. Seasonality indices are greater than the average for certain months, near the average, and below the average for others. It appears that the arrivals from January to April, August and November to December are higher than the average. The arrivals from August to October are close to the average, whereas the arrivals from May to July are below the average.
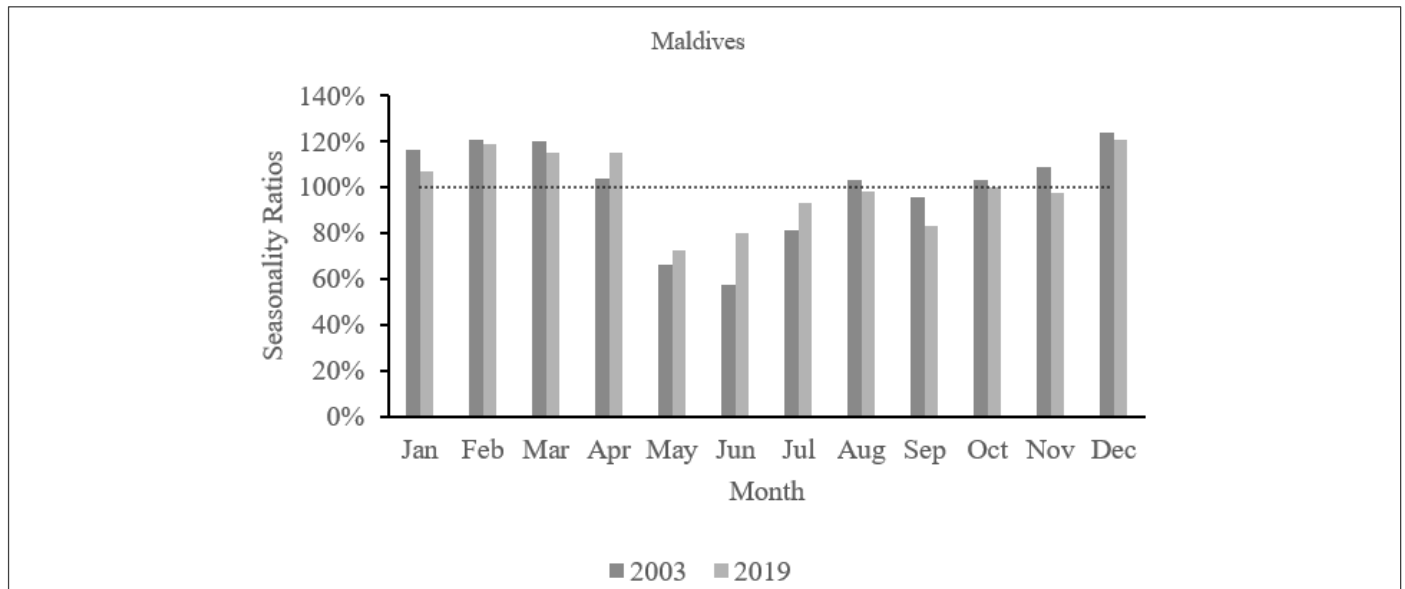
Fig. 2. Seasonal ratios by months (2003 and 2019)

Table 2. Seasonality Ratios (2003 – 2019)

| Month / Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Seasonality Ratio
2003	116	121	120	104	66	57	81	103	96	103	109	124	1.24
2004	120	116	124	108	82	66	85	109	91	102	110	87	1.24
2005	57	89	108	90	77	69	91	116	102	123	135	142	1.42
2006	116	109	109	112	82	66	85	100	89	109	107	117	1.17
2007	115	116	114	112	83	68	91	94	86	104	101	116	1.16
2008	114	119	126	110	86	71	84	91	89	99	102	110	1.26
2009	113	107	114	105	79	66	81	96	92	114	113	120	1.20
2010	102	117	114	92	88	67	87	100	95	113	113	113	1.17
2011	102	113	104	103	83	72	93	99	93	117	110	110	1.17
2012	120	104	96	99	80	74	96	100	96	116	103	115	1.20
2013	95	112	106	97	85	82	94	105	98	114	101	112	1.14
2014	105	110	105	105	91	83	100	104	95	110	89	103	1.10
2015	94	117	109	99	93	79	102	107	93	103	88	116	1.17
2016	101	113	107	97	87	74	103	105	95	110	98	112	1.13
2017	108	105	97	103	81	74	98	105	92	111	104	124	1.24
2018	115	117	108	97	75	76	99	100	87	103	102	122	1.22
2019	107	119	115	115	73	80	93	98	83	100	97	121	1.21

The seasonality indicator is the second technique used for determining the seasonality pattern. The seasonality indicator is calculated oppositely as the seasonality ratio; thus, the average index value (i.e., 100) is divided by the highest seasonal index. Typically, the seasonality indicator is calculated using the number of overnight stays in tourism establishments. For instance, a seasonality indicator of 0.7 indicates that only 70% of available accommodation space is utilized. However, due to a lack of data, the current study analyzed the number of visitor arrivals. The seasonality indicator for the period 2003 to 2019 for the Maldives is shown in Table 3. The maximum capacity for each year has been determined by the highest seasonal index value. The data indicate that the seasonal indicator is greater than 0.80 for all years except 2005 and 2008. January to April, August, and November to December are typically the busiest months, whereas the number of visitors is markedly lower from May to July and September.

The Gini coefficient is the third technique used to determine the seasonality pattern. In this study, the Gini coefficient is determined in two different ways. The coefficient in the first method is between zero and one, reflecting total equality and complete inequality, respectively. The gap between the Lorenz curve and the equality line can be considered a simple representation of the Gini coefficient (Lundtorp, 2001; Weidner, 2006). To illustrate the distribution of visitor arrivals over the twelve months of the year in the Maldives, the Lorenz curve was generated using the first and last years in the datasets (see Figure 3). The difference between the 45° line and the curve indicates an unbalanced distribution of visitor arrivals. Certain months have a higher arrival rate than the rest of the year. For example, in the first three quarters of 2005, arrivals to the Maldives accounted for 67% of total inbound arrivals, compared to 70% in the same period of 2019. These results imply that the month-to-month difference in tourist numbers was higher in 2005 than in 2019.

Table 3. Seasonality Indicators (2003 – 2019)

Month / Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Seasonality Indicator
2003	116	121	120	104	66	57	81	103	96	103	109	124	0.81
2004	120	116	124	108	82	66	85	109	91	102	110	87	0.80
2005	57	89	108	90	77	69	91	116	102	123	135	142	0.70
2006	116	109	109	112	82	66	85	100	89	109	107	117	0.86
2007	115	116	114	112	83	68	91	94	86	104	101	116	0.86
2008	114	119	126	110	86	71	84	91	89	99	102	110	0.79
2009	113	107	114	105	79	66	81	96	92	114	113	120	0.83
2010	102	117	114	92	88	67	87	100	95	113	113	113	0.86
2011	102	113	104	103	83	72	93	99	93	117	110	110	0.85
2012	120	104	96	99	80	74	96	100	96	116	103	115	0.83
2013	95	112	106	97	85	82	94	105	98	114	101	112	0.87
2014	105	110	105	105	91	83	100	104	95	110	89	103	0.91
2015	94	117	109	99	93	79	102	107	93	103	88	116	0.85
2016	101	113	107	97	87	74	103	105	95	110	98	112	0.89
2017	108	105	97	103	81	74	98	105	92	111	104	124	0.81
2018	115	117	108	97	75	76	99	100	87	103	102	122	0.82
2019	107	119	115	115	73	80	93	98	83	100	97	121	0.83
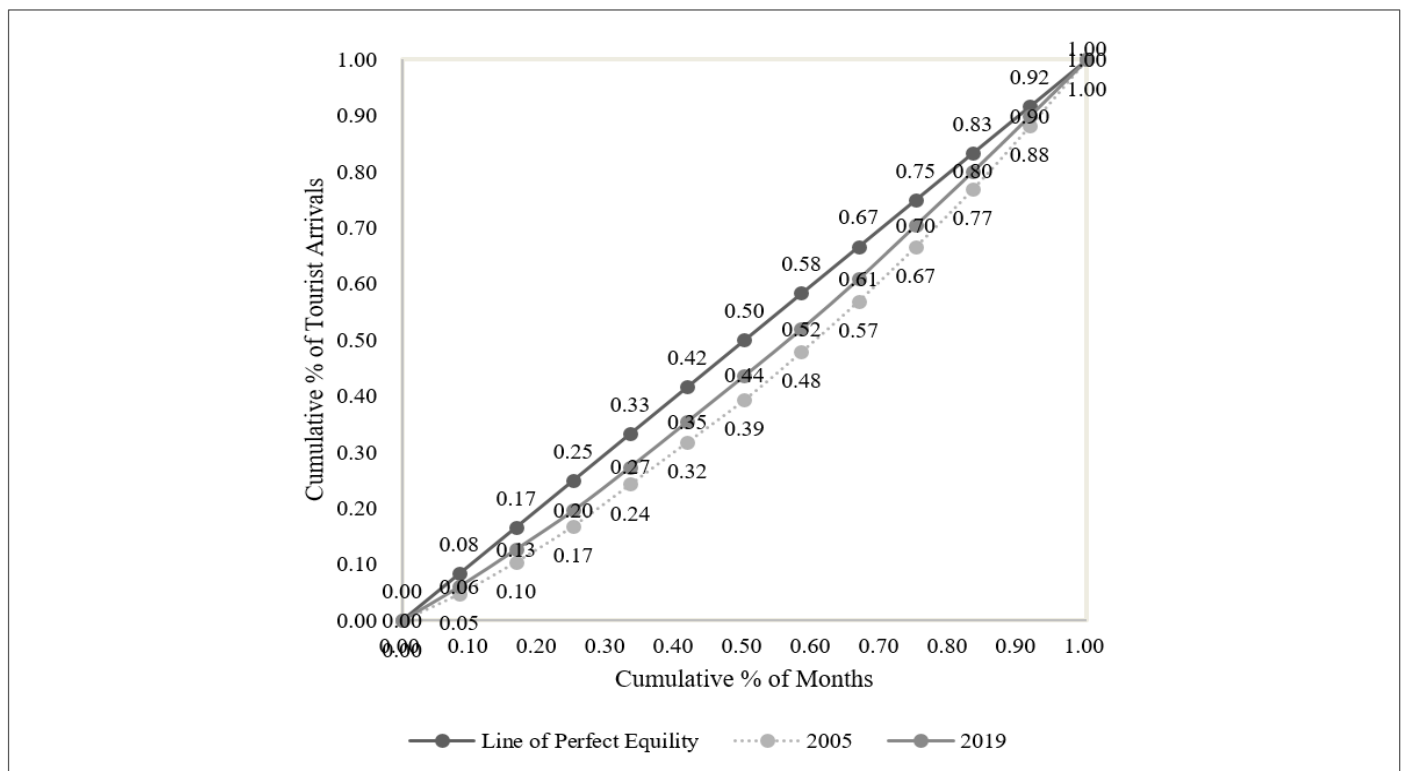
Fig. 3. Lorenz curve (2005 and 2019 tourist arrivals ratios)

In the second technique, the Gini coefficient expresses inequality as a ratio. The formula employed in this study is as follows (Lundtorp, 2001).

$$G = \frac{2}{n}\sum_{i=1}^{n}(x_i - y_i) \qquad (1)$$

G denotes the Gini coefficient, n is the ratio value (i.e., 12 months), x_i denotes the ratio order (1/12, 2/12......, 12/12), and y_i denotes the cumulative actual ratios in the Lorenz curve. Gini coefficients for the Maldives are presented in Table 4. For example, the Gini coefficient was 0.14 in 2005 and 0.09 in 2019. These findings demonstrate that monthly distributions of tourist arrivals were more unequal in 2005 than in 2019. The Gini coefficient can also be estimated for the various source markets. Table 5 presents the Gini coefficients of the top ten source markets for the Maldives in 2019.

Table 4. The Gini Coefficients (2003 – 2019)

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Gini Coefficient	0.11	0.10	0.14	0.08	0.08	0.09	0.09	0.08	0.07	0.07	0.06	0.05	0.06	0.06	0.07	0.08	0.09

Table 5. The Gini Coefficients by Markets (2003 – 2019)

Market \ Year	Russia	UK	Italy	France	Germany	Japan	India	USA	Australia	China
2003	0.20	0.11	0.22	0.28	0.08	0.16	0.15	-	0.13	0.43
2004	0.19	0.09	0.20	0.26	0.10	0.12	0.09	-	0.09	0.27
2005	0.16	0.10	0.24	0.30	0.15	0.24	0.08	-	0.15	0.31
2006	0.19	0.06	0.19	0.27	0.09	0.13	0.11	-	0.16	0.12
2007	0.20	0.05	0.21	0.31	0.09	0.11	0.12	-	0.12	0.17
2008	0.18	0.08	0.25	0.30	0.12	0.10	0.11	-	0.16	0.15
2009	0.21	0.05	0.24	0.28	0.12	0.12	0.12	-	0.07	0.22
2010	0.13	0.06	0.26	0.30	0.14	0.12	0.18	0.09	0.10	0.17
2011	0.10	0.07	0.30	0.31	0.14	0.11	0.13	0.11	0.11	0.16
2012	0.15	0.07	0.31	0.32	0.12	0.13	0.18	0.11	0.10	0.20
2013	0.14	0.07	0.28	0.29	0.13	0.15	0.14	0.10	0.09	0.14
2014	0.13	0.08	0.28	0.30	0.13	0.11	0.11	0.11	0.12	0.12
2015	0.16	0.08	0.31	0.30	0.14	0.12	0.13	0.11	0.10	0.16
2016	0.13	0.09	0.27	0.29	0.16	0.08	0.13	0.08	0.14	0.13
2017	0.15	0.08	0.29	0.29	0.13	0.11	0.13	0.09	0.10	0.11
2018	0.17	0.09	0.30	0.29	0.16	0.11	0.20	0.09	0.11	0.17
2019	0.14	0.11	0.30	0.33	0.17	0.15	0.11	0.12	0.09	0.13

The seasonality index was utilized as the fourth approach in this study to determine the seasonality pattern. The seasonality index is calculated using moving average methods. This is the most often used approach for classifying monthly tourist arrivals into a trend (T), seasonal (S), cyclical (C), and irregular (I) fluctuations (DeLurgio, 1998). Table 6 presents the summary of the calculations of the seasonal index. The highest values are observed from January to April, August and November to December during the time period 2003 to 2019, while the lowest values for the corresponding period are observed from May to July and September.

The seasonal index has been normalized to highlight seasonal changes, utilizing Agacevic and Xu's (2020) normalizing function.

$$Z_i = \frac{X_i - min(X)}{max(X) - min(X)} - 0.5 \qquad (2)$$

The seasonal indices are restricted to a range of -0.5 to 0.5, with 0 as the average. Positive numbers (i.e., 0 < X < 0.5) represent the peak period, whereas negative values (i.e., -0.5 < X < 0) represent the off-peak period. A considerable surge is noticed in the first and fourth quarters and a specific period in the second and third quarters of the calendar year, as shown in Table 7. In other words, the months of January to April, August and November to December are the peak period for the Maldives. As for the European markets, this can be attributed to the winter school holidays and Christmas and New Year holidays. As for the Chinese market, the Chinese spring festival holidays in January/February, the summer school holidays from July to August, when many parents travel with their children, the mid-autumn festival in September, and the national holidays in early October all account for the significant increase in arrivals in the peak period. The months from May to July and September show negative values and appear to be the off-season for the Maldives. This can be due to travelers from the key source markets opting to stay home during summer and autumn. Another reason can be due to travelers opting for destinations with pleasant weather conditions as opposed to the wet season in the Maldives. There is clear evidence in the existing literature to support this argument. The findings of the studies conducted by Klenosky (2002) and Kozak (2002) show that pleasant weather or warm climate is a major pull factor for travelling overseas. The findings of the current study clearly show that seasonality exists in the inbound tourism of the Maldives. It also shows that visitors from all major

source markets have developed seasonal patterns in visiting the Maldives.

This study further takes the major source markets of the inbound tourism of the Maldives into consideration for further discussion. Table 8 presents the ten major source markets from 2003 to 2019. It clearly indicates that countries from the Europe, Asia, America and Oceania have a strong presence in the inbound tourism of the Maldives. The top ten list of the past 17 years consisted of 7 countries from Europe, 4 from Asia, and one from America and Oceania, respectively. It further shows that the United Kingdom, Italy, Germany, France, Russia, Japan and China are the only markets that consistently appeared in the top ten list from 2003 to 2019. India, the United States and Australia also shows strong presence due to the changes in market composition in recent years. The European markets dominated the inbound tourism of the Maldives before the 2008 global financial crisis. However, Chinese tourists visiting the Maldives have increased dramatically in recent years. The Chinese arrivals in 2008 were only 6% of the total arrivals compared to 17.6% in 2019.

For this reason, China has become the most important source of inbound tourists for the Maldives. The Chinese outbound tourism market has played a critical part in the remarkable rise in visitor influx over the last two decades. The Chinese market has emerged as the most important and largest source market for the Maldives and many other tourist destinations that rely significantly on inbound tourism for their economic growth. Due to its fast expansion over the past two decades, the Chinese outbound market has risen to become the world's largest source market (UNWTO, 2019) and the dominant source market for several Asian countries. It grew from 4.5 million in 1995 to 251 million in 2019. Tourist spending from the market climbed from USD 24 billion in 2006 to USD 277 billion in 2018 (UNWTO, 2018, 2019). Since 2012, it has also retained its status as the world's largest tourism source market (UNWTO, 2019). The rapid growth of the Chinese outbound market is essentially due to the economic liberalization policy of the Chinese government and the Approved Destination Status (ADS) scheme introduced in 1995. This expansion was aided by policy changes made in recent years, such as the removal of travel restrictions to foreign nations and the establishment of annual paid leave. Due to its huge population, increasing income of the Chinese people, increasing number of Chinese passport holders, visa convenience, and tax return policies, the Chinese outbound tourism market has tremendous development potential (UNWTO, 2019).
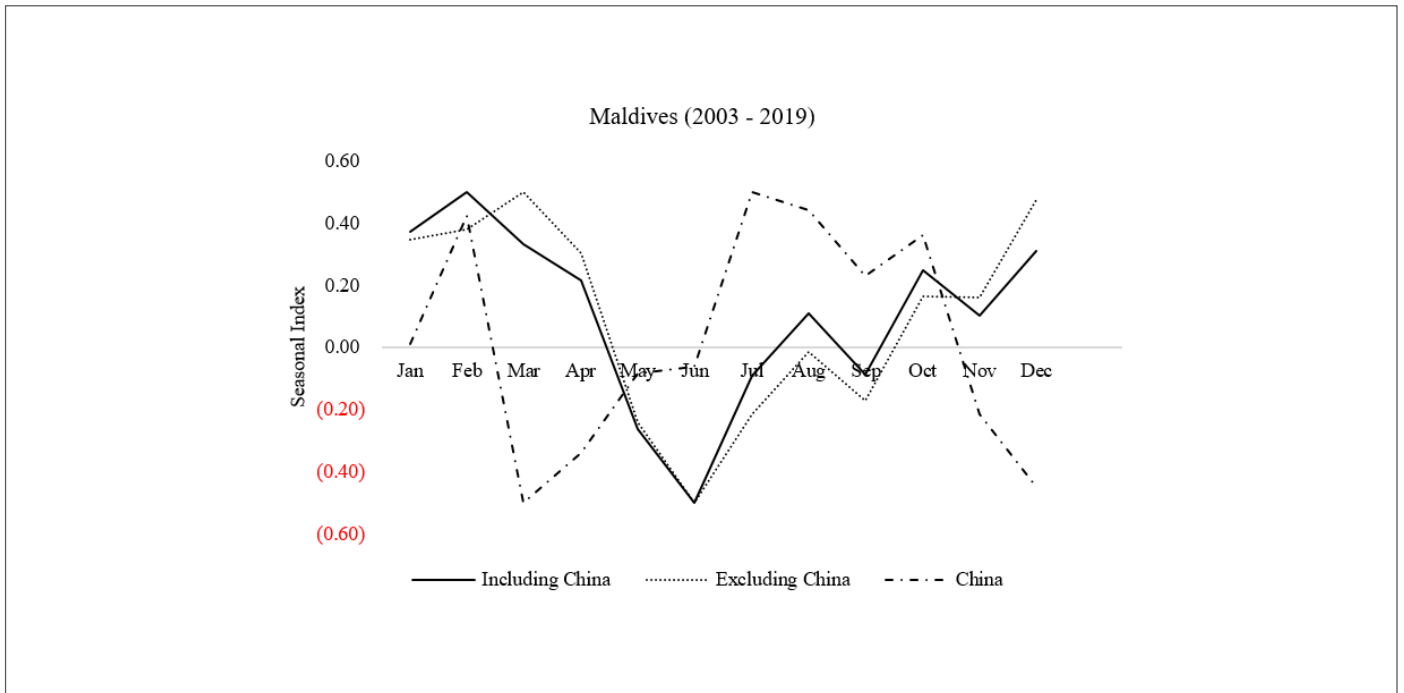
Fig. 4. Impact of the Chinese Market on Overall Seasonality (2003 – 2019)
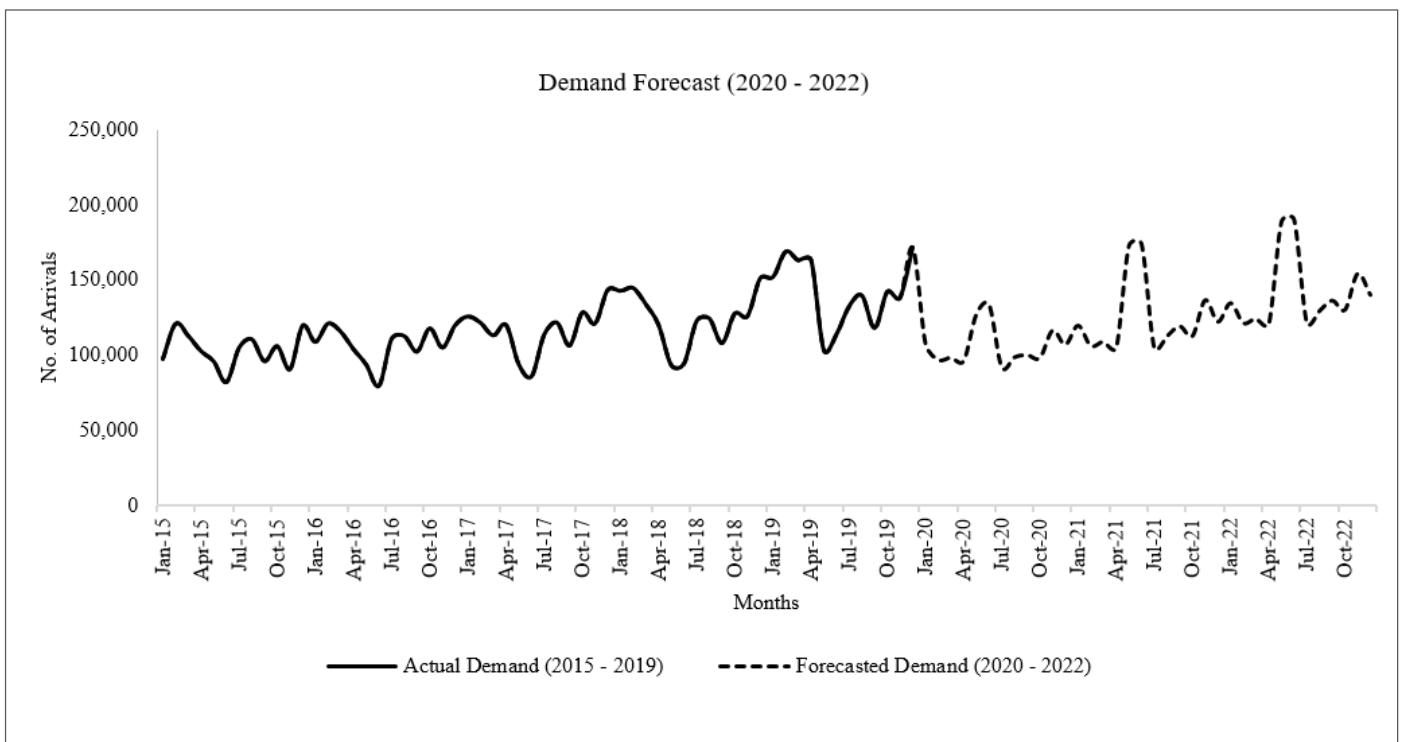
Fig. 5. Forecasted Tourism Demand of the Maldives (2020 – 2022)

Table 6. Calculation of the Seasonal Index (2003 – 2019)

Month	Ratios x 100																	Median	Seasonal Index
Jan		121.95	49.49	130.12	119.04	112.77	114.63	111.50	122.26	110.29	102.04	105.90	95.91	104.23	113.50	116.75	111.90	112.34	111.97
Feb		116.44	80.35	119.39	119.20	119.01	109.26	125.03	105.45	119.47	118.59	110.50	118.52	115.62	109.14	117.86	123.52	118.19	117.80
Mar		123.63	101.23	116.70	117.23	125.34	115.97	119.54	96.46	109.13	110.87	104.99	110.32	109.97	101.08	108.86	118.40	110.59	110.23
Apr		106.73	86.72	117.05	114.15	109.68	106.26	95.30	99.69	106.53	99.59	104.49	100.51	98.14	106.87	97.61	117.72	105.38	105.03
May		80.67	76.10	83.94	83.75	85.42	79.57	90.06	79.96	84.59	86.19	90.65	93.94	87.49	82.61	75.64	73.75	83.85	83.57
Jun		65.11	68.78	66.51	68.61	70.64	66.40	67.12	74.61	72.53	82.06	82.97	79.75	73.75	74.23	76.02	80.45	73.14	72.90
Jul	80.55	87.76	86.32	84.84	90.59	83.95	80.75	86.07	96.77	92.61	93.14	100.13	101.15	102.36	97.14	98.60		91.60	91.30
Aug	101.52	120.00	86.22	97.75	94.20	92.10	93.68	98.35	99.56	97.46	103.10	104.05	106.11	103.38	102.65	98.82		100.54	100.21
Sep	93.38	106.20	85.81	85.25	91.36	88.06	91.82	93.69	91.57	96.26	94.34	91.90	93.91	88.31	84.27			91.69	91.39
Oct	99.25	125.44	98.84	103.88	102.76	102.75	107.80	108.06	110.76	116.34	110.94	109.26	101.35	107.69	105.88	97.44		106.79	106.44
Nov	103.29	141.33	103.96	100.72	99.30	106.56	105.61	105.79	97.36	109.33	96.66	88.87	86.71	95.25	99.71	94.46		100.21	99.89
Dec	116.04	114.36	106.83	109.22	113.67	115.91	109.96	104.67	106.74	109.31	106.47	102.60	114.82	108.61	118.03	112.38		109.64	109.28
Total																		1,203.95	1,200.00

Table 7. Normalized Seasonal Index (2003 – 2019)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.37	0.50	0.33	0.22	-0.26	-0.50	-0.09	0.11	-0.09	0.25	0.10	0.31

Note: The values in black and red depict high and low seasons, respectively.

Table 8. Major Ten Source Markets for the Maldives from 2003 – 2019

Markets	Region	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
United Kingdom	Northern Europe	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Italy	Southern Europe	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Germany	Western Europe	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
France	Western Europe	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Switzerland	Western Europe	*	*	*	*	*	*	*	*	*	*	*	*	*	*			
Austria	Western Europe	*	*	*	*													
Russia	Eastern Europe	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Japan	North-East Asia	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
China	North-East Asia	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Korea	North-East Asia					*	*	*	*	*	*	*	*	*	*	*	*	*
India	South Asia	*	*	*								*	*	*	*	*	*	*
USA	America														*	*	*	*
Australia	Oceania															*	*	*

China has contributed heavily to the inbound tourism of the Maldives in the past two decades and remains the main source market for the country. The market share of Chinese tourists has also increased considerably. Therefore, this study further attempts to examine the impact of Chinese travelers on the overall seasonality of the Maldives. The seasonal index was first calculated for the Chinese market separately before calculating the seasonal index for all markets and excluding the arrivals from the Chinese market to present the changes graphically. The tourism sector of the Maldives appears to have very significant peak and off-peak seasons, as illustrated in Figure 4. The results indicate the strong presence of the Chinese market in recent years has softened the strong seasonality in the inbound tourism of the Maldives. This is an intriguing and important conclusion because there is considerable evidence that the Chinese market has enormous potential. In the coming years, the significant influx of Chinese visitors and travelers from the European market might constitute a substantial burden for the Maldives. This is because the peak season of the European market runs from late November to early March each year. The winter months in Europe and the Christmas and New Year holidays fall within this time frame. The first peak season for Chinese arrivals (i.e., February) corresponds with the peak period for European travelers. This alerts policymakers to develop suitable policies to attract more Chinese tourists or to encourage Chinese visitors to remain longer in the Maldives during off-peak periods. This also suggests that decision-makers should concentrate their efforts on alternative tourist source markets to ensure the long-term viability of the tourism industry. Market segmentation, product diversification, and differential pricing techniques are some strategies tourism stakeholders generally use to counteract the negative effects of tourism seasonality during off-peak periods (Duro & Turrión-Prats, 2019). Increasing the number of tourists during the peak season, which corresponds with other well-established important markets, might not be the best plan for the Maldives. Increasing hotel capacity may aid in reducing peak-season congestion and meeting future tourism demand. However, such strategies can have major social and environmental consequences. According to several academics, socio-cultural and ecological recuperation usually occurs during the off-season (Rudihartmann, 1986).

Figure 5 depicts the flow of inbound tourist arrivals to the Maldives from all source markets between 2015 and 2019 and the anticipated inbound tourist arrivals for 2020 to 2022. Using auto.arima() function in R, a model was chosen to generate a baseline forecast for international arrivals. The projections are based on the actual number of international visitors to the country from 2015 to 2019. Due to the impact of COVID-19 on Maldives tourist arrivals, these projections may be subject to certain limitations. Nevertheless, the Maldives has successfully restored the tourism industry to its pre-pandemic level. China was previously the most significant source market for the island nation. As a result of the emergence of a new virus, however, Chinese borders remain closed to leisure travel. This has a significant impact on the inbound tourism of the country and the positive seasonality changes attributed to this market over the past decade.

5. Conclusion

Seasonality is seen as a fundamental and significant constraint on tourism growth in many parts of the world. However, the tourism industry of the Maldives is quickly expanding and attracting more visitors. Most importantly, the inbound arrivals to the Maldives have shown steady growth over the past two decades. This study uses a dataset of inbound tourist arrivals from 2003 to 2019 to analyze the seasonality patterns of tourist arrivals in the Maldives and produce demand forecasts. The findings show that the inbound tourism of the Maldives has three peaks (January to April, August, and November to December) and two off-peak

(May to July and September). Arrivals are often higher during January to April, August, and November to December, partly due to the public holidays that tourists receive and the pleasant weather in the Maldives. On the other hand, tourist arrivals are generally lower throughout the months of May to July, probably due to pleasant weather in source markets and unfavorable weather in the Maldives. Another significant finding is the influence of the Chinese outbound market on Maldivian tourism. In recent years, the Chinese market has become a primary international source market for the Maldives. Chinese tourists are known for spending heavily on international tourism mainly due to rising disposable incomes, relaxation of restrictions on international travel and appreciating currency. This study shows the rapid expansion of the Chinese outbound market has significantly lowered the seasonality of the inbound tourism of the Maldives. This indicates that with the influx of visitors from the Chinese outbound market, the seasonality issue in inbound tourism can be further minimized. However, due to its fast expansion, the Chinese domestic tourism market is expected to capture many prospective outbound travelers.

5.1 Contribution and Implications

This research adds to the existing body of knowledge in a number of ways. Firstly, the primary goal is to examine the seasonality of the tourist arrivals in the Maldives, as well as the influence of the Chinese market on the overall seasonality of Maldivian inbound tourism. This is accomplished by a thorough examination of visitor arrival trends. The study also attempts to forecast demand for the country's inbound tourism. Secondly, this research has offered a number of well-established methods for determining the seasonality patterns of inbound tourist arrivals in the Maldives.

The findings of this study are beneficial for academics and may also be used as a guideline for future tourism strategies. The conclusions of this study are also significant to major tourism stakeholders, such as tourism demand, supply, and destination management organizations, as they work to recover from the COVID-19 crisis. Tourism stakeholders may develop response, recovery, and reset strategies based on the findings of this study. Furthermore, the developing trend in the Chinese outbound market indicates that tourism stakeholders, such as airlines, travel agents, tour operators, and accommodation facilities, should be prepared for a substantial inflow of Chinese visitors to the Maldives in the coming years. The findings also point to favorable and significant changes. This encourages tourism stakeholders to adopt efficient anti-seasonal strategies, emphasizing China and other major source markets, as well as tourism products, to ensure year-round tourist visits to the Maldives. Sports tourism, eco-tourism, medical tourism, and Meetings, Incentives, Conferences, and Exhibitions (MICE) tourism can help to minimize the negative impacts of off-peak periods. According to Jeffrey et al. (1999), hotels that cater to conferences, business travelers, and group tours have less seasonality. Furthermore, market positioning and promotion can all help attract more visitors. Although measures to address seasonality can come from either a public policy or a marketing standpoint, such as price adjustments to stimulate demand in the off-season or reduce demand in the peak season, there is less evidence on the effects of these programs and fewer studies that have explicitly sought to assess demand from a marketing standpoint. Certain anti-seasonality policies or initiatives may prove to be costly and ineffective and may even worsen socio-cultural and environmental harm. As a result, various tasks linked to staff training and development and maintenance or upgrading tourism-related facilities can be arranged during the off-peak period. The infrastructure of tourist locations may be maintained or enhanced during low-demand seasons, according to Twining-Ward and Twining-Ward (1996), and this can be considered a possible advantage.

5.2 Limitations and Further Research Directions

The following are some of the limitations of the current study. First, the dataset covers the 2003 SARS pandemic, the 2004 Indian Ocean tsunami, and the 2007-2009 global financial crisis. Because these crises had an enormous impact on international tourism (Birkland et al., 2006; Cooper, 2006; Pine & McKercher, 2004; Purwomarwanto & Ramachandran, 2015), the imbalances in the dataset may have influenced the findings of this study to some extent. Secondly, the study only looked at the influence of the Chinese market on the overall seasonality of Maldivian inbound tourism and did not consider other key markets. Therefore, it is important to conduct an independent study for all key source markets to have a comprehensive understanding of seasonal changes in each market, particularly newly emerged markets in the top ten list. Finally, it is necessary to consider variables such as the cost and distance connected with travel, the average length of stay of visitors in the Maldives, and the factors that influence their length of stay. Such research can help policymakers make more effective decisions in areas like tourism marketing and national planning, allowing the tourism sector of the Maldives to grow and thrive further. In addition, advanced methodologies, such as machine learning techniques, can be employed in future studies to obtain more robust results.

Declaration of competing interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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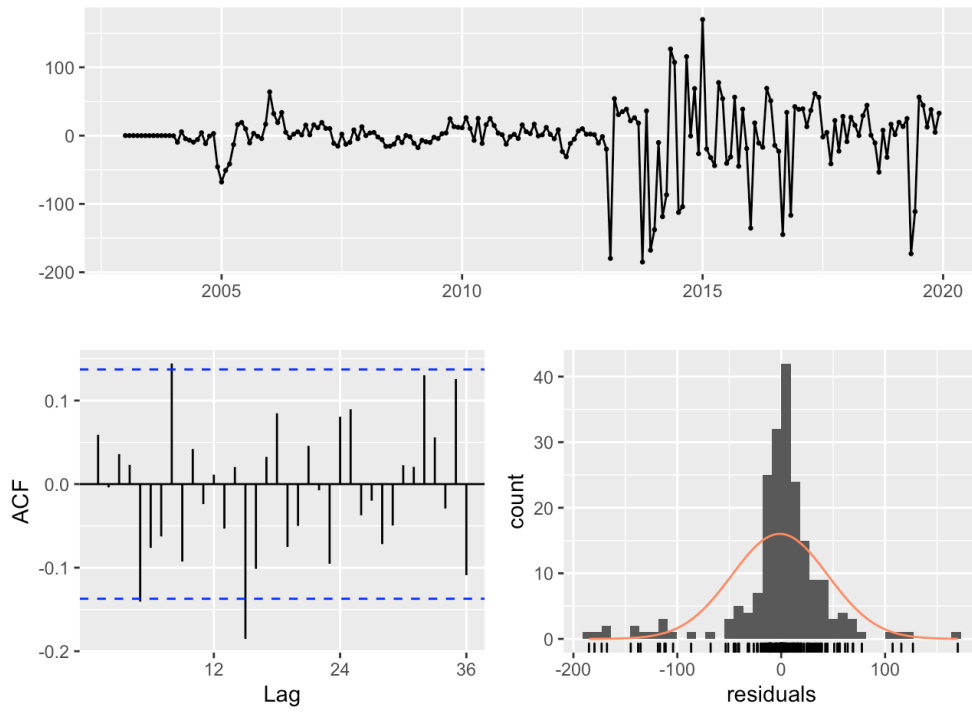
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Supplementary materials

Measuring Seasonality in Maldivian Inbound Tourism
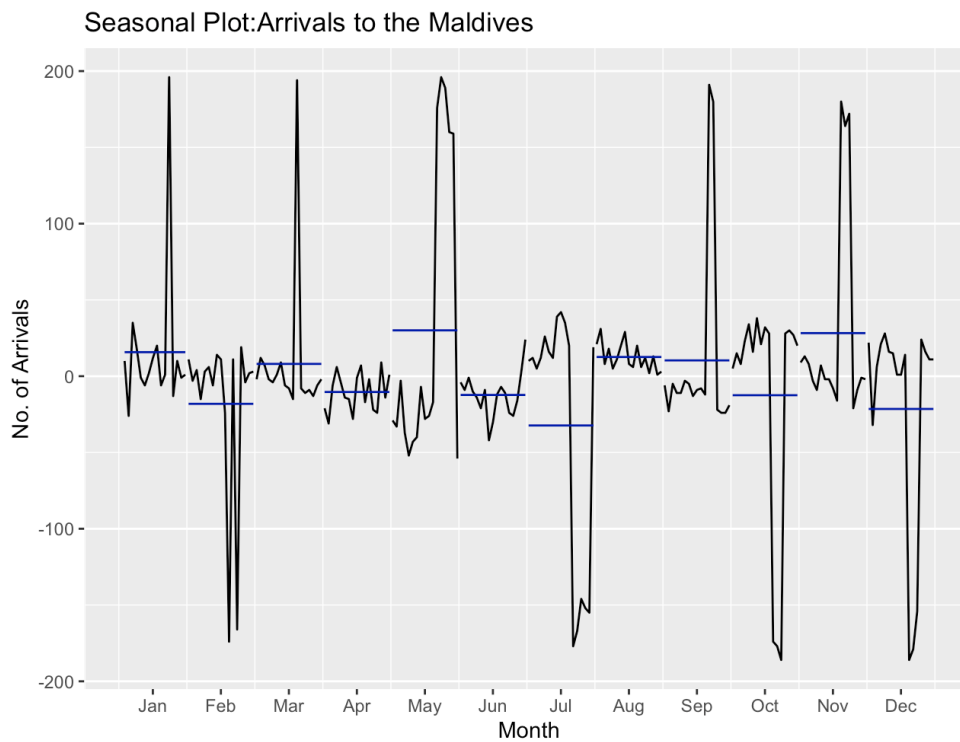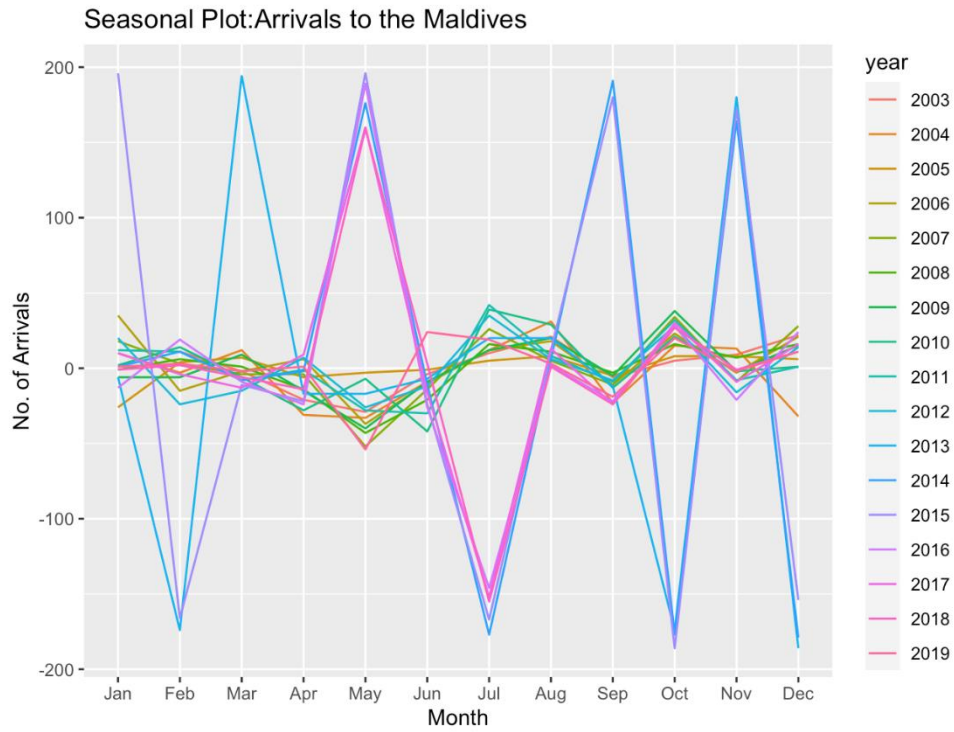
Residuals from ARIMA(0,1,1)(0,1,2)[12]

Forecasts from ARIMA(0,1,1)(0,1,2)[12]