Forecasting Tourism Demand for Austrian Attractions

Bachelor Thesis for Obtaining the Degree

Bachelor of Business Administration in

Tourism and Hospitality Management

Submitted to Dr. Irem Önder

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Vienna, 22. April 2015

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Affidavit

I hereby affirm that this Bachelor's Thesis represents my own written work and that I have used no sources and aids other than those indicated. All passages quoted from publications or paraphrased from these sources are properly cited and attributed.

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Acknowledgement

First of all the author would very much thank her supervisor Dr. Irem Önder for giving her the support she needed throughout her thesis. The biggest “Thank you” goes to her parents who enabled her to study at Modul University Vienna and who have always been there for her in every step of her live. The author is also very thankful to her friends and study colleagues Angelika and Gloria who made the last three years of her life very special. In addition she would also like to thank her sister Tanja, her close friend Sebastian who supported her whenever she struggled with her thesis to motivate her. The last “Thank you” is for the rest of her family and friends.

Abstract

In the hospitality and tourism industry it is essential for managers to somehow plan for the future to minimize the risk of failure. For this reason forecasting plays an essential role in the management process. (Archer, 1994, p. 105)

This study discusses some important literature about the importance of attractions, the need of forecasting and ways to find the best forecasting model for a certain time series. Forecasts have been conducted for 21 attractions all over Austria to find out about the development of these attraction. For this purpose the models Naïve 1, Naïve 2, Simple Moving Average 4 (SMA(4)), Single Exponential Smoothing (SES) and the Double Exponential Smoothing (LES) have been applied. The data had been retrieved from the marketing information system TourMIS. One issue was to discover if there are differences between regions in the field of predictability and how accurate the forecasted values are. Thus two error measures, the Mean Absolut Percentage Error (MAPE) and the Root Mean Squared Error (RMSE) had been used to find out about the accuracy of the forecasting models. In 62 % the MAPE and the RMSE came to the same result which of the forecasting models is the best for each attraction. It turned out that the LES and the SES are the most accurate forecasting models in this study. The Naïve 2 model cannot be recommended for attractions which have a similar development as most of the attractions forecasted in this study. The author would also recommend to use the MAPE for interpretation instead of the RMSE since the MAPE is easier to interpret due to the fact that this method gives a percentage value.

Keywords: tourism demand; forecasting; error measures, MAPE

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1 Introduction

To get an idea of what forecasting is about in general it is important to define the fundamentally idea of it.

> *Forecasting fundamentally is the process of organizing information about a phenomenon's past in order to predict its future. (Freichtling, D. C., 2001, Chap 1)*

What is meant with this definition is that with help of forecasting a single or a set of futures can be predicted in respect of different influences to support the management. It is used in many different industries.(Freichtling, D.C., 2001, Chap 1)

Tourism plays in many countries a crucial role for the economy. In 2013 Austria could welcome more than 44.8 million visitors to 256 sights and attractions throughout the country which is an increase of about 10 % compared to 2012 (44.5 mio. visitors). (tourmis.com, 2015) According to the Austrian tourism board this industry contributes more than 8 % to the annual GDP and represents one of the most important and fastest growing sectors in the Austrian economy. Thus it is essential for the tourism industries and those interested in their success to reduce the risk that a decision will fail to achieve the desired objectives. To reduce this risk one way is trying to forecast future values. Although forecasting plays in many different industry an important role, the need might be higher in the tourism industry. (Frechtling, D. C., 2001, Chap. 1) According to Douglas C. Frechtling (2001) following reasons cause the high importance for tourism demand forecasting.

1. The tourism product is *perishable*, which means that an unsold seat or room, for example, is varnished forever including their revenues. Forecasting should therefore avoid unsold inventory and unfulfilled demand.
2. Production and consumption are inseparable by the people. Usually the production and consumption of the tourism product takes place at the same time since in many cases this process involves the interaction of people thus it is important to right supply the staff, for example, when and where they are needed.

3. Complementary services influence the customer satisfaction. That's why the future demand depends on many different complementary factors to the service like the volume of supply, the friendliness of the service employees, the availability of recreation and many more. Forecasting should make sure that these services are available when they are needed.
4. Natural and human-made catastrophes easily influence the leisure tourism demand. Many people want to escape from the daily stress, therefore crises, such as, war, extreme weather conditions and disease outbreaks have a big impact on the travel behavior.
5. Large and long-term investments in plant, equipment and infrastructure are required for tourism supply.

While there are other industries that do share some of these characteristics, the tourism industry is the only one where all these factors apply. (Frechtling D.C, 2001, Chap 1)

1.1 Aims of the Study

The aim of this study is to forecast the tourism demand for 21 sights and attractions in Austria, 3 sights for each region (excluding Burgenland and Lower Austria). And to compare the forecast results to see which attractions are more stable than others, which attractions are gaining popularity in the recent years and if there is a difference between the regions in terms of forecasting predictability, such as, is it easier to predict attractions in Vienna than the ones in Upper Austria.

Since there do not exist a lot of studies concerning the development of visitor demand for attractions, this study should also bridge the gap in tourism studies by conducting a forecasting study about attractions.

1.2 Approach

To estimate the future tourist demand for the 21 sights and attractions different forecasting methods will be applied that are Naive 1 and 2, Single Moving Average, Single Exponential Smoothing and Double Exponential Smoothing. Because it is crucial to find out how accurate the calculated results are, the Mean Absolute Percentage Error (MAPE) and the Root Mean Squared Error (RMSE) will be

computed. Since the forecasting methods that will be used in this study are time series methods, there is the need of past data to be able to calculate the forecasting values. For this purpose the website tourmis.com was used to retrieve the necessary data.

1.3 Outline of the Thesis

This study starts off with an explanation of the aim and approach of this study. To get a better understanding of the topic the next chapter provides information on tourism demand forecasting and also about information supply, since for some forecasting models previous data is necessary. As the main focus of the study lies on performing forecasts for certain attraction, chapter 3 explains the methods that have been applied and from where the data has been retrieved. Chapter 4 then presents the challenges and the results of the forecasts. And last but not least at the end a conclusion will discuss the research and the limitations, the study had to deal with. The total forecasts can be found in the Appendix sorted by region.

2 Literature Review

In this chapter relevant literature is presented which is necessary to understand the need of forecasting tourism demand. The first part of the review discuss studies about the development and importance of tourist attractions followed by important literature about tourism demand forecasting over the past years. Since it is also necessary to evaluate forecasting models in terms of accuracy, the third part deals with error measures. Last but not least, the review covers the importance of information supply that is necessary to conduct forecasting, which support the decision-making process.

2.1 Studies on Tourist Attractions

Attractions can be very important for a destination. Following statement should help to understand why tourist attractions have such a high importance to a destination:

> *"Visitor attractions are at the heart of the tourism industry, they are motivators that make people want to take a trip in the first place" (Swarbrooke, 2000 as cited in Fyall et al, 2008)*

Attractions have a high value to a destination since they can be the key motivator for tourists going to a destination. This leads not only to the importance of tourist attractions itself, they also contribute to the product offer of a destination. Attractions may also play a crucial role in the decision process whether to return or not, thus generating repeat visitors. Another field where attractions can be of high importance, is the revitalization of a destination. They can be crucial pull factors to develop stronger tourist activities within a destination. (Fyall et al, 2008)

A study conducted by Jie Zhang in 2014 investigated the importance of attractions in Denmark and the impact on their region. The main focus on the paper lies on the development of tourist attractions and their impact on the regional economy. Since hotels and restaurants are closely related to attraction, some of them have been included in the analysis performed in the study. The paper investigated the development in tourist attractions in the economic term and the number of visitors to an attraction. Jie Zhang (2014) defined in her study at least 4 different types of tourist attractions which are (1) free and open attractions, like natural beauty of

landscape, old buildings and monuments; (2) knowledge or aesthetic seeking attractions such as art galleries and museums; (3) commercial amusements and attractions, like amusement parks and zoos and (4) cultural events such as musical festivals and sport events. It could also be argued that hotels and restaurants are a type of tourist attraction if they are chosen for a unique experience. (Zhang, 2014)

For the analysis, Zhangs study mostly includes museums, theme parks and zoo since it is not possible to count the number of visitors for an attraction that has a free entrance fee, like, monuments, beaches, etc. The author found out that the museums in Denmark could record the highest growth from 2002 to 2009. Amusement parks have more stagnated to a slightly decreasing trend in the last years. The Zoos showed a trend in growth in most years, but slowing down in 2004, 2005 and then again in 2008. The study also investigated the survey results by VisitDenmark and found out that tourist attractions influence the tourists' choice on their destination thus leading to have an important role in the field of destination branding. (Zhang, 2014) Jie Zhang (2014) did also a case study in her paper to investigate the impact of tourist attractions on employment in Denmark with a scenario analysis. The direct and the total effect have been calculated for four attractions and also a multiplier factor was computed to show that these attractions did not only create employment in their sector itself, they also have an impact on other branches and regions. (Zhang, 2014)

Another study on attractions conducted by Adrian C. Darnell and Peter S. Johnson in 1999 examined the influence of repeat visitors on the visit flow to an attraction over time because repeating tourists play an important role for the economy as a whole and the attractions themselves. A report from 1998 by the English Tourist Board and the British Tourism Authority found out that 48 per cent of the all overseas visitors to the UK have been repeat visitors. The VFR (Visiting Friends and Relative) did have with 75 % the highest percentage of repeat visits. (BTA/ETB Research Services 1998 as cited in Darnell et al, 1999) The latest visitor survey from 1994 by the British Museum identified too the importance of repeat visits to a specific attraction. It showed that in 1993, 51 % of the visitors have been there before and 22 % even visited the museum six or more times in the last 12 months. Another survey that investigated the visitors to 14 museums and galleries in Leicestershire indicated that

the percentage of repeat visitors varied from 39 to 82 per cent and that these variations depend on the characteristics of the visitors. (Caygill & Leese, 1994; Prince and Higgins, 1992 as cited in Darnell et al., 1999) One many finding of the Darnells et al (1999) study was that a rapid growth especially for a new attraction at the beginning might not be sustained, in many cases there comes a decline after the peak which may stay temporary. The other important outcome was that the visit flows are influenced by the time profile of repeat visits which leads to a challenge for managers since they have to find a way how to influence this profile. (Darnell et al, 1999)

2.2 Tourism demand forecasting

Archer (1994) defined the need for forecasts in hospitality and tourism industries as followed:

> *Forecasting should be an essential element in the process of management. No manager can avoid the need for some form of forecasting: a manager must plan for the future in order to minimize the risk of failure or, more optimistically, to maximize the possibilities of success. In order to plan, he must forecast…. Forecasts are needed for marketing, production, and financial planning. (p. 105)*

For choosing a forecasting technique certain criteria need to be considered, such as accuracy of the forecasting methods, cost of generating the forecasts, and efficiency of producing the forecasts. (Chen, Bloomfield and Cubbage, 2007)

Witt and Witt (1995) reviewed and evaluated in their study " Tourism demand forecasting - a review of empirical research" the existing empirical literature on tourism demand forecasting. Especially the accuracy of the different forecasting methods plays an essential role in their study. Archer (1987) stated that "In the tourism industry ... the need to forecast accurately is especially acute because of the perishable nature of the product." Witt and Witt (1995) compared 13 studies and presented out of these studies 48 cases of tourism forecasting in which the accuracy of econometric models is compared. It turned out that there are many forecasting techniques for tourism demand available, but the focus lies just on a few of these techniques. One of the main findings of the study was that it is not possible to apply

one single model which fits for each tourism demand forecast. Sometimes it even makes more sense to ignore the complex, costly and time-consuming forecasting methods and go for the naive models, but the Naïve 1 model, for example has in some ways a very relative accuracy since the demand usually does not stay the same from year to year. When looking two years or a longer period ahead, it is advisable to put a little more effort in the forecast and try to build an autoregressive model, since this model constantly performed better over other methods over a two-year horizon. (Witt S. F and Witt C. A., 1995)

A newer review of different forecasting methods has been done by Song and Li 2007. They included the published studies on tourism demand modeling and forecasting since 2000. In comparison to the review of Witt and Witt in 1995 the research by Song and Li (2007) does not only focus on econometric approaches, instead the paper gave a review of all methods used in tourism demand forecasting, including time-series models, the econometric approach and some emerging new statistical and non-statistical methods. For this purpose 121 studies have been identified to investigate whether there are any new trends/issues emerging recently in the tourism forecasting literature and to suggest new directions for further research. Out of the 121 all expect two studies applied the quantitative forecasting methods. Song and Li (2005) pointed out that although recent studies showed that the newer and more advanced forecasting methods usually showed a high accuracy, previous studies showed that no model can consistently outperform other models. The author also recommends for researchers that it would be necessary to not only evaluate the impact of disasters and crisis on tourism demand, also to develop forecasting methods that take in consideration unexpected events and their impacts through scenario analysis.

One study which Song and Li (2007) included in their review was “A practitioners guide to time-series methods for tourism demand forecasting -a case study of Durnban, South Africa” by Burger, Dohnal, Kathrada and Law (2001). The objective of the study was to conduct a forecast of US demand for travel to Durban, South Africa. In a review of the World Tourism Organization in 1995 about African tourism, South Africa was considered to be "one of the most promising tourism destinations on the African continent" but it has not been able to realize its full potential yet.

(South Africa, 1996) Tourism plays an essential role for the economy of South Africa, directly and indirectly. Thus tourism planning in respect to forecasting is crucial for the private sector to avoid shortages or surpluses in goods and services. (Burger et al., 2001) The Authors used a verity of time-series methods to show which of the techniques would perform best for Durban. The models which have been employed are naive, moving average, single exponential smoothing, ARIMA; multiple regression, genetic regression and neural networks. The study indicated that the neural network achieved the highest accuracy among the applied models. The time series analysis allows the forecaster to view trends in visitor behavior and is therefore a valuable tool for the beginning of a forecasting project. Simple methods can give reasonable estimations of a short time period into the future. (Burger et al., 2001)

2.3 Error Measures

Since some companies only rely on a single forecasting method for a specific given data it is important to identify the most accurate method. (Armstrong, Collopy, 1992) For this purpose Armstrong and Collopy evaluated in their paper "Error Measures For Generalizing About Forecasting Methods: Empirical Comparisons" six different error measures in terms of reliability, construct validity, sensitivity to small changes, protection against outliers, and their relationship to decision making.

To give guidelines for selecting an error measure, the methods have been rated with poor, fair or good for each criterion. (Armstrong, Collopy, 1992)

Error measure	Reliability	Construct validity	Outlier protection	Sensitivity	Relationship to decisions
RMSE	Poor	Fair	Poor	Good	Good
Percent Better	Good	Fair	Good	Poor	Poor
MAPE	Fair	Good	Poor	Good	Fair
MdAPE	Fair	Good	Good	Poor	Fair
GMRAE	Fair	Good	Fair	Good	Poor
MdRAE	Fair	Good	Good	Poor	Poor

Table 1: Rating of the error measures (Armstrong, Collopy, 1992)

The result of the evaluation was that none of the error measures performed well in each category. According to the results, it is recommended to use Geometric Mean of the Relative Absolut Error (GMRAE) when it comes to calibrating a model for a set of time series. The Median Relative Absolut Error (MdRAE) or the Median Absolut Percentage Error (MdAPE) are recommended when few series is available. (Armstrong, Collopy, 1992). As reported by Armstrong and Collopy (1992) the Root Mean Square Error (RMSE) is not reliable, and is therefore inappropriate for comparing accuracy across series.

A further study which explored and evaluated the major accuracy measures has been conducted by Makridakis S. and Hibon M. (1995) but in comparison to Armstrong and Collopy (1995) they evaluated the error measures according to two statistical criteria and two user oriented criteria. An important question the study wanted to answer was “Is there a best overall measure that can be used in the great majority of situations and which satisfies both theoretical and practical concerns?”. (Makridakis and Hibon, 1995)

Although the criteria have been different the study showed also that none of the measures is superior to all others but each of it provides some useful information that makes it unique. The selection of an appropriate error measure depends therefore on the situation and the needs of decision makers. (Makridakis and Hibon, 1995) For reporting or making comparisons among methods Makridakis and Hibon (1995) suggest to use symmetric MAPE and Mean Square Error (MSE) while the dMAPE should be preferred for comparing a method to an appropriate benchmark.

2.4 Information Supply

Karl Wöber discussed in his paper “Information Supply in Tourism Management by Marketing Decision Support Systems” from 2002 the importance and development of Marketing Decision Support Systems. A MDSS is important for the information management and it supports the decision-making process by providing forecasts and decision models (Little, 1970) Due to the fact of the evolution of new technology and high-capacity storage the need an efficient information management is of high importance. Especially in the tourism sector, operators are confronted with an

enormous field of complex aims that requiring different plans of action. (Wöber, 2002)

According to Wöber it is important that decision-makers have a factual knowledge of the industry (declarative knowledge) and the methodology used (procedural knowledge). Although in the tourism sector is no lack on market research data there is an uncontrollable growth of data. (Seitz and Meyer 1995) The overload of information leaves the managers the challenge to determine which the best source is or that entrepreneurs have to rely on extern specialists in marketing research resulting in additional costs (Wöber, 2002) The problem which occurs in the field of procedural knowledge is that the practitioners are insufficient educated and the problem solving features of standard software solutions are inadequate. These reasons lead to a poor application of management science models and methodologies. (Wöber, 2002)

One step in improving the situation is to develop simple and affordable programs, every tourism manager can have access to. This leaded to the development of TourMIS (Tourism Marketing Information System) which not only provides online data, it also provides various program modules that converts acknowledged methods/models into simple surfaces. More detailed information about TourMIS can be found later in the study in Chapter 3.

3 Methodology

3.1 Forecasting Methods

According to Frechtling (2001, Chap. 2) there are two main subcategories of quantitative forecasting models which are the extrapolative and the causal methods. Extrapolative methods, also called "time series methods", assume that the past variables are fundamental in order to predict the future, which means that patterns in data are used to forecast future values. On the other hand the causal methods try to mathematically simulate cause-and-effect-relationships in order to predict future values. The central objective is to determine explanatory variables which affect the forecasting variables and the appropriate mathematical expression of the relationship.

In this paper only extrapolative methods are applied, which are: Naive 1, Seasonal Naive, Single Moving Average, Singe Exponential Smoothing and Double Exponential Smoothing.

3.1.1 Naive 1

The Naïve 1 model is the simplest extrapolation model in order to forecast time series. It states that the value for the period to be forecast is the same as the actual value of the last period available, which brings us to the formula (Frechtling, D.C, 2001, Chap. 4):

$$\text{Naive 1model:} \quad F_t = A_{t-1}$$

Witt and Witt (1992, p 99 - 132) found out that more complex forecasting models can be less accurate as the naive model and therefore sometimes it is not worth to invest money and time in complex forecasting models.

3.1.2 Naive 2

The Naïve 2 forecast model is defined as a forecast value, by which the current value is multiplied by the growth rate between the current value and the previous value. The Naïve 2 forecast model is a useful comparison for a series that has an upward or downward trend (Frechtling, D.C, 2001, Chap. 4).

$$\text{Naive 2 model:} \quad \mathrm{F_t} = A_{t-1} \times \frac{\mathrm{A_{t-1}}}{A_{t-2}}$$

F = forecast value

A = actual value

t = some time period

3.1.3 Single Moving Average (SMA)

Another method of extrapolation is the single moving average method. In some cases a better forecast for the next period is obtained by averaging the last several values. (Frechtling, D.C, 2001, Chap. 4)

$$\mathrm{F_t} = \frac{A_{t+1} - A_{t+2} - A_{t+n}}{n}$$

F = forecast value

A = actual value

t = some time period

n = number of periods

The more past values included in the SMA model the smoother the forecast, because the influence of single value is smaller than it would be if there are not as many values (Frechtling, D.C, 2001, Chap. 4).

3.1.4 Single Exponential Smoothing (SES)

The single exponential smoothing method is usually used to forecast from stationary time series and allows varying the importance of recent values and thus includes the entire information of the past values. Since this method only works on with data that

has no seasonality, this model should be applied by annual data or monthly or quarterly time series where the seasonality has been removed.

$$F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1})$$

F = forecast value

α = smoothing constant between 0 and 1

A = actual value

t = some time period

The smoothing constant alpha is the portion of the previous period's error included in the next period's forecast and has a value between 0 and 1. Zero indicates that the SES model always forecasts the same value. And if the constant is one the SES model reverts to the Naïve model, because the forecast values on the right-hand side cancel each other out. If the smoothing constant is higher, more weight is given to the last value in the time series. (Frechtling, D.C, 2001, Chap. 5).

3.1.5 Double Exponential Smoothing (LES)

Double exponential smoothing is a method, which is normally used with series showing a linear trend or a trend where seasonality is removed. Moreover DES model calculates a smoothed level and trend at every data mark. With these last points in the time series it is possible to calculate one or two point ahead in the future. (Frechtling, D.C, 2001, Chap. 5) According to Robert F. Nau (2014), the simplest time-varying trend model is Brown's linear exponential smoothing model, which uses two different smoothed series (S_t^1, S_t^2) that are centered at different points in time.

$$F_{t+m} = a_t + b_t \times m$$
$$a_t = 2S_t^1 - S_t^2$$
$$b_t = \frac{\alpha}{1-\alpha}(S_t^1 - S_t^2)$$
$$S_t^1 = \alpha A_t + (1-\alpha)S_{t-1}^2$$
$$S_t^2 = \alpha S_t^1 + (1-\alpha)S_{t-1}^2$$

F = forecast value

A = actual value

a = base term

b =trend term

t = some time period

m = number of time periods ahead to be forecast

α = smoothing constant between 0 and 1

S^x = smoothing operator x

In order to be able to begin the Double Exponential Smoothing process, it is essential to develop starting values. Ulrich Gunter suggested following formulas to obtain the starting values:

$$b_0 = A_2 - A_1$$

$$a_0 = A_1 - b_0$$

$$S_0^1 = a_0 - b_0 \frac{1-\alpha}{\alpha}$$

$$S_0^2 = S_0^1 - b_0 \frac{1-\alpha}{\alpha}$$

3.1.6 Microsoft-Excel Solver

The Solver is used to determine the optimal minimum or maximum value of one cell –called the target cell - by changing other cells which are directly or indirectly related to the target cell. By adjusting the values in the changing cells the Solver produces the optimal result. (Support.office.com, 2015)

3.2 Error Measures

Since there are a various number of forecasting methods, it is essential to have objective criteria by which to evaluate these methods, which are specified structure, plausible structure, acceptability, explanatory power, robustness, parsimony, cost and accuracy. Witt and Witt (1992) found out that the accuracy is the most important forecast evaluation criterion. With error magnitude accuracy measures you can evaluate the accuracy of the certain forecasting methods. (Frechtling, 2001, chap. 2)

In this study the Mean Absolute Percentage Error (MAPE) and the Root Mean Squared Error (RMSE) are applied to find out which of the forecasting models delivered the most accurate result.

3.2.1 Mean Absolute Percentage Error (MAPE)

One of the most useful models to determine the accuracy of a forecasting model is the MAPE (Frechtling, 2001, chap. 2):

$$\text{MAPE} = \frac{1}{n} \times \left(\frac{|e_t|}{A_t} \right) \times 100$$

n = number of periods

e = forecast error (A_t - F_t)

A = actual value of the variable being forecast

t = some time period

The MAPE is basically the sum of the absolute forecast error for each time period (t) divided by the actual value for the period. The sum is then divided by the number of periods and in order to state in in a percentage term you multiply the result by 100. The lower the MAPE value the more accurate is the forecasting model. (Frechtling, 2001, chap. 2)

Lewis (1982) suggested following interpretation of the MAPE:

- Less than 10 per cent is highly accurate forecasting
- Between 10 and 20 per cent is good forecasting
- Between 20 and 50 per cent is reasonable forecasting
- Greater than 50 per cent is inaccurate forecasting

But it is important to be careful with the interpretation because such standards can be misleading since it ignores the characteristics of the time series being forecast. (Frechtling, 2001, chap. 2)

3.2.2 Root Mean Squared Error (RMSE)

The RMSE is used to measure the difference between the values predicted by a model and the values actually observed. These differences are also called residuals. (Barreto, Humberto, and Howland, 2006)

$$\mathrm{RMSE} = \sqrt{\frac{1}{n} \times \sum_{t=1}^{n} (\mathrm{A_t} - \mathrm{F_t})^2}$$

n = number of periods

A = actual value of the variable being forecast

F = forecast value

t = some time period

3.3 Data source

In Order to be able to conduct the forecasts, certain previous data is necessary, and therefore the website TourMIS.com was used.

3.3.1 TourMIS

TourMIS is a marketing information system to support the decision-making process and was introduced by the Austrian National Tourist Office and developed by the Institute for Tourism and Leisure Studies at the Vienna University of Economics and Business Administration. Everyone who has access to Internet can register on the Website to get free access to their data. (Wöber, 2008)

The Website started off with data from Statistik Austria that was strongly influenced by the Austrian National Tourist Office. This means that touristic data, empirical tourism studies and economic indicators had been collected that was interesting for the Austrian Tourism Industry. Over the years more and more data was collected. Especially with the cooperation of the European Travel Commission (ETC) and the European City Tourism (ECT) the database expanded rapidly. (Wöber, 2002)

In 2008 TourMIS could count more than 10,000 registered users from which approximately 1,700 use the website on a day-to-day basis. (Wöber, 2008)

3.3.2 Data for the forecasts

Since 1981 the Austrian National Tourist Office have been collecting the number of visitors to an Austrian sight/attraction. The nine regional tourist boards deliver on an annual basis statistics and today you can find statistics for more than 300 sites in Austria on TourMIS. (TourMIS, 2015) The statistics for these sites can be found under “Austria” in the category “Attractions and Sights”. There it is possible to choose between annual and monthly data (only available for the Schloss Schönbrunn/Schauräume)

Since there is no monthly data for certain sights available, annual data was used for the conducted forecasts in this study. In the following *figure 1* shows how to get to the appropriate data for the calculations.

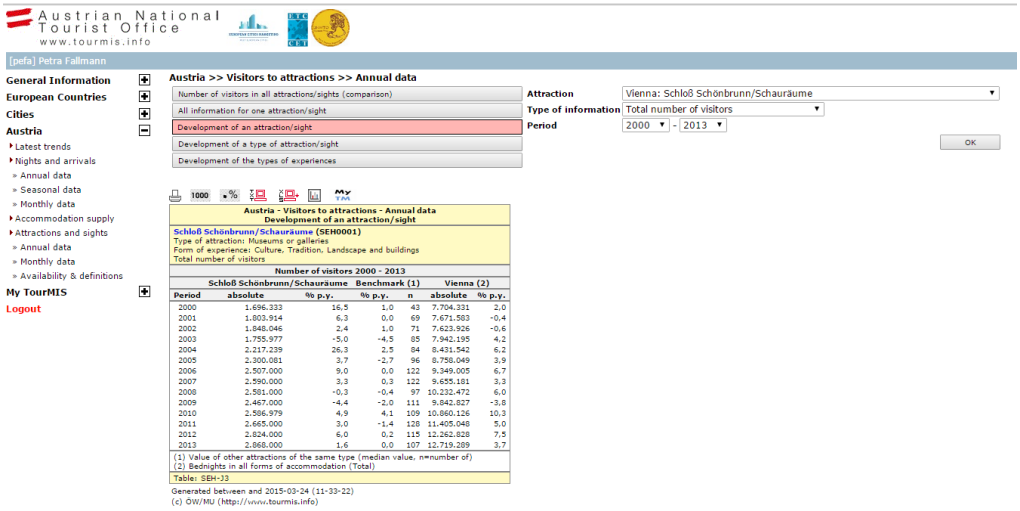

Figure 1: Query – Schloss Schönbrunn

After selecting annual data, it was possible to choose between five different kinds of statistics. As a certain time series is needed for conducting the forecasts, the necessary data can be found under “Development of an attraction/sight”. Then the single attractions have to be selected for a certain time period, in this case from 2000 – 2013 which makes a time series of 13 years. The displayed table was then downloaded as an excel-sheet.

Since there is not for all of the attractions complete data available for the years 2000 to 2013, two regions could not be included in the study – for Lower Austria and Burgenland there do not exist complete data for a single attraction on TourMIS.

The following *table 2* shows which attractions have been selected for the study. (Three from each region)

Attraction	Region
Nockalmstraße	Carinthia
Obir Tropfsteinhöhle	Carinthia
Terra Mystica	Carinthia
Festung Hohesalzburg	Salzburg
Großglockner Alpenstraße	Salzburg
Hellbrunn (Schloß- u. Wasserspiele)	Salzburg
Freilichtmuseum Stübing	Styria
Erzberg	Styria
Zeughaus Graz	Styria
Swarovski Cristal Wolrds, Wattens	Tyrol
Alpenzoo, Innsbruck	Tyrol
Kufstein Fortress	Tyrol
Postling Bergbahn Linz	Upper Austria
Wolfgangseeschifffahrt	Upper Austria
Ars Electronica Museum	Upper Austria
Schloss Schönbrunn	Vienna
Schönbrunn Zoo	Vienna
Museum of Nature History	Vienna
Bregenz, Pfäder, Wildpark	Vorarlberg
Silvretta-Stausee und Bielerhöhe	Vorarlberg
Inatura Erlebnis Naturschau, Dornbirn	Vorarlberg

Table 2: Attractions to be forecast

4 Results

After downloading the necessary data of the 21 attractions around Austria, the forecasting methods and error measures explained in chapter 3 have been applied in the Microsoft-Excel program. This section now illustrates and discusses the findings of the calculations. The entire forecasts of the 21 attractions can be found in the appendix.

4.1 Development of the Attractions

In this section the attractions will be analyzed to find out which sights are more stable than others and which are gaining popularity in the recent years.

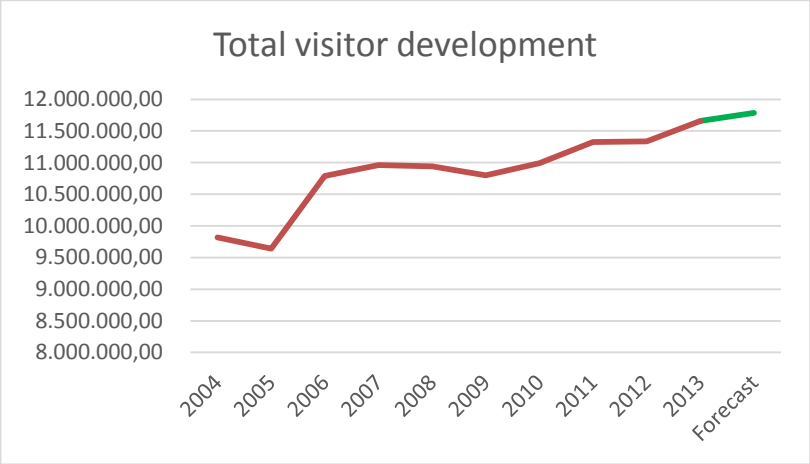

Figure 2: Total visitor development

Before going in deep it is important to look at the overall development of visitors for the attractions used in this study. When looking at *Figure 2* it is clearly visible that there has been a growth in visitors over the last 10 years and for 2014 there is again an increase predicted. When comparing the visitors of 2013 to 2004, an increase of 18.72 % in people visiting these attractions could be recorded.

Within the last 10 years 12 out of 21 attractions could record a rise in the number of visitors. (*Table 3*) The Ars Electronica Center and the Museum of Nature History had the highest growth rate in visitors from 2004 to 2013, they could even more than double their visitor number. When looking at these two attractions more closly it can be seen that the Museum of Nature History has a quite constant growing from year to year (except in 2008) whereas the Ars Electronica Center had a big jump in

visitors from 2008 to 2009. Since 2010 the center could record a quite constant number of visitors. For the Museum of Nature history a growth in visitors is predicted again for 2014, while for the Ars Electronica Center a slight decrease is expected. Although both have a similar growth rate, it can be said that only the Museum of Nature History is getting more popular from year to year looking at these two attractions. The most popular attractions in this study are with 2 to 3 million visitors per year, Schloss Schönbrunn and the Schönbrunn Zoo.They could record a growth rate of almost 30 % within the last 10 years. While the Zoo has a quite stable visitor number since 2009, the Schloss Schönbrunn could register a steady growth and it is also expected to have again a rise in visitors for 2014. The Festung Hohesalzburg has a similar development as the Schloss Schönbrunn. What the three attractions with the highest visitors have in common is, that all of them had a drop in visitors from 2008 to 2009 and in 2010 again a growth.

As mentioned before not all of the attractions in this study had a growth in visitors. The Silvretta-Stausee, Erzberg and the Obir Tropfsteinhöhle had the highest loss in visitors with a growth rate of about –30 %. While the Obir Tropfsteinhöhle has a rather constant decrease, the Silvretta Stausee and the Erzberg do have ups and downs but the trend is downwards.

The Großglockner Alpenstraße, the Nockalmstraße and the Bregenz, Pfäder, Wildpark recorded a slight increase or decrease in visitors from 2004 compared to 2013. When taking a look at the development over the past years it can be seen that these attractions have sometimes jumps or drops in visitors of about 10 % and then they are again quite constant. The Großglockner Alpenstraße, for example, has these fluctuations from 2004 to 2005 and from 2012 to 2013. In between they can record a rather stable visitor number. Although the fluctuations are not that high, the forecasts should be done very carefully for these attractions, since it is not known when the next bigger fluctuation will be.

Attractoin	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	growth
Schloss Schön.	2,217,239	2,300,081	2,507,000	2,590,000	2,581,000	2,467,000	2,586,979	2,665,000	2,824,000	2,868,000	29.35 %
Schön. Zoo	1,725,637	1,698,012	2,270,996	2,453,987	2,578,698	2,183,445	2,237,236	2,355,149	2,193,154	2,226,404	29.02 %
Festung Hohes..	888,482	805,636	935,166	970,000	930,000	857,096	907,333	939,336	995,643	1,012,000	13.90 %
Großgl. Alpenstr.	891,608	819,154	823,252	835,723	820,004	832,741	790,698	819,959	803,913	903,301	1.31 %
Museum of Nat.	318,640	338,897	368,801	397,140	372,778	392,149	527,744	552,997	564,512	726,207	127.91 %
Swarovski Cristal	726,737	680,000	690,000	650,000	720,000	700,000	680,000	680,000	680,000	650,000	-10.56 %
Postling Bergbahn	425,709	494,451	458,491	438,742	370,917	604,231	597,210	542,832	595,062	606,839	42.55 %
Pfäder	565,476	533,953	499,922	550,528	551,000	575,463	541,030	586,757	582,837	558,042	-1.31 %
Wolfgangseeschif.	362,000	353,000	485,208	426,919	427,572	388,930	398,341	403,463	388,621	394,743	9.05 %
Hellbrunn	262,546	241,872	282,000	267,987	267,000	255,000	263,309	274,000	283,693	285,000	8.55 %
Silvretta-	357,000	302,000	350,000	346,108	278,000	321,739	265,177	305,212	293,221	258,605	-27.56 %
Alpenzoo,	233,743	234,488	300,000	230,112	255,787	251,868	248,974	259,259	248,388	240,769	3.01 %
Kufstein Fortress	148,200	152,320	152,700	169,500	175,000	153,000	174,600	170,000	174,000	175,299	18.29 %
Ars Electronica	63,155	72,000	74,229	56,000	39,622	248,678	162,438	179,883	173,779	175,261	177.51 %
Nockalmstraße	231,948	221,864	241,704	221,979	225,028	225,694	233,836	234,557	231,880	231,233	-0.31 %
Inatura	120,642	88,979	83,000	81,200	77,000	86,128	114,769	89,000	89,071	104,818	-13.12 %
Erzberg	95,000	105,000	84,000	86,600	81,500	73,600	73,700	81,000	42,000	66,000	-30.53 %
Freilichtmuseum	49,627	53,162	57,113	58,403	55,055	57,974	59,063	61,566	54,000	61,850	24.63 %
Zeughaus Graz	48,724	53,622	52,891	53,138	55,035	46,913	50,398	47,111	44,376	43,348	-11.03 %
Obir	48,950	49,820	40,000	45,000	45,509	39,096	38,314	38,239	35,166	34,695	-29.12 %
Terra Mystica	36,467	40,609	31,000	30,000	30,000	35,105	36,452	36,500	34,500	32,900	-9.78 %
Total visitors	**9,819,534**	**9,640,925**	**10,789,479**	**10,961,073**	**10,938,513**	**10,797,859**	**10,989,611**	**11,323,831**	**11,333,828**	**11,657,327**	**18.72 %**

Table 3: Number of actual Visitors from the last 10 years

The following table (*Table 4*) should give an overview of the forecasted visitors of each attraction for 2014 to get an idea of how popular each of these attractions is. The attractions are ranked according to the predicted future visitors. It is clearly seen that the attractions in Vienna are rank in the top 5 of this list but the main focus at this table should lie on the (non-) correlation of the MAPE and the number of the visitors.

Attraction	Region	Forecast (lowest error) 2014	MAPE
Schloss Schönbrunn	Vienna	2,945,311.53	4.51 %
Schönbrunn Zoo	Vienna	2,224,627.54	8.91 %
Festung Hohesalzburg	Salzburg	1,017,519.75	5.58 %
Großglockner Alpenstraße	Salzburg	847,627.98	3.55 %
Museum of Nature History	Vienna	774,989.67	8.37 %
Swarovski Cristal Wolrds, Wattens	Tyrol	668,253.44	3.31 %
Postling Bergbahn Linz	Upper Austria	624,553.10	10.08 %
Bregenz, Pfäder, Wildpark	Vorarlberg	567,166.50	4.19 %
Wolfgangseeschifffahrt	Upper Austria	394,084.09	5.75 %
Hellbrunn (Schloß- u. Wasserspiele)	Salzburg	290,477.14	4.82 %
Silvretta-Stausee und Bielerhöhe	Vorarlberg	280,553.75	10.14 %
Alpenzoo, Innsbruck	Tyrol	242,666.86	5.77 %
Nockalmstraße	Carinthia	232,876.50	3.34 %
Ars Electronica Museum	Upper Austria	175,138.01	21.47 %
Kufstein Fortress	Tyrol	174,152.89	4.61 %
Inatura Erlebnis Naturschau, Dornbirn	Vorarlberg	104,818.00	14.63 %
Freilichtmuseum Stübing	Styria	59,119.75	6.16 %
Erzberg	Styria	53,415.83	11.91 %
Zeughaus Graz	Styria	42,710.98	5.69 %
Obir Tropfsteinhöhle	Carinthia	33,366.47	6.51 %
Terra Mystica	Carinthia	32,900.00	7.78 %

Table 4: Attraction ranking according to the visitors

The table should answer the question “Is it easier to predict attractions with a higher number of visitors than the ones with a lower visitor rate?”. It is assumed that attractions with a lower error value are easier to forecast since the predicted value is closer to the actual value. By having a look at these numbers we can see that there is not really a relationship between the number of visitors and the error. Attractions with a lower visitor number can have the same low error as attractions with a high visitor number and the other way around. Therefore it cannot be stated that an attraction with a higher number of visitors, for example, are easier to predict.

4.2 Results of the Error Measures

Usually the outcome of the single models differ from model to model, to find out which of the forecasting models has the highest accuracy, thus providing the most accurate forecasting value, the error measures Mean Absolut Percentage Error (MAPE) and the Root Mean Squared Error (RMSE) have been calculated.

For computing the errors it is important to start at the time when each of the forecasting method come out with a forecasting value to have an equal number of periods, otherwise the result would not be representative. In this study a time period of 10 years was given for the error measures, since some forecasting methods needed data from the last four years (SMA (4)) it was not possible to start with 2001 that more values could have been included.

Table 5: Error Measures of the Forecasting Model gives an overview of the results of the MAPE and the RMSE for each attraction and each forecasting method. To visualize which model resulted in the lowest error for each single attraction, the value was formatted in bold. At first glance it can be seen that none of the methods delivered the most accurate result for each attraction. Neither the MAPE nor the RMSE gave a significant result, on the contrary they did not even match in some cases. *Figure* 3 should illustrates the finding in a better way. Only for 62 % of the attractions forecasted in this study the MAPE and the RMSE came to the same result.

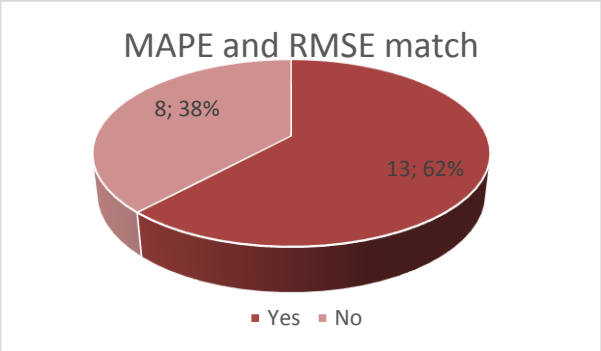

Figure 3: Match of MAPE and RMSE

Attraction	Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
	Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
Nockalmstraße	3.78%	7.12%	**3.34%**	3.57%	5.04%	11,948	21,850	**9,929**	11,161	15,579
Obir Tropfsteinhöhle	8.55%	16.88%	8.43%	8.56%	**6.51%**	5,039	8,853	**3,985**	5,013	4,004
Terra Mystica	**7.78%**	14.26%	14.87%	7.85%	10.33%	3,838	6,213	6,039	**3,836**	4,525
Festung Hohesalzburg	6.16%	8.86%	6.28%	6.16%	**5.58%**	63,700	98,531	65,434	**63,582**	64,013
Großglockner Alpenstraße	4.34%	6.99%	4.11%	4.01%	**3.55%**	47,643	74,649	45,848	45,819	**44,074**
Hellbrunn (Schloß- u. Wasserspiele)	5.54%	9.04%	5.88%	5.39%	**4.82%**	18,829	34,294	19,767	**17,818**	21,520
Erzberg	19.81%	29.13%	17.74%	18.42%	**11.91%**	16,767	24,469	14,549	15,287	**10,445**
Freilichtmuseum Stübing	8.04%	11.59%	**6.16%**	7.72%	8.10%	5,324	8,007	**4,103**	5,189	5,017
Zeughaus Graz	11.21%	29.92%	7.36%	9.09%	**5.69%**	9,609	29,015	3,997	7,986	**3,912**
Swarovski Cristal Wolrds, Wattens	5.21%	10.74%	3.88%	**3.31%**	4.76%	51,523	101,802	34,375	**27,136**	54,393
Alpenzoo, Innsbruck	8.25%	15.49%	6.42%	7.35%	**5.77%**	32,127	60,000	**21,814**	28,238	25,171
Kufstein Fortress	5.95%	10.10%	10.61%	**4.61%**	6.52%	12,582	20,316	20,594	**10,159**	14,125
Ars Electronica Museum	24.54%	107.60%	27.52%	**21.47%**	22.99%	72,235	448,407	65,697	66,178	**65,404**
Postling Bergbahn Linz	10.72%	20.66%	11.46%	10.55%	**10.08%**	84,497	164,669	**78,305**	83,782	80,076
Wolfgangseeschifffahrt	6.65%	14.09%	7.02%	**5.75%**	8.49%	47,984	92,586	44,538	**43,993**	62,389
Schloss Schönbrunn	5.56%	8.25%	10.22%	5.59%	**4.51%**	181,688	261,160	299,242	181,954	**152,187**
Schönbrunn Zoo	8.95%	15.94%	9.02%	**8.91%**	10.57%	255,880	392,423	291,505	**255,358**	310,231
Museum of Nature History	8.81%	12.12%	14.51%	8.83%	**8.37%**	6,559	82,325	101,265	69,682	**59,699**
Bregenz, Pfäder, Wildpark	4.71%	7.75%	**4.19%**	4.65%	5.15%	3,501	50,322	**27,606**	29,610	37,607
Silvretta-Stausee und Bielerhöhe	13.79%	21.94%	**10.14%**	12.02%	10.28%	4,661	74,111	**39,722**	43,225	41,329
Inatura Erlebnis Naturschau,	**14.63%**	79.94%	19.04%	14.71%	20.74%	**1,050**	218,741	30,857	18,096	27,705
Average	**9.19 %**	**21.83 %**	**9.91 %**	**8.50 %**	**8.56 %**	**51,666**	**108,226**	**58,532**	**49,195**	**52,543**

Table 5: Error Measures of the Forecasting Models

By taking a deeper look at *Table 5*, especially when looking at the MAPE values for the single attractions, it can be seen that their values are really close. In some cases like Großglockner Alpenstraße the result of the MAPE for each forecasting method indicates a high accuracy since the MAPE value is below 10. This shows that in some cases not only one single forecasting method performs well, others also deliver an accurate prediction of the future.

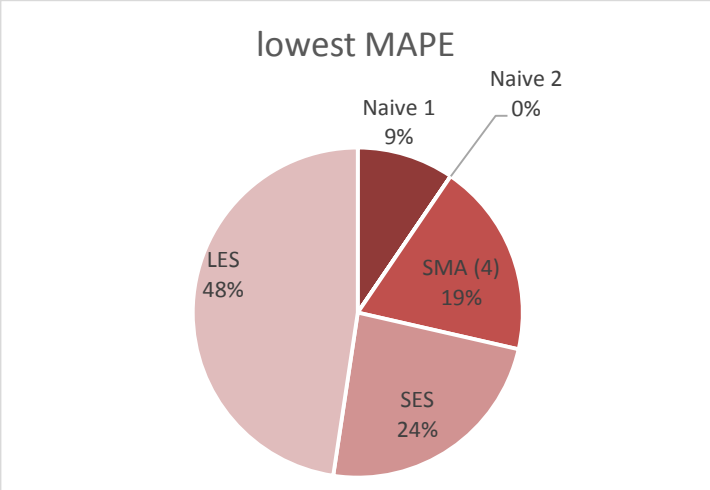

Figure 4: Best Model according to the MAPE

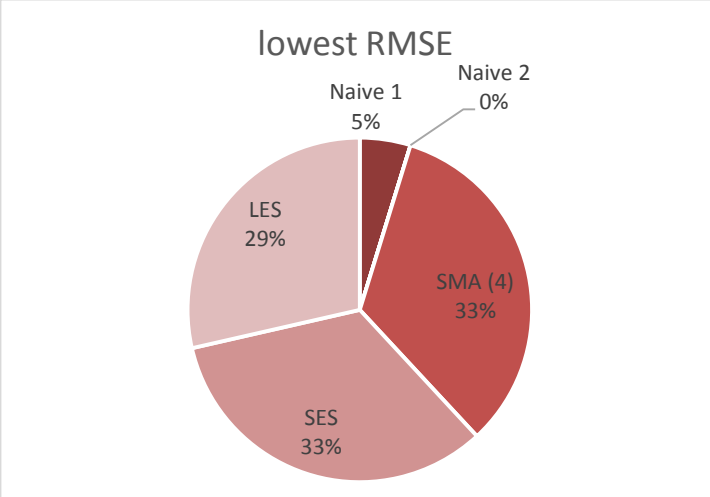

Figure 5: Best Model according to the RMSE

As mentioned earlier in this paper, no method for predicting future values is the most accurate model for the majority of the attractions analyzed. *Figure 4* and *Figure 5* illustrate the results to visualize in how many cases each model reached the best MAPE. As the two figures show, the Naïve 2 gave not only for one attraction the best result, neither the MAPE nor the RMSE indicated that model to be the most

accurate method. For the MAPE there is actually one model that stands out. According to its values the LES delivered for almost half of the attractions the most accurate forecast. When averaging the error values of the attractions of that model the LES has an error of only 8.56 % (MAPE) which indicates a highly accurate forecast. The RMSE for the LES (52,543) does also show that this model has a high accuracy compared to the other forecasting methods since the RMSE values vary between 49,000 and about 108,000 in this study. Although the LES was indicated to be the best model in more cases then the other models considering the MAPE, when looking at the RMSE, the LES did not perform best, because the SES and even the SMA delivered in one case more a better result. Also when looking at the average error values the SES did perform better than the other methods. It can be now assume that the Single and the Double Exponential Smoothing are the best forecasting models for attractions and the SMA (4) does also give quite accurate future values. One reason why the LES and the SES performed so well could be that both of these models use a smoothing constant. This value determines how much weight is given to the certain values of the time series (Frechtling, D.C, 2001, Chap. 5). The Microsoft-Excel Solver was applied to demine the optimum α-Value.

The Naïve 2 method turned out to be the least accurate model, this is shown by a MAPE value of 21.83 % which is double the value of the other models and by the RMSE that resulted in a value of 108,226. What is interesting to see is that for the RMSE the Naïve 1 model turned out to deliver the second most accurate value (51,666) and therefore it delivers even a better result than the LES, according to the RMSE. For the MAPE it is the other way around because there the LES was indicated to deliver a better outcome than the Naïve 1 method. (Naïve 1: 9.19 %). Both methods indicated that the SMA (4) provides quite accurate forecasting values too.

To find out how accurate the predicted numbers really are, it will be taken a closer look at the error values itself. Since it is more difficult to interpret the RMSE and according to Armstrong and Collopy (1992) this method is also not reliable, in the field of comparing accuracy across series, the main focus in interpreting the accuracy of the forecasting models lies on the MAPE. The difficulty in the interpretation lies in the format of the result, because in contrast to the MAPE, which provides a percentage, the RMSE delivers only an absolute value. There is no limit of the value,

the level of the result normally depends on the height of the actual and the forecast values.

As discussed earlier in this study Lewis (1982) suggested one way of interpreting the MAPE. Based on this suggestion, *Figure 6* gives an overview of the accuracy of the forecasts of the attractions. The marked values for the MAPE from *Table 5*: Error Measures of the Forecasting Model have been allocated according to Lewis' interpretation. It can be seen that the forecasts for 76.2 % (16) attractions are highly accurate and only in one case (Ars Electornica Center, Linz) the accuracy of the forecast is reasonable.

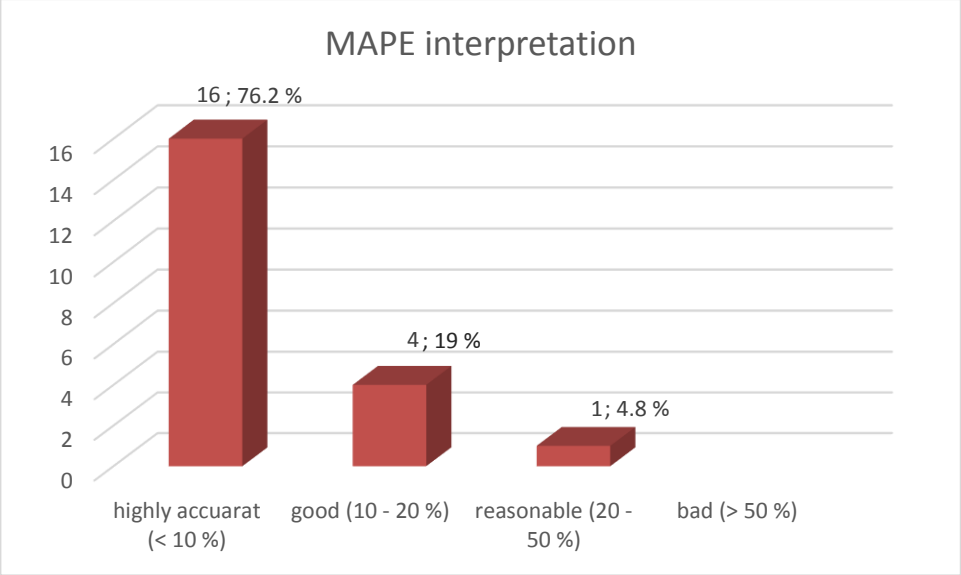

Figure 6: MAPE interpretation according to Lewis (1982)

The next diagram *(Figure 7*: MAPE distribution) illustrates the distribution of the single MAPE values. Right away it can be seen that many values are located between 3 to 7 % which is very good value for the MAPE. According to the conducted forecasts Swarovski Cristal World (MAPE 3.31 %) is the attraction which can be forecasted easier than the others when it is assumed that attractions with a lower MAPE are easier to predict. It can be seen very well that there exists one outlier with a value of about 21 % which is the Ars Electronica Center in Linz.

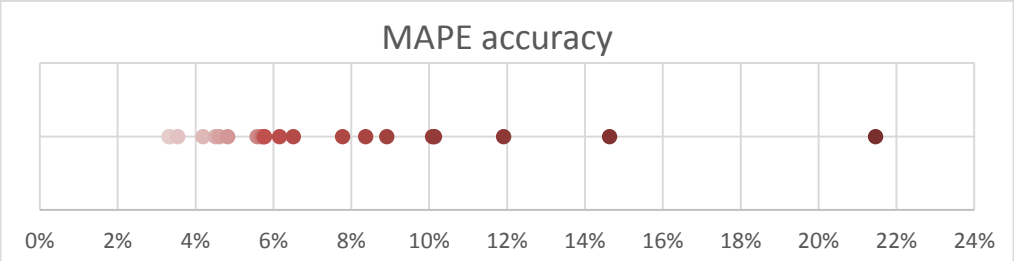

Figure 7: MAPE distribution

But as Freichtling stated (2002, Capt. 2) it is important to be careful with the interpretation because such standards can be misleading since it ignores the characteristics of the time series being forecast. For this reason it is advisable to have a closer look at the MAPE values of the previous years and the actual visitors to finding out what could have caused the poor results. (*Table 6)*

Period	Actual	Mean Absolute Percentage Error (MAPE)				
		Naive 1	Naive 2	SMA (4)	SES	LES
2000	68,500					
2001	65,000					
2002	60,000					
2003	60,000					
2004	63,155	5.00%	5.00%	0.35%	3.09%	13.11%
2005	72,000	12.28%	7.67%	13.84%	11.62%	22.31%
2006	74,229	3.00%	10.58%	14.06%	5.78%	16.05%
2007	56,000	32.55%	36.66%	20.26%	30.66%	20.80%
2008	39,622	41.34%	6.63%	67.45%	52.03%	51.68%
2009	248,678	84.07%	88.73%	75.69%	82.02%	81.38%
2010	162,438	53.09%	860.84%	35.59%	22.11%	0.00%
2011	179,883	9.70%	41.01%	29.57%	4.77%	1.81%
2012	173,779	3.51%	14.63%	9.28%	2.29%	10.92%
2013	175,261	0.85%	4.21%	9.09%	0.28%	11.85%
		24.54%	**107.60%**	**27.52%**	**21.47%**	**22.99%**
		3	**5**	**4**	**1**	**2**

Table 6: MAPE of Ars Electoronica Center, Linz

Taking a closer look at the actual number of visitor to the Ars Electronica Center it can be seen that there is a big gap between 2008 and 2009 and again from 2009 to 2010. From 2011 to 2013 the visitors have been quite constant compared to the previous years. This variance in the actual visitor numbers probably has caused the high MAPE because the MAPE did not perform so worse considering the last 3 years.

While the result for Naïve 1, SMA (4), SES and LES are rather close, the Naïve 2 method totally failed for this attraction. And so "can it now be said that the forecasting values are not accurate and therefore not meaningful?" This Attraction is a good example for the possibility of misinterpretating the result of the MAPE, thus it is important to not only look at the result itself. There are more factors that should be considered when interpreting the accuracy of a forecasting method. Important would also be to find out what caused such a fluctuation. In the case of Ars Electronica Center this was caused by the opening of the new center, which is an enhanced and updated version of the original one. (*Ars Electronica Linz GmbH, 2015)*

4.3 Regional Differences

As another aim of the study was to find out if there is a difference between the regions in terms of forecasting predictability, *Table 7* shows the averaged MAPE values of the three attractions in each region.

Attraction	Region	MAPE	Model
Nockalmstraße	Carinthia	3.34%	
Obir Tropfsteinhöhle	Carinthia	6.51%	
Terra Mystica	Carinthia	7.78%	**5.88%**
Festung Hohesalzburg	Salzburg	5.58%	
Großglockner Alpenstraße	Salzburg	3.55%	
Hellbrunn (Schloß- u. Wasserspiele)	Salzburg	4.82%	**4.65%**
Freilichtmuseum Stübing	Styria	6.16%	
Erzberg	Styria	11.91%	
Zeughaus Graz	Styria	5.69%	**7.92%**
Swarovski Cristal Wolrds, Wattens	Tyrol	3.31%	
Alpenzoo, Innsbruck	Tyrol	5.77%	
Kufstein Fortress	Tyrol	4.61%	**4.56%**
Postling Bergbahn Linz	Upper Austria	10.08%	
Wolfgangseeschifffahrt	Upper Austria	5.75%	
Ars Electronica Museum	Upper Austria	21.47%	**12.43%**
Schloss Schönbrunn	Vienna	4.51%	
Schönbrunn Zoo	Vienna	8.91%	
Museum of Nature History	Vienna	8.37%	**7.26%**
Bregenz, Pfäder, Wildpark	Vorarlberg	4.19%	
Silvretta-Stausee und Bielerhöhe	Vorarlberg	10.14%	
Inatura Erlebnis Naturschau, Dornbirn	Vorarlberg	14.63%	**9.65%**

Table 7: Regional differences in forecasting predictability

If a comparison between the MAPE and the number of arrivals in the certain regions (*Table 8)* would be made it cannot be stated that the region with the highest arrival number is also the one with the highest forecasting predictability. Because Carinthia, for example has a lower number of arrivals and also a low MAPE whereas Upper Austria has a low arrivals too but its MAPE value is twice as high.

According to this study, Tyrol is the region with the highest predictability, because it has a low error in the forecasted values, but close behind there comes Salzburg with an average prediction error with 4.65 %. Upper Austria is with a value of 12.43 % the least predictable region in Austria (Lower Austria and Burgenland excluded in the calculations). Of course, such interpretations should be handled with care because when taking a closer look at the single numbers for each region we can see that the Wolfgangsseeschifffahrt for example can be quite good forecasted. This could be an exception of the region or not. In order to be able to make a statement about regional differences it would be necessary to look at many more attractions in every single region.

4.4 Correlation between Visitors and Arrivals

To find out whether there is a correlation between the visitors in an attraction and the arrivals in the region, or not, a Pearson Correlation Coefficient has been computed. The following table (*Table* 8*)* shows the visitors for each attraction and the total arrivals in each of the region, where the attraction is located. The coefficient was calculated in Excel with the formula "=PEARSON(Matrix 1;Matrix2)".

Attraction	Region	Visitors (2013)	Total Arrivals (2013)
Nockalmstraße	Carinthia	231,233	2,787,794
Obir Tropfsteinhöhle	Carinthia	34,695	2,787,794
Terra Mystica	Carinthia	32,900	2,787,794
Festung Hohesalzburg	Salzburg	1,012,000	6,458,801
Großglockner Alpenstraße	Salzburg	903,301	6,458,801
Hellbrunn (Schloß- u. Wasserspiele)	Salzburg	285,000	6,458,801
Erzberg	Styria	66,000	3,485,105
Freilichtmuseum Stübing	Styria	61,850	3,485,105
Zeughaus Graz	Styira	43,348	3,485,105
Swarovski Cristal Wolrds, Wattens	Tyrol	650,000	10,188,128

Alpenzoo, Innsbruck	Tyrol	240,769	10,188,128
Kufstein Fortress	Tyrol	175,299	10,188,128
Ars Electronica Museum	Upper Austria	175,261	2,511,551
Postling Bergbahn Linz	Upper Austria	606,839	2,511,551
Wolfgangseeschifffahrt	Upper Austra	394,743	2,511,551
Schloss Schönbrunn	Vienna	2,868,000	5,836,699
Schönbrunn Zoo	Vienna	2,226,404	5,836,699
Museum of Nature History	Vienna	726,207	5,836,699
Bregenz, Pfäder, Wildpark	Vorarlberg	558,042	2,263,959
Silvretta-Stausee und Bielerhöhe	Vorarlberg	258,605	2,263,959
Inatura Erlebnis Naturschau, Dornbirn	Vorarlberg	104,818	2,263,959

Correlation Coefficient	**0.241203402**

Table 8: Pearson Correlation Coefficient

The Pearson Correlation Coefficient is a measure to calculate how strong the relationship between two variables is. The coefficient identified as "r" can range from - 1 to 1. A value of 1 indicates a perfectly positive relationship and a value of – 1 a perfectly negative relationship. A value close to 0 indicates no linear relationship. (Lane, 2015) The calculation resulted in a correlation coefficient of 0.2412 which is close to 0. This value shows that there is a weak positive linear relationship which could also be interpreted that there is no relationship between the visitors of a certain attraction and the total arrivals in the respective region. That leads to the result that it cannot be stated that a high number of arrivals in a region also leads to a high number of visitors to the attractions. (Visualized in Figure 8).

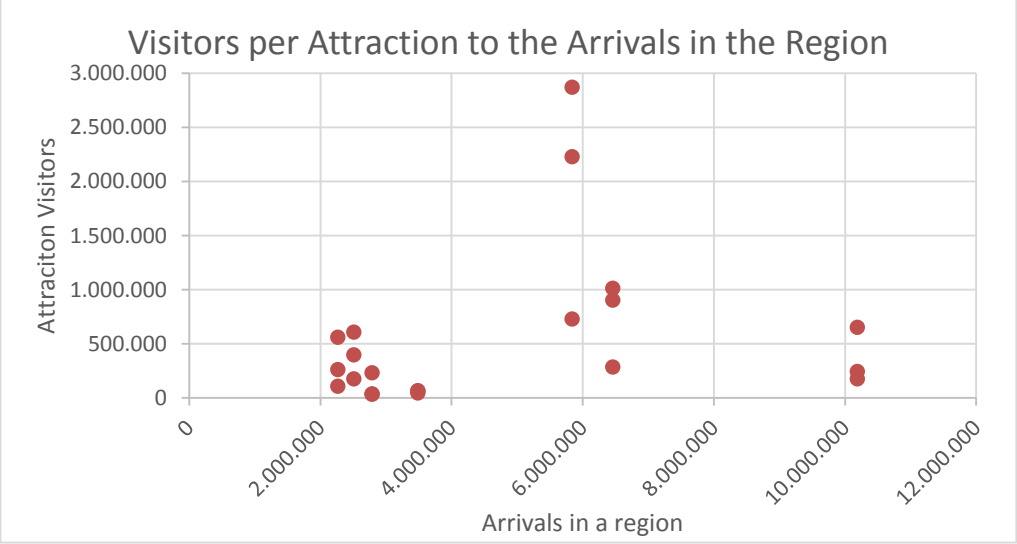

Figure 8: Pearson Correlation Coefficient - Diagram

In the diagram it can be seen that the points do not lie on a line, it would be rather difficult to draw a linier line in that diagram, since the points are wide spread.

What is also interesting to see is that Tyrol has the highest number of arrivals and not Vienna. *(Table 8)* Since Vienna is the biggest city in Austria with a great offer for tourist, someone would expect to have in this region the highest number of arrivals or at least to come close to Tyrol. The reason, why Tyrol has such a high arrival number, is the winter tourism. In winter 2013 they had arrivals of about 5.4 Mio (Landesregierung, 2015) which are more than 50 % of the total arrivals of Tyrol. Compared to Vienna, Tyrol is a popular skiing destination with more than 80 alpine ski resorts that offer about 3000 km skiable terrain. (Tirol Tourismus, 2015)

5 Conclusion

The aim of this study was to forecast the visitors for 2014 for 21 attractions all over Austria to find out about the development of the attractions, if there are differenced in terms of forecasting predictability and how accurate the predicted values are. For this purpose the data of the past 13 years has been retrieved from TourMIS for each sight to be able to conduct the calculations in Microsoft-Excel.

In general, when looking at the development of visitors to the attractions it can be stated that attractions in Austria are getting more popular from year to year since there has been a growth of 18.72 % within 10 year (2004 to 2013). Of course, some attractions lost over the past years. The biggest winners have been the Ars Electronica Center in Linz and the Museum of Nature History in Vienna. Although the Ars Electronica had a higher growth rate, the Museum of Nature History is the best attraction in the field of development because the Ars Electronica opened a new center which caused the increase in visitors. The Museum of Nature History is getting popular without any major changes. The Schloss Schönbrunn could also record an increase of about 30 % from 2004 to 2013 and since 2009 the visitor numbers are steadly increasing. The biggest loser with a loss in tourism demand of about 30 % are the Ezberg, Obir Tropfsteinhöhle and the Silvretter Stausee.

This study identified, as other previous studies too, that there is no forecasting model which is superior over the others but it indicated one model that could not deliver the most accurate result for one single attraction which is the Naïve 2 method. According to this study the Double Exponential Smoothing and the Single Exponential Smoothing are two models which are highly recommended when forecasting attractions. According to the MAPE result, for most of the attractions a highly accurate prediction could be calculated. There was only one attraction, that was the Ars Electronica Center, which had a MAPE value of over 20 % which means that it is according to Armstong and Collopy (1992) a reasonable forecast. This case is a good example that the interpretation should be done carefully because the high MAPE was caused by a jump in the data set, after that jump they could record a quite stable visitor number.

The analysis of the attractions in respect to their region discovered that Tyrol and Salzburg have a quite high predictability since none of their attractions has a MAPE value above 5 % which indicates that their forecasted values are highly accurate. When looking at the MAPE values of attractions in Upper Austria it could be stated that this region has the lowest predictability because for only one attraction a highly accurate forecasting value could be predicted.

Another issue was to find out if there is a correlation between the number of arrivals in a region and the number of visitors. The Pears Correlation showed that there is a very weak relationship between these variables which means that regions with a high arrival number do not necessarily lead to a high number of visitors to the attractions. It could also not be declared that a high tourism demand leads to a lower error, thus being easier to predict.

5.1 Limitations and Future Research

A number of important limitation have to be considered in this study which should be kept in mind when doing further research. One important issue would be to consider seasonality. For this purpose it would be necessary to work with monthly data, but since TourMIS did not provide monthly data for enough attractions, annual data was used for this study. It would have been possible to ask each of the attraction for monthly data but that process would have been very time consuming and there was no guaranty that they would pass on these information. With monthly data also more complex models like the Holt Winter's Model and the ARIMA could have been applied.

TourMIS did not only leak on monthly data of the attraction, also complete data for the attractions in Lower Austria and Burgenland were missing. This is not the fault of the website itself, because the tourism boards in the single regions are responsible for updating the data about their area. That leak of statistics leads to the difficulty of finding out if there are differences in the field of forecasting compared to the regions.

Another limitation would be that the forecasts have only been conducted for Austrian attractions, the situation might differ from country to country. In Order to

be able to make general assumptions about forecasting attractions it would be necessary to look at attractions in different countries.

For future research it would therefore be important to use monthly data to get a more comprehensive and also accurate result, since the seasonality can also be considered. To find out about forecasting attractions in general it would be necessary to include attractions from other countries too.

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Appendices

Appendix 1: Forecasts Carinthia

Nockalmstraße (SEH0185)
Type of attraction: Important streets or hiking paths
Form of experience: Culture, Landscape and buildings
Total number of visitors from 2000 - 2013

					Alpha 0,815607144				Alpha 0,596190609
						LES			
Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	a	b	S1	S2	LES
2000	232.051				1.350.000	212.265	19.786	198.864	185.462	
2001	251.837	232.051			438.193	248.611	26.819	230.446	212.281	232.051
2002	236.947	251.837	273.310		286.200	243.222	13.140	234.322	225.422	275.429
2003	253.374	236.947	222.937		246.029	253.861	12.078	245.681	237.500	256.362
2004	231.948	253.374	270.940	243.552	252.020	237.491	- 4	237.493	237.496	265.940
2005	221.864	231.948	212.334	243.527	235.649	224.412	- 5.557	228.175	231.939	237.487
2006	241.704	221.864	212.218	236.033	224.406	237.978	2.565	236.241	234.504	218.855
2007	221.979	241.704	263.318	237.223	238.514	225.006	- 4.034	227.738	230.470	240.543
2008	225.028	221.979	203.864	229.374	225.028	224.367	- 2.592	226.122	227.878	220.972
2009	225.694	225.028	228.119	227.644	225.028	225.055	- 1.199	225.867	226.679	221.775
2010	233.836	225.694	226.362	228.601	225.571	232.209	2.348	230.618	229.027	223.856
2011	234.557	233.836	242.272	226.634	232.312	234.557	2.348	232.966	231.376	234.557
2012	231.880	234.557	235.280	229.779	234.143	232.699	562	232.319	231.938	236.905
2013	231.233	231.880	229.234	231.492	232.297	231.564	- 159	231.671	231.779	233.262
Forecast for 2014		**231.233**	**230.588**	**232.877**	**231.429**					**231.405**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
9,24%	16,81%	5,00%	8,65%	14,65%	459.073.476	1.520.364.116	134.658.618	402.869.343	1.155.424.828
4,55%	4,30%	9,76%	6,21%	7,04%	101.687.056	90.823.925	469.263.906	190.027.897	244.074.879
8,21%	12,20%	2,35%	7,16%	9,45%	393.625.600	869.400.340	32.157.406	299.225.416	522.094.403
8,89%	18,62%	6,87%	7,45%	8,36%	389.075.625	1.708.927.404	232.364.292	273.417.727	344.618.617
1,35%	9,41%	1,93%	0,00%	1,80%	9.296.401	447.926.772	18.885.543	0	16.447.677
0,30%	1,07%	0,86%	0,30%	1,74%	443.556	5.880.041	3.801.525	443.556	15.361.897
3,48%	3,20%	2,24%	3,53%	4,27%	66.292.164	55.861.108	27.402.608	68.307.012	99.602.229
0,31%	3,29%	3,38%	0,96%	0,00%	519.841	59.516.995	62.769.968	5.039.895	0
1,15%	1,47%	0,91%	0,98%	2,17%	7.166.329	11.561.517	4.415.252	5.121.365	25.254.383
0,28%	0,86%	0,11%	0,46%	0,88%	418.609	3.997.790	66.952	1.132.711	4.115.163
3,78%	**7,12%**	**3,34%**	**3,57%**	**5,04%**	**11.948**	**21.850**	**9.929**	**11.161**	**15.579**
3	**5**	**1**	**2**	**4**	**3**	**5**	**1**	**2**	**4**

Obir Tropfsteinhöhlen, Bad Eisenkappel (SEH0202)
Type of attraction: Mines and caves
Form of experience: Landscape and buildings
Total number of visitors from 2000 - 2013

					Alpha					Alpha
					0,99					0,347983848
Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	LES a	LES b	LES S1	LES S2	LES LES
2000	50.000				1.350.000	47.630	2.370	43.189	38.749	
2001	52.370	50.000			63.000	51.362	2.657	46.384	41.406	50.000
2002	50.120	52.370	54.852		52.476	51.778	2.185	47.684	43.590	54.019
2003	40.000	50.120	47.967		50.144	45.936	494	45.010	44.084	53.963
2004	48.950	40.000	31.923	48.123	40.101	47.879	799	46.381	44.884	46.430
2005	49.820	48.950	59.903	47.860	48.862	49.334	938	47.578	45.821	48.678
2006	40.000	49.820	50.705	47.223	49.810	44.367	- 306	44.941	45.515	50.272
2007	45.000	40.000	32.116	44.693	40.098	44.601	- 193	44.961	45.322	44.061
2008	45.509	45.000	50.625	45.943	44.951	45.041	- 59	45.152	45.263	44.408
2009	39.096	45.509	46.024	45.082	45.503	41.598	- 772	43.045	44.491	44.982
2010	38.314	39.096	33.587	42.401	39.160	39.382	- 1.076	41.398	43.415	40.826
2011	38.239	38.314	37.548	41.980	38.322	38.267	- 1.084	40.299	42.331	38.306
2012	35.166	38.239	38.164	40.290	38.240	36.024	- 1.329	38.513	41.002	37.183
2013	34.695	35.166	32.340	37.704	35.197	34.695	- 1.329	37.184	39.674	34.695
Forecast for 2014		**34.695**	**34.230**	**36.604**	**34.700**					**33.366**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
18,28%	34,78%	1,69%	18,08%	5,15%	80.102.500	289.905.657	684.756	78.297.091	6.351.102
1,75%	20,24%	3,93%	1,92%	2,29%	756.900	101.658.067	3.841.600	918.695	1.304.556
24,55%	26,76%	18,06%	24,53%	25,68%	96.432.400	114.606.932	52.164.506	96.244.245	105.512.870
11,11%	28,63%	0,68%	10,89%	2,09%	25.000.000	166.007.345	94.556	24.028.583	882.632
1,12%	11,24%	0,95%	1,23%	2,42%	259.081	26.173.456	187.922	311.385	1.212.158
16,40%	17,72%	15,31%	16,39%	15,05%	41.126.569	47.993.822	35.835.189	41.055.029	34.641.282
2,04%	12,34%	10,67%	2,21%	6,56%	611.524	22.347.347	16.705.613	715.842	6.311.034
0,20%	1,81%	9,78%	0,22%	0,17%	5.625	477.976	13.993.211	6.966	4.463
8,74%	8,53%	14,57%	8,74%	5,74%	9.443.329	8.988.884	26.250.252	9.448.459	4.068.815
1,36%	6,79%	8,67%	1,45%	0,00%	221.841	5.546.235	9.052.577	251.741	0
8,55%	**16,88%**	**8,43%**	**8,56%**	**6,51%**	**5.039**	**8.853**	**3.985**	**5.013**	**4.004**
3	**5**	**2**	**4**	**1**	**4**	**5**	**1**	**3**	**2**

Terra Mystica (SEH0325)
Type of attraction: Adventure/amusement parks and exhibitions
Form of experience: Landscape and buildings
Total number of visitors from 2000 - 2013

					Alpha 0,99					Alpha 0,572782211
						LES				
Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	a	b	S1	S2	LES
2000	51.352				1.350.000	50.032	1.320	49.047	48.063	
2001	52.672	51.352			64.338	52.431	1.753	51.124	49.816	51.352
2002	50.000	52.672	54.026		52.789	50.764	380	50.480	50.196	54.184
2003	38.000	50.000	47.464		50.028	40.399	- 3.932	43.332	46.264	51.144
2004	36.467	38.000	28.880	48.006	38.120	36.467	- 3.932	39.400	42.332	36.467
2005	40.609	36.467	34.996	44.285	36.484	39.135	- 1.283	40.092	41.049	32.535
2006	31.000	40.609	45.221	41.269	40.568	32.251	- 3.531	34.884	37.518	37.852
2007	30.000	31.000	23.665	36.519	31.096	29.766	- 3.111	32.087	34.407	28.719
2008	30.000	30.000	29.032	34.519	30.011	29.390	- 2.014	30.891	32.393	26.655
2009	35.105	30.000	30.000	32.902	30.000	33.694	522	33.305	32.916	27.376
2010	36.452	35.105	41.079	31.526	35.054	36.044	1.256	35.108	34.171	34.216
2011	36.500	36.452	37.851	32.889	36.438	36.646	993	35.905	35.164	37.300
2012	34.500	36.500	36.548	34.514	36.499	35.073	- 37	35.100	35.128	37.639
2013	32.900	34.500	32.610	35.639	34.520	33.290	- 738	33.840	34.390	35.036
Forecast for 2014		**32.900**	**31.374**	**35.088**	**32.916**					**32.552**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
4,20%	20,81%	31,64%	4,53%	0,00%	2.350.089	57.562.569	133.148.521	2.733.331	0
10,20%	13,82%	9,05%	10,16%	19,88%	17.156.164	31.507.515	13.511.138	17.019.480	65.188.656
31,00%	45,88%	33,13%	30,86%	22,10%	92.332.881	202.249.846	105.452.361	91.541.751	46.954.349
3,33%	21,12%	21,73%	3,65%	4,27%	1.000.000	40.135.964	42.497.361	1.200.509	1.639.714
0,00%	3,23%	15,06%	0,04%	11,15%	-	936.524	20.421.361	120	11.187.474
14,54%	14,54%	6,27%	14,54%	22,02%	26.061.025	26.061.025	4.852.108	26.059.906	59.740.163
3,70%	12,69%	13,51%	3,84%	6,13%	1.814.409	21.406.361	24.263.013	1.954.541	4.997.963
0,13%	3,70%	9,89%	0,17%	2,19%	2.304	1.824.351	13.037.516	3.842	639.207
5,80%	5,94%	0,04%	5,80%	9,10%	4.000.000	4.194.563	203	3.997.521	9.854.310
4,86%	0,88%	8,33%	4,92%	6,49%	2.560.000	84.339	7.503.491	2.624.380	4.563.720
7,78%	**14,26%**	**14,87%**	**7,85%**	**10,33%**	**3.838**	**6.213**	**6.039**	**3.836**	**4.525**
1	**4**	**5**	**2**	**3**	**2**	**5**	**4**	**1**	**3**

Appendix 2: Forecasts Salzburg

Festung Hohensalzburg (SEH0053)
Type of attraction: Castles, ruins and palaces
Form of experience: Tradition, Landscape and buildings
Total number of visitors from 2000 - 2013

Alpha 0,99

Alpha 0,263280586

Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	LES a	LES b	LES S1	LES S2	LES LES
2000	820.046				1.350.000	782.708	37.338	678.228	573.747	
2001	857.384	820.046			825.346	837.119	39.926	725.396	613.674	820.046
2002	846.921	857.384	896.422		857.064	863.271	37.838	757.391	651.512	877.045
2003	845.814	846.921	836.586		847.022	875.826	34.005	780.671	685.517	901.109
2004	888.482	845.814	844.708	842.541	845.826	900.069	32.525	809.056	718.042	909.831
2005	805.636	888.482	933.302	859.650	888.055	874.543	23.725	808.155	741.767	932.595
2006	935.166	805.636	730.515	846.713	806.460	915.140	26.283	841.595	768.050	898.268
2007	970.000	935.166	1.085.522	868.775	933.879	954.489	28.264	875.401	796.313	941.422
2008	930.000	970.000	1.006.132	899.821	969.639	958.632	24.607	889.776	820.920	982.753
2009	857.096	930.000	891.649	910.201	930.396	925.561	15.863	881.172	836.783	983.239
2010	907.333	857.096	789.907	923.066	857.829	925.836	13.500	888.060	850.284	941.424
2011	939.336	907.333	960.515	916.107	906.838	939.336	13.500	901.560	863.784	939.336
2012	995.643	939.336	972.468	908.441	939.011	972.409	16.467	926.330	880.251	952.836
2013	1.012.000	995.643	1.055.325	924.852	995.077	999.450	18.070	948.885	898.321	988.877
Forecast for 2014		**1.012.000**	**1.028.626**	**963.578**	**1.011.831**					**1.017.520**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
4,80%	4,93%	5,17%	4,80%	2,40%	1.820.558.224	1.916.123.947	2.110.552.511	1.819.527.147	455.772.047
10,28%	15,85%	6,70%	10,23%	15,76%	6.863.459.716	16.298.718.193	2.917.539.203	6.792.964.229	16.118.478.547
13,85%	21,88%	9,46%	13,76%	3,95%	16.778.020.900	41.882.061.162	7.823.888.983	16.565.184.393	1.361.425.621
3,59%	11,91%	10,44%	3,72%	2,95%	1.213.407.556	13.345.288.194	10.246.601.850	1.304.730.835	816.683.402
4,30%	8,19%	3,25%	4,26%	5,67%	1.600.000.000	5.796.010.123	910.772.041	1.571.233.627	2.782.865.136
8,51%	4,03%	6,20%	8,55%	14,72%	5.314.993.216	1.193.943.294	2.820.087.920	5.372.946.865	15.912.009.504
5,54%	12,94%	1,73%	5,46%	3,76%	2.523.756.169	13.788.854.563	247.511.556	2.450.645.632	1.162.183.375
3,41%	2,25%	2,47%	3,46%	0,00%	1.024.192.009	448.530.691	539.574.827	1.056.122.601	0
5,66%	2,33%	8,76%	5,69%	4,30%	3.170.478.249	537.090.175	7.604.145.203	3.207.181.204	1.832.434.734
1,62%	4,28%	8,61%	1,67%	2,28%	267.551.449	1.877.075.850	7.594.773.904	286.398.753	534.692.941
6,16%	**8,86%**	**6,28%**	**6,16%**	**5,58%**	**63.700**	**98.531**	**65.434**	**63.582**	**64.013**
2	**5**	**4**	**3**	**1**	**2**	**5**	**4**	**1**	**3**

Großglockner Hochalpenstraße (SEH0052)
Type of attraction: Important streets or hiking paths
Form of experience: Landscape and buildings
Total number of visitors from 2000 - 2013

					Alpha 0,669351372				Alpha 0,285064765
						LES			
Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	a	b	S1	S2	LES
2000	874.874				1.350.000	890.796	- 15.922	930.728	970.660	
2001	858.952	874.874			1.031.974	867.090	- 17.216	910.267	953.444	874.874
2002	868.308	858.952	843.320		916.161	858.886	- 15.718	898.306	937.726	849.874
2003	955.700	868.308	877.766		884.131	898.181	- 6.573	914.667	931.153	843.168
2004	891.608	955.700	1.051.888	889.459	932.036	891.608	- 6.573	908.094	924.580	891.608
2005	819.154	891.608	831.814	893.642	904.975	852.828	- 11.927	882.740	912.653	885.035
2006	823.252	819.154	752.588	883.693	847.531	832.273	- 13.361	865.782	899.291	840.901
2007	835.723	823.252	827.371	872.429	831.280	827.130	- 11.995	857.213	887.296	818.912
2008	820.004	835.723	848.383	842.434	834.254	817.515	- 11.599	846.606	875.697	815.135
2009	832.741	820.004	804.581	824.533	824.716	819.030	- 9.420	842.654	866.278	805.916
2010	790.698	832.741	845.676	827.930	830.087	800.365	- 10.956	827.843	855.321	809.610
2011	819.959	790.698	750.778	819.792	803.722	804.344	- 8.474	825.596	846.848	789.408
2012	803.913	819.959	850.303	815.851	814.590	799.802	- 7.820	819.415	839.027	795.870
2013	903.301	803.913	788.181	811.828	807.443	846.402	1.226	843.328	840.253	791.982
Forecast for 2014		**903.301**	**1.014.976**	**829.468**	**871.606**					**847.628**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
7,19%	17,98%	0,24%	4,53%	0,00%	4.107.784.464	25.689.576.690	4.620.350	1.634.398.693	0
8,84%	1,55%	9,09%	10,48%	8,04%	5.249.582.116	160.280.524	5.548.462.144	7.365.306.275	4.340.258.191
0,50%	8,58%	7,34%	2,95%	2,14%	16.793.604	4.993.433.515	3.653.054.040	589.456.040	311.480.175
1,49%	1,00%	4,39%	0,53%	2,01%	155.525.841	69.764.237	1.347.293.730	19.742.701	282.617.374
1,92%	3,46%	2,74%	1,74%	0,59%	247.086.961	805.362.899	503.116.115	203.057.852	23.704.744
1,53%	3,38%	0,99%	0,96%	3,22%	162.231.169	793.004.944	67.367.160	64.405.616	719.576.409
5,32%	6,95%	4,71%	4,98%	2,39%	1.767.613.849	3.022.563.103	1.386.221.824	1.551.528.136	357.679.393
3,57%	8,44%	0,02%	1,98%	3,73%	856.206.121	4.786.059.825	28.056	263.638.060	933.339.886
2,00%	5,77%	1,48%	1,33%	1,00%	257.474.116	2.152.018.041	142.503.906	114.004.302	64.692.504
11,00%	12,74%	10,13%	10,61%	12,32%	9.877.974.544	13.252.612.437	8.367.355.466	9.188.674.132	12.391.981.403

4,34%	**6,99%**	**4,11%**	**4,01%**	**3,55%**	**47.643**	**74.649**	**45.848**	**45.819**	**44.074**
4	**5**	**3**	**2**	**1**	**4**	**5**	**3**	**2**	**1**

Hellbrunn (Schloß u. Wasserspiele) (SEH0056)
Type of attraction: Castles, ruins and palaces
Form of experience: Entertainment, Culture, Tradition, Landscape and buildings
Total number of visitors from 2000 - 2013

					Alpha 0,824526289					Alpha 0,723728046
						LES				
Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	a	b	S1	S2	LES
2000	379.796				1.350.000	480.259	- 100.463	518.609	556.959	
2001	279.333	379.796			550.041	287.001	- 153.084	345.438	403.876	379.796
2002	263.745	279.333	205.444		326.835	253.836	- 85.082	286.315	318.793	133.917
2003	292.332	263.745	249.027		274.816	282.900	- 20.354	290.670	298.439	168.753
2004	262.546	292.332	324.018	303.802	289.258	262.546	- 20.354	270.316	278.086	262.546
2005	241.872	262.546	235.795	274.489	267.233	241.896	- 20.522	249.730	257.564	242.192
2006	282.000	241.872	222.826	265.124	246.322	277.373	11.233	273.085	268.797	221.375
2007	267.987	282.000	328.785	269.688	275.739	269.561	433	269.395	269.230	288.606
2008	267.000	267.987	254.670	263.601	269.347	267.229	- 1.135	267.662	268.095	269.994
2009	255.000	267.000	266.017	264.715	267.412	255.847	- 6.946	258.498	261.149	266.094
2010	263.309	255.000	243.539	267.997	257.178	262.209	601	261.980	261.750	248.901
2011	274.000	263.309	271.889	263.324	262.233	273.146	6.462	270.679	268.212	262.810
2012	283.693	274.000	285.125	264.827	271.935	283.381	8.602	280.098	276.814	279.608
2013	285.000	283.693	293.729	269.001	281.630	285.533	4.944	283.646	281.758	291.983
Forecast for 2014		**285.000**	**286.313**	**276.501**	**284.409**					**290.477**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
11,35%	23,41%	15,71%	10,17%	0,00%	887.205.796	3.778.746.565	1.702.016.280	713.549.349	0
8,55%	2,51%	13,49%	10,49%	0,13%	427.414.276	36.930.836	1.063.868.689	643.196.258	102.474
14,23%	20,98%	5,98%	12,65%	21,50%	1.610.256.384	3.501.567.060	284.807.814	1.272.902.280	3.675.402.707
5,23%	22,69%	0,63%	2,89%	7,69%	196.364.169	3.696.454.357	2.891.700	60.101.128	425.124.080
0,37%	4,62%	1,27%	0,88%	1,12%	974.169	152.020.840	11.551.502	5.510.092	8.963.618
4,71%	4,32%	3,81%	4,87%	4,35%	144.000.000	121.366.250	94.376.368	154.055.254	123.066.706
3,16%	7,51%	1,78%	2,33%	5,47%	69.039.481	390.840.016	21.975.000	37.589.626	207.586.010
3,90%	0,77%	3,90%	4,29%	4,08%	114.297.481	4.457.406	113.976.976	138.458.429	125.209.278
3,42%	0,50%	6,65%	4,14%	1,44%	93.954.249	2.050.857	355.916.523	138.245.164	16.688.058
0,46%	3,06%	5,61%	1,18%	2,45%	1.708.249	76.193.673	255.984.000	11.358.110	48.760.455

5,54%	**9,04%**	**5,88%**	**5,39%**	**4,82%**	**18.829**	**34.294**	**19.767**	**17.818**	**21.520**
3	**5**	**4**	**2**	**1**	**2**	**5**	**3**	**1**	**4**

Appendix 3: Forecasts Styria

Erzberg (SEH0160)
Type of attraction: Mines and caves
Form of experience: Landscape and buildings
Total number of visitors from 2000 - 2013

Alpha 0,795034605

Alpha 0,038570168

Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	LES a	LES b	LES S1	LES S2	LES LES
2000	105.220				1.350.000	109.428	- 4.208	214.320	319.212	
2001	101.012	105.220			360.357	104.902	- 4.214	209.950	314.997	105.220
2002	100.000	101.012	96.972		154.169	100.635	- 4.215	205.709	310.782	100.687
2003	100.000	100.000	98.998		111.103	96.691	- 4.210	201.632	306.572	96.420
2004	95.000	100.000	100.000	101.558	102.276	92.672	- 4.206	197.519	302.366	92.481
2005	105.000	95.000	90.250	99.003	96.491	89.716	- 4.182	193.950	298.184	88.465
2006	84.000	105.000	116.053	100.000	103.256	85.419	- 4.184	189.710	294.001	85.535
2007	86.600	84.000	67.200	96.000	87.947	81.641	- 4.176	185.733	289.825	81.235
2008	81.500	86.600	89.280	92.650	86.876	77.770	- 4.170	181.712	285.655	77.465
2009	73.600	81.500	76.700	89.275	82.602	73.600	- 4.170	177.542	281.485	73.600
2010	73.700	73.600	66.466	81.425	75.445	69.753	- 4.164	173.537	277.321	69.430
2011	81.000	73.700	73.800	78.850	74.058	66.755	- 4.141	169.968	273.181	65.590
2012	42.000	81.000	89.023	77.450	79.577	61.055	- 4.171	165.032	269.009	62.615
2013	66.000	42.000	21.778	67.575	49.702	57.574	- 4.158	161.213	264.852	56.884
Forecast for 2014		**66.000**	**103.714**	**65.675**	**62.659**					**53.416**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
5,26%	5,26%	6,90%	7,66%	2,65%	25.000.000	25.000.000	43.007.364	52.935.399	6.345.466
9,52%	14,05%	5,71%	8,10%	15,75%	100.000.000	217.562.500	35.964.009	72.398.641	273.394.976
25,00%	38,16%	19,05%	22,92%	1,83%	441.000.000	1.027.371.191	256.000.000	370.793.649	2.355.058
3,00%	22,40%	10,85%	1,56%	6,20%	6.760.000	376.360.000	88.360.000	1.813.909	28.787.227
6,26%	9,55%	13,68%	6,60%	4,95%	26.010.000	60.535.810	124.322.500	28.901.917	16.284.299
10,73%	4,21%	21,30%	12,23%	0,00%	62.410.000	9.612.148	245.705.625	81.034.281	0
0,14%	9,82%	10,48%	2,37%	5,79%	10.000	52.334.129	59.675.625	3.045.300	18.232.152
9,01%	8,89%	2,65%	8,57%	19,03%	53.290.000	51.838.043	4.622.500	48.195.796	237.481.643
92,86%	111,96%	84,40%	89,47%	49,08%	1.521.000.000	2.211.168.782	1.256.702.500	1.412.035.799	424.968.729
36,36%	67,00%	2,39%	24,69%	13,81%	576.000.000	1.955.604.938	2.480.625	265.624.871	83.103.142
19,81%	**29,13%**	**17,74%**	**18,42%**	**11,91%**	**16.767**	**24.469**	**14.549**	**15.287**	**10.445**
4	**5**	**2**	**3**	**1**	**4**	**5**	**2**	**3**	**1**

Freilichtmuseum Stübing (SEH0164)
Type of attraction: Museums or galleries
Form of experience: Entertainment, Culture, Tradition, Landscape and buildings
Total number of visitors from 2000 - 2013

					Alpha 0,84109908				Alpha 0,364141231
						LES			
Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	a	b	S1	S2	LES
2000	59.324				1.350.000	62.247	- 2.923	67.351	72.455	
2001	56.401	59.324			264.414	57.583	- 3.311	63.364	69.145	59.324
2002	60.000	56.401	53.622		89.454	57.684	- 2.551	62.139	66.594	54.272
2003	60.000	60.000	63.829		64.680	58.032	- 1.906	61.360	64.688	55.133
2004	49.627	60.000	60.000	58.931	60.744	52.255	- 2.768	57.088	61.920	56.126
2005	53.162	49.627	41.047	56.507	51.393	51.676	- 2.280	55.658	59.640	49.487
2006	57.113	53.162	56.949	55.697	52.881	53.993	- 1.257	56.188	58.383	49.396
2007	58.403	57.113	61.358	54.976	56.441	56.112	- 506	56.994	57.877	52.736
2008	55.055	58.403	59.722	54.576	58.091	55.278	- 579	56.288	57.299	55.606
2009	57.974	55.055	51.899	55.933	55.537	56.650	- 144	56.902	57.154	54.699
2010	59.063	57.974	61.048	57.136	57.587	58.029	195	57.689	57.349	56.506
2011	61.566	59.063	60.172	57.624	58.828	60.215	638	59.101	57.987	58.224
2012	54.000	61.566	64.175	58.415	61.131	56.771	- 271	57.243	57.716	60.853
2013	61.850	54.000	47.364	58.151	55.133	59.687	439	58.921	58.155	56.500
Forecast for 2014		**61.850**	**70.841**	**59.120**	**60.783**					**60.126**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
20,90%	20,90%	18,75%	22,40%	13,10%	107.599.129	107.599.129	86.569.068	123.581.215	42.243.255
6,65%	22,79%	6,29%	3,33%	6,91%	12.496.225	146.765.500	11.189.025	3.127.751	13.503.564
6,92%	0,29%	2,48%	7,41%	13,51%	15.610.401	26.961	2.004.348	17.910.022	59.552.892
2,21%	5,06%	5,87%	3,36%	9,70%	1.664.100	8.729.888	11.747.756	3.851.298	32.116.715
6,08%	8,48%	0,87%	5,51%	1,00%	11.209.104	21.782.168	229.202	9.218.276	303.714
5,04%	10,48%	3,52%	4,20%	5,65%	8.520.561	36.906.514	4.164.661	5.936.782	10.724.495
1,84%	3,36%	3,26%	2,50%	4,33%	1.185.921	3.939.290	3.712.366	2.179.079	6.540.680
4,07%	2,26%	6,40%	4,45%	5,43%	6.265.009	1.941.965	15.541.335	7.494.261	11.171.101
14,01%	18,84%	8,18%	13,21%	12,69%	57.244.356	103.532.117	19.487.810	50.851.139	46.957.339
12,69%	23,42%	5,98%	10,86%	8,65%	61.622.500	209.849.854	13.684.451	45.116.447	28.624.072
8,04%	**11,59%**	**6,16%**	**7,72%**	**8,10%**	**5.324**	**8.007**	**4.103**	**5.189**	**5.017**
3	**5**	**1**	**2**	**4**	**4**	**5**	**1**	**3**	**2**

Zeughaus Graz (SEH0172)
Type of attraction: Company/premises exhibitions/tours
Form of experience: Culture, Tradition
Total number of visitors from 2000 - 2013

					Alpha 0,79074691				Alpha 0,317809982
							LES		
Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	a	b	S1	S2	LES
2000	38.802				1.350.000	43.336	- 4.534	53.068	62.801	
2001	34.268	38.802			313.174	36.378	- 4.992	47.093	57.809	38.802
2002	43.596	34.268	30.264		92.630	37.914	- 3.759	45.982	54.050	31.386
2003	76.967	43.596	55.463		53.857	57.043	565	55.829	54.616	34.155
2004	48.724	76.967	135.882	48.408	72.131	52.859	- 332	53.571	54.284	57.608
2005	53.622	48.724	30.845	50.889	53.622	53.112	- 221	53.587	54.062	52.527
2006	52.891	53.622	59.012	55.727	53.622	52.891	- 221	53.366	53.841	52.891
2007	53.138	52.891	52.170	58.051	53.044	52.920	- 174	53.294	53.667	52.670
2008	55.035	53.138	53.386	52.094	53.118	53.970	57	53.847	53.724	52.746
2009	46.913	55.035	57.000	53.672	54.634	50.224	- 661	51.643	53.063	54.027
2010	50.398	46.913	39.990	51.994	48.529	50.009	- 577	51.248	52.486	49.562
2011	47.111	50.398	54.142	51.371	50.007	48.191	- 811	49.933	51.675	49.432
2012	44.376	47.111	44.038	49.864	47.717	45.774	- 1.115	48.167	50.560	47.380
2013	43.348	44.376	41.800	47.200	45.075	43.958	- 1.247	46.635	49.313	44.659
Forecast for 2014		**43.348**	**42.344**	**46.308**	**43.709**					**42.711**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
57,97%	178,88%	0,65%	48,04%	18,23%	797.667.049	7.596.546.620	99.698	547.890.431	78.933.542
9,13%	42,48%	5,10%	0,00%	2,04%	23.990.404	518.802.938	7.470.656	0	1.199.559
1,38%	11,57%	5,36%	1,38%	0,00%	534.361	37.471.213	8.044.314	534.361	0
0,46%	1,82%	9,25%	0,18%	0,88%	61.009	937.091	24.137.569	8.843	219.304
3,45%	3,00%	5,34%	3,48%	4,16%	3.598.609	2.718.695	8.650.952	3.673.652	5.239.225
17,31%	21,50%	14,41%	16,46%	15,16%	65.966.884	101.741.960	45.677.322	59.612.750	50.608.438
6,91%	20,65%	3,17%	3,71%	1,66%	12.145.225	108.334.059	2.548.014	3.494.550	698.264
6,98%	14,92%	9,04%	6,15%	4,93%	10.804.369	49.433.390	18.147.600	8.385.821	5.387.859
6,16%	0,76%	12,37%	7,53%	6,77%	7.480.225	113.987	30.120.888	11.162.020	9.023.121
2,37%	3,57%	8,89%	3,98%	3,02%	1.056.784	2.396.989	14.834.052	2.982.897	1.719.135
11,21%	**29,92%**	**7,36%**	**9,09%**	**5,69%**	**9.609**	**29.015**	**3.997**	**7.986**	**3.912**
4	**5**	**2**	**3**	**1**	**4**	**5**	**2**	**3**	**1**

Appendix 4: Forecasts Tyrol

Swarovski Cristal Worlds, Wattens (SEH0036)
Type of attraction: Company/premises exhibitions/tours
Form of experience: Entertainment, Culture
Total number of visitors from 2000 - 2013

					Alpha 0,445306228				Alpha 0,443174899
						LES			
Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	a	b	S1	S2	LES
2000	663.455				1.350.000	695.279	- 31.824	735.264	775.249	
2001	631.631	663.455			1.044.277	641.498	- 38.074	689.337	737.175	663.455
2002	669.567	631.631	601.334		860.523	649.059	- 25.084	680.575	712.091	603.424
2003	600.000	669.567	709.781		775.489	607.434	- 29.792	644.866	682.299	623.975
2004	726.737	600.000	537.661	641.163	697.343	680.509	- 509	681.149	681.789	577.641
2005	680.000	726.737	880.244	656.984	710.432	680.000	- 509	680.640	681.280	680.000
2006	690.000	680.000	636.269	669.076	696.881	686.741	1.555	684.788	682.835	679.491
2007	650.000	690.000	700.147	674.184	693.817	661.874	- 5.967	669.371	676.868	688.296
2008	720.000	650.000	612.319	686.684	674.305	700.128	6.621	691.808	683.489	655.907
2009	700.000	720.000	797.538	685.000	694.653	702.093	5.296	695.439	688.785	706.749
2010	680.000	700.000	680.556	690.000	697.034	688.492	- 83	688.597	688.701	707.388
2011	680.000	680.000	660.571	687.500	689.449	682.607	- 1.735	684.787	686.967	688.408
2012	680.000	680.000	680.000	695.000	685.241	680.270	- 1.906	682.665	685.060	680.872
2013	650.000	680.000	680.000	685.000	682.907	658.794	- 7.477	668.189	677.583	678.364
Forecast for 2014		**650.000**	**621.324**	**672.500**	**668.253**					**651.317**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
17,44%	26,02%	11,78%	4,04%	20,52%	16.062.267.169	35.749.769.236	7.322.866.689	864.018.742	22.229.545.053
6,87%	29,45%	3,38%	4,48%	0,00%	2.184.347.169	40.097.837.866	529.747.764	926.120.179	0
1,45%	7,79%	3,03%	1,00%	1,52%	100.000.000	2.887.053.521	437.813.776	47.342.166	110.448.945
6,15%	7,71%	3,72%	6,74%	5,89%	1.600.000.000	2.514.727.509	584.877.948	1.919.894.981	1.466.598.367
9,72%	14,96%	4,63%	6,35%	8,90%	4.900.000.000	11.595.232.094	1.109.939.198	2.088.051.434	4.107.903.980
2,86%	13,93%	2,14%	0,76%	0,96%	400.000.000	9.513.751.479	225.000.000	28.588.737	45.548.972
2,94%	0,08%	1,47%	2,51%	4,03%	400.000.000	308.642	100.000.000	290.161.896	750.119.264
0,00%	2,86%	1,10%	1,39%	1,24%	- 0	377.469.388	56.250.000	89.278.515	70.701.806
0,00%	0,00%	2,21%	0,77%	0,13%	- 0	- 0	225.000.000	27.469.676	760.730
4,62%	4,62%	5,38%	5,06%	4,36%	900.000.000	900.000.000	1.225.000.000	1.082.886.080	804.530.831

5,21%	**10,74%**	**3,88%**	**3,31%**	**4,76%**	**51.523**	**101.802**	**34.375**	**27.136**	**54.393**
4	**5**	**2**	**1**	**3**	**3**	**5**	**2**	**1**	**4**

Alpenzoo, Innsbruck (SEH0037)
Type of attraction: Zoos and other animal attractions
Form of experience: Entertainment, Landscape and buildings
Total number of visitors from 2000 - 2013

					Alpha 0,755937556					Alpha 0,21750894
						LES				
Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	a	b	S1	S2	LES
2000	258.077				1.350.000	263.668	- 5.591	283.782	303.895	
2001	252.486	258.077			524.574	255.909	- 5.856	276.975	298.040	258.077
2002	265.622	252.486	247.016		318.893	256.090	- 5.119	274.505	292.921	250.054
2003	247.159	265.622	279.441		278.623	249.493	- 5.299	268.557	287.622	250.971
2004	233.743	247.159	229.979	255.836	254.838	240.142	- 5.794	260.985	281.828	244.194
2005	234.488	233.743	221.055	249.753	238.892	234.402	- 5.787	255.222	276.041	234.348
2006	300.000	234.488	235.235	245.253	235.563	256.292	- 2.410	264.961	273.631	228.615
2007	230.112	300.000	383.815	253.848	284.273	244.666	- 3.534	257.381	270.096	253.882
2008	255.787	230.112	176.505	249.586	243.331	246.814	- 2.841	257.034	267.255	241.132
2009	251.868	255.787	284.327	255.097	252.747	247.034	- 2.468	255.911	264.788	243.973
2010	248.974	251.868	248.009	259.442	252.083	246.275	- 2.259	254.402	262.529	244.566
2011	259.259	248.974	246.113	246.685	249.733	249.926	- 1.538	255.458	260.991	244.016
2012	248.388	259.259	269.969	253.972	256.934	248.388	- 1.538	253.921	259.453	248.388
2013	240.769	248.388	237.973	252.122	250.474	244.492	- 1.826	251.060	257.627	246.850
Forecast for 2014		**240.769**	**233.384**	**249.348**	**243.138**					**242.667**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
5,74%	1,61%	9,45%	9,02%	4,47%	179.989.056	14.165.164	488.100.649	445.010.180	109.214.801
0,32%	5,73%	6,51%	1,88%	0,06%	555.025	180.439.260	233.004.960	19.391.356	19.577
21,84%	21,59%	18,25%	21,48%	23,79%	4.291.822.144	4.194.456.715	2.997.234.009	4.152.159.954	5.095.786.977
30,37%	66,79%	10,31%	23,54%	10,33%	4.884.332.544	23.624.596.844	563.373.960	2.933.444.883	565.001.661
10,04%	31,00%	2,42%	4,87%	5,73%	659.205.625	6.285.618.323	38.455.502	155.158.518	214.780.634
1,56%	12,89%	1,28%	0,35%	3,13%	15.358.561	1.053.568.272	10.424.827	772.454	62.338.526
1,16%	0,39%	4,20%	1,25%	1,77%	8.375.236	931.139	109.573.790	9.662.803	19.429.510
3,97%	5,07%	4,85%	3,67%	5,88%	105.781.225	172.810.678	158.099.189	90.750.976	232.347.021
4,38%	8,69%	2,25%	3,44%	0,00%	118.178.641	465.733.888	31.181.056	73.033.782	0
3,16%	1,16%	4,72%	4,03%	2,53%	58.049.161	7.818.553	128.896.286	94.182.228	36.980.137

8,25%	**15,49%**	**6,42%**	**7,35%**	**5,77%**	**32.127**	**60.000**	**21.814**	**28.238**	**25.171**
4	**5**	**2**	**3**	**1**	**4**	**5**	**1**	**3**	**2**

Kufstein Fortress (SEH0041)
Type of attraction: Museums or galleries
Form of experience: Culture, Landscape and buildings
Total number of visitors from 2000 - 2013

					Alpha 0,617324011				Alpha 0,525220288
						LES			
Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	a	b	S1	S2	LES
2000	80.000				1.350.000	60.000	20.000	41.921	23.841	
2001	100.000	80.000			565.999	95.492	25.517	72.425	49.359	80.000
2002	110.000	100.000	125.000		278.326	112.482	22.480	92.160	71.839	121.009
2003	131.950	110.000	121.000		174.414	132.629	21.649	113.059	93.488	134.962
2004	148.200	131.950	158.280	105.488	148.200	149.570	19.973	131.516	113.461	154.278
2005	152.320	148.200	166.451	122.538	148.200	156.202	15.222	142.442	128.683	169.543
2006	152.700	152.320	156.555	135.618	150.743	156.921	10.057	147.830	138.739	171.424
2007	169.500	152.700	153.081	146.293	151.951	168.931	10.752	159.211	149.492	166.977
2008	175.000	169.500	188.148	155.680	162.785	176.056	9.460	167.504	158.952	179.684
2009	153.000	175.000	180.678	162.380	170.325	160.330	491	159.886	159.443	185.516
2010	174.600	153.000	133.766	162.550	159.630	171.494	4.292	167.614	163.735	160.820
2011	170.000	174.600	199.249	168.025	168.871	171.304	2.696	168.867	166.430	175.786
2012	174.000	170.000	165.521	168.150	169.568	174.000	2.696	171.563	169.126	174.000
2013	175.299	174.000	178.094	167.900	172.304	175.614	2.310	173.525	171.437	176.696
Forecast for 2014		**175.299**	**176.608**	**173.475**	**174.153**					**177.924**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
10,96%	6,80%	28,82%	0,00%	4,10%	264.062.500	101.606.858	1.824.357.656	0	36.946.432
2,70%	9,28%	19,55%	2,70%	11,31%	16.974.400	199.691.704	886.997.306	16.973.961	296.626.439
0,25%	2,52%	11,19%	1,28%	12,26%	144.400	14.857.456	291.811.806	3.828.302	350.586.619
9,91%	9,69%	13,69%	10,35%	1,49%	282.240.000	269.585.268	538.588.056	307.958.473	6.364.470
3,14%	7,51%	11,04%	6,98%	2,68%	30.250.000	172.878.583	373.262.400	149.218.039	21.937.845
14,38%	18,09%	6,13%	11,32%	21,25%	484.000.000	766.097.484	87.984.400	300.170.446	1.057.303.857
12,37%	23,39%	6,90%	8,57%	7,89%	466.560.000	1.667.438.890	145.202.500	224.100.146	189.880.857
2,71%	17,21%	1,16%	0,66%	3,40%	21.160.000	855.528.089	3.900.625	1.273.851	33.473.915
2,30%	4,87%	3,36%	2,55%	0,00%	16.000.000	71.890.197	34.222.500	19.641.802	0
0,74%	1,59%	4,22%	1,71%	0,80%	1.687.401	7.812.683	54.745.201	8.969.932	1.951.106

5,95%	**10,10%**	**10,61%**	**4,61%**	**6,52%**	**12.582**	**20.316**	**20.594**	**10.159**	**14.125**
2	**4**	**5**	**1**	**3**	**2**	**4**	**5**	**1**	**3**

Appendix 5: Forecasts Upper Austria

Ars Electronica Center Museum / Linz (SEH0085)
Type of attraction: Museums or galleries
Form of experience: Entertainment, Culture
Total number of visitors from 2000 - 2013

Alpha 0,75328002

Alpha 0,295501448

Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	LES a	LES b	LES S1	LES S2	LES
2000	68.500				1.350.000	72.000	- 3.500	80.344	88.689	
2001	65.000	68.500			384.672	66.737	- 3.806	75.810	84.883	68.500
2002	60.000	65.000	61.679		143.869	61.455	- 4.062	71.138	80.821	62.931
2003	60.000	60.000	55.385		80.692	58.706	- 3.834	67.847	76.987	57.393
2004	63.155	60.000	60.000	63.375	65.105	59.044	- 3.111	66.460	73.877	54.872
2005	72.000	63.155	66.476	62.039	63.636	64.026	- 1.708	68.097	72.169	55.933
2006	74.229	72.000	82.084	63.789	69.936	68.317	- 668	69.909	71.501	62.318
2007	56.000	74.229	76.527	67.346	73.170	61.782	- 1.685	65.799	69.816	67.650
2008	39.622	56.000	42.248	66.346	60.236	49.784	- 3.473	58.064	66.343	60.097
2009	248.678	39.622	28.034	60.463	44.708	148.240	14.198	114.390	80.541	46.311
2010	162.438	248.678	1.560.768	104.632	198.355	162.438	14.198	128.589	94.739	162.438
2011	179.883	162.438	106.106	126.685	171.299	178.271	14.482	143.746	109.221	176.636
2012	173.779	179.883	199.202	157.655	177.765	183.196	12.825	152.621	122.046	192.753
2013	175.261	173.779	167.882	191.195	174.762	185.565	11.012	159.311	133.058	196.021
Forecast for 2014		**175.261**	**176.756**	**172.840**	**175.138**					**196.576**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
5,00%	5,00%	0,35%	3,09%	13,11%	9.954.025	9.954.025	48.400	3.803.250	68.603.423
12,28%	7,67%	13,84%	11,62%	22,31%	78.234.025	30.515.676	99.226.502	69.953.964	258.135.533
3,00%	10,58%	14,06%	5,78%	16,05%	4.968.441	61.697.289	108.998.820	18.425.801	141.870.121
32,55%	36,66%	20,26%	30,66%	20,80%	332.296.441	421.357.980	128.731.716	294.807.095	135.715.196
41,34%	6,63%	67,45%	52,03%	51,68%	268.238.884	6.893.980	714.172.176	424.943.967	419.224.941
84,07%	88,73%	75,69%	82,02%	81,38%	43.704.411.136	48.683.783.530	35.424.980.333	41.603.790.522	40.952.305.313
53,09%	860,84%	35,59%	22,11%	0,00%	7.437.337.600	1.955.326.646.886	3.341.504.733	1.289.995.529	0
9,70%	41,01%	29,57%	4,77%	1,81%	304.328.025	5.443.119.319	2.830.080.402	73.679.561	10.543.619
3,51%	14,63%	9,28%	2,29%	10,92%	37.258.816	646.303.641	259.975.314	15.890.067	360.012.510
0,85%	4,21%	9,09%	0,28%	11,85%	2.196.324	54.447.751	253.876.422	248.518	430.973.312

24,54%	**107,60%**	**27,52%**	**21,47%**	**22,99%**	**72.235**	**448.407**	**65.697**	**66.178**	**65.404**
3	**5**	**4**	**1**	**2**	**4**	**5**	**2**	**3**	**1**

Pöstlingbergbahn / Linz (SEH0074)
Type of attraction: Cable cars, elevators and similar
Form of experience: Tradition
Total number of visitors from 2000 - 2013

					Alpha 0,969636698				Alpha 0,329575845
						LES			
Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	a	b	S1	S2	LES
2000	445.332				1.350.000	455.490	- 10.158	476.153	496.817	
2001	435.174	445.332			472.801	439.740	- 11.261	462.648	485.556	445.332
2002	430.163	435.174	425.248		436.316	429.406	- 11.078	451.941	474.477	428.478
2003	434.689	430.163	425.210		430.350	427.335	- 9.301	446.255	465.176	418.327
2004	425.709	434.689	439.263	436.340	434.557	422.259	- 8.467	439.484	456.708	418.034
2005	494.451	425.709	416.915	431.434	425.978	458.197	294	457.600	457.002	413.792
2006	458.491	494.451	574.293	446.253	492.372	458.491	294	457.893	457.296	458.491
2007	438.742	458.491	425.146	453.335	459.520	447.751	- 1.883	451.582	455.413	458.785
2008	370.917	438.742	419.844	454.348	439.373	404.605	- 10.024	424.996	445.388	445.867
2009	604.231	370.917	313.577	440.650	372.996	510.000	12.748	484.068	458.136	394.580
2010	597.210	604.231	984.304	468.095	597.210	563.741	20.836	521.357	478.972	522.748
2011	542.832	597.210	590.271	502.775	597.210	561.595	16.302	528.434	495.274	584.577
2012	595.062	542.832	493.405	528.798	544.483	587.347	18.166	550.393	513.440	577.897
2013	606.839	595.062	652.317	584.834	593.526	606.243	18.310	568.996	531.750	605.513
Forecast for 2014		**606.839**	**618.849**	**585.486**	**606.435**					**624.553**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
2,11%	3,18%	2,50%	2,08%	1,80%	80.640.400	183.700.635	113.007.530	78.291.506	58.908.578
13,90%	15,68%	12,74%	13,85%	16,31%	4.725.462.564	6.011.906.838	3.971.173.798	4.688.598.011	6.505.915.200
7,84%	25,26%	2,67%	7,39%	0,00%	1.293.121.600	13.410.153.617	149.768.644	1.147.916.970	0
4,50%	3,10%	3,33%	4,74%	4,57%	390.023.001	184.843.944	212.955.649	431.714.342	401.710.169
18,29%	13,19%	22,49%	18,46%	20,21%	4.600.230.625	2.393.818.709	6.960.773.477	4.686.207.600	5.617.541.742
38,61%	48,10%	27,07%	38,27%	34,70%	54.435.422.596	84.479.720.217	26.758.661.771	53.469.834.934	43.953.388.898
1,18%	64,82%	21,62%	0,00%	12,47%	49.294.441	149.841.795.295	16.670.618.668	0	5.544.661.699
10,02%	8,74%	7,38%	10,02%	7,69%	2.956.966.884	2.250.419.073	1.604.563.249	2.956.966.647	1.742.684.191
8,78%	17,08%	11,14%	8,50%	2,88%	2.727.972.900	10.334.084.311	4.390.983.960	2.558.225.576	294.641.115
1,94%	7,49%	3,63%	2,19%	0,22%	138.697.729	2.068.289.050	484.231.028	177.229.114	1.758.511
10,72%	**20,66%**	**11,46%**	**10,55%**	**10,08%**	**84.497**	**164.669**	**78.305**	**83.782**	**80.076**
3	**5**	**4**	**2**	**1**	**4**	**5**	**1**	**3**	**2**

WolfgangseeSchifffahrt / St. Wolfgang (SEH0075)
Type of attraction: Ferries and boat excursions
Form of experience: Entertainment, Landscape and buildings
Total number of visitors from 2000 - 2013

					Alpha 0,725531499				Alpha 0,409609468
						LES			
Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	a	b	S1	S2	LES
2000	425.400				1.350.000	482.277	- 56.877	564.257	646.236	
2001	368.523	425.400			679.174	388.348	- 66.420	484.082	579.816	425.400
2002	357.422	368.523	319.251		453.787	345.050	- 60.465	432.201	519.352	321.928
2003	376.188	357.422	346.655		383.871	344.259	- 45.096	409.258	474.256	284.586
2004	362.000	376.188	395.939	381.883	378.297	340.098	- 34.553	389.900	439.703	299.163
2005	353.000	362.000	348.347	366.033	366.473	336.459	- 26.591	374.786	413.112	305.545
2006	485.208	353.000	344.224	362.153	356.698	424.091	2.828	420.016	415.940	309.868
2007	426.919	485.208	666.931	394.099	449.936	426.919	2.828	422.843	418.768	426.919
2008	427.572	426.919	375.632	406.782	433.236	428.330	2.463	424.780	421.231	429.747
2009	388.930	427.572	428.226	423.175	429.127	403.522	- 4.561	410.096	416.670	430.793
2010	398.341	388.930	353.780	432.157	399.963	398.557	- 4.665	405.281	412.005	398.961
2011	403.463	398.341	407.980	410.441	398.786	400.127	- 3.059	404.536	408.946	393.892
2012	388.621	403.463	408.651	404.577	402.179	391.565	- 4.476	398.017	404.469	397.068
2013	394.743	388.621	374.325	394.839	392.342	392.075	- 3.192	396.676	401.277	387.089
Forecast for 2014		**394.743**	**400.961**	**396.292**	**394.084**					**388.883**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
3,92%	9,38%	5,49%	4,50%	17,36%	201.299.344	1.151.875.108	395.343.631	265.584.694	3.948.446.693
2,55%	1,32%	3,69%	3,82%	13,44%	81.000.000	21.649.450	169.865.606	181.520.379	2.252.007.440
27,25%	29,06%	25,36%	26,49%	36,14%	17.478.955.264	19.876.556.801	15.142.656.080	16.514.845.708	30.744.092.316
13,65%	56,22%	7,69%	5,39%	0,00%	3.397.607.521	57.605.978.078	1.077.152.400	529.783.464	0
0,15%	12,15%	4,86%	1,32%	0,51%	426.409	2.697.724.827	432.234.495	32.085.977	4.729.141
9,94%	10,10%	8,80%	10,34%	10,76%	1.493.204.164	1.544.175.522	1.172.702.903	1.615.775.711	1.752.493.688
2,36%	11,19%	8,49%	0,41%	0,16%	88.566.921	1.985.657.137	1.143.538.764	2.630.013	384.147
1,27%	1,12%	1,73%	1,16%	2,37%	26.234.884	20.400.754	48.685.506	21.873.261	91.602.018
3,82%	5,15%	4,11%	3,49%	2,17%	220.284.964	401.195.306	254.577.980	183.828.642	71.348.982
1,55%	5,17%	0,02%	0,61%	1,94%	37.478.884	416.895.314	9.168	5.763.179	58.585.241

6,65%	**14,09%**	**7,02%**	**5,75%**	**8,49%**	**47.984**	**92.586**	**44.538**	**43.993**	**62.389**
2	**5**	**3**	**1**	**4**	**3**	**5**	**2**	**1**	**4**

Appendix 6: Forecasts Vienna

Schönbrunn Zoo (SEH0002)
Type of attraction: Zoos and other animal attractions
Form of experience: Entertainment
Total number of visitors from 2000 - 2013

					Alpha 0,855268595					Alpha 0,613024004
	Arrivals	Naive 1	Naive 2	SMA (4)	SES	LES				
Period	absolute					a	b	S1	S2	LES
2000	1.613.663				1.350.000	1.502.870	110.793	1.432.931	1.362.992	
2001	1.724.456	1.613.663			1.575.503	1.707.865	152.429	1.611.643	1.515.421	1.613.663
2002	1.806.796	1.724.456	1.842.856		1.702.898	1.814.807	132.325	1.731.276	1.647.746	1.860.294
2003	2.001.791	1.806.796	1.893.068		1.791.759	1.993.606	152.865	1.897.108	1.800.611	1.947.132
2004	1.725.637	2.001.791	2.217.830	1.786.677	1.971.393	1.788.657	- 5.283	1.791.992	1.795.328	2.146.471
2005	1.698.012	1.725.637	1.487.579	1.814.670	1.761.206	1.710.795	- 37.362	1.734.380	1.757.965	1.783.374
2006	2.270.996	1.698.012	1.670.829	1.808.059	1.707.158	2.181.511	187.201	2.063.339	1.945.166	1.673.433
2007	2.453.987	2.270.996	3.037.330	1.924.109	2.189.391	2.441.217	219.247	2.302.815	2.164.414	2.368.712
2008	2.578.698	2.453.987	2.651.723	2.037.158	2.415.692	2.590.943	188.520	2.471.938	2.352.934	2.660.464
2009	2.183.445	2.578.698	2.709.747	2.250.423	2.555.106	2.272.699	- 35.463	2.295.085	2.317.471	2.779.462
2010	2.237.236	2.183.445	1.848.775	2.371.782	2.237.236	2.237.236	- 35.463	2.259.622	2.282.008	2.237.236
2011	2.355.149	2.237.236	2.292.352	2.363.342	2.237.236	2.332.181	22.176	2.318.182	2.304.184	2.201.773
2012	2.193.154	2.355.149	2.479.277	2.338.632	2.338.083	2.217.294	- 38.404	2.241.537	2.265.780	2.354.357
2013	2.226.404	2.193.154	2.042.302	2.242.246	2.214.130	2.219.289	- 20.548	2.232.260	2.245.231	2.178.890
Forecast for 2014		**2.226.404**	**2.260.158**	**2.252.986**	**2.224.628**					**2.198.740**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
16,00%	28,52%	3,54%	14,24%	24,39%	76.261.031.716	242.254.404.178	3.725.820.560	60.395.876.299	177.101.375.826
1,63%	12,39%	6,87%	3,72%	5,03%	763.140.625	44.281.878.919	13.609.088.964	3.993.427.472	7.286.612.709
25,23%	26,43%	20,38%	24,83%	26,31%	328.310.664.256	360.200.143.344	214.310.665.969	317.913.183.781	357.081.855.510
7,46%	23,77%	21,59%	10,78%	3,47%	33.485.706.081	340.289.085.919	280.770.694.884	70.011.071.001	7.271.863.847
4,84%	2,83%	21,00%	6,32%	3,17%	15.552.833.521	5.332.642.268	293.265.571.600	26.571.072.927	6.685.747.660
18,10%	24,10%	3,07%	17,02%	27,30%	156.224.934.009	276.993.565.258	4.486.085.973	138.131.795.328	355.236.604.669
2,40%	17,36%	6,01%	0,00%	0,00%	2.893.471.681	150.902.047.018	18.102.491.570	0	0
5,01%	2,67%	0,35%	5,01%	6,51%	13.903.475.569	3.943.439.795	67.117.056	13.903.475.613	23.524.098.445
7,39%	13,05%	6,63%	6,61%	7,35%	26.242.380.025	81.866.129.115	21.163.848.484	21.004.497.873	25.986.264.480
1,49%	8,27%	0,71%	0,55%	2,13%	1.105.562.500	33.893.709.824	250.968.964	150.655.514	2.257.569.467
8,95%	**15,94%**	**9,02%**	**8,91%**	**10,57%**	**255.880**	**392.423**	**291.505**	**255.358**	**310.231**
2	**5**	**3**	**1**	**4**	**2**	**5**	**3**	**1**	**4**

Schloß Schönbrunn/Schauräume (SEH0001)
Type of attraction: Museums or galleries
Form of experience: Culture, Tradition, Landscape and buildings
Total number of visitors from 2000 - 2013

					Alpha 0,99					Alpha 0,412379223
						LES				
Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	a	b	S1	S2	LES
2000	1.696.333				1.350.000	1.588.752	107.581	1.435.454	1.282.156	
2001	1.803.914	1.696.333			1.692.870	1.766.766	125.876	1.587.399	1.408.032	1.696.333
2002	1.848.046	1.803.914	1.918.318		1.802.804	1.863.445	118.292	1.694.885	1.526.324	1.892.642
2003	1.755.977	1.848.046	1.893.258		1.847.594	1.833.932	79.900	1.720.078	1.606.224	1.981.737
2004	2.217.239	1.755.977	1.668.495	1.776.068	1.756.893	2.112.473	131.496	1.925.097	1.737.721	1.913.831
2005	2.300.081	2.217.239	2.799.666	1.906.294	2.212.636	2.280.706	141.039	2.079.732	1.878.759	2.243.969
2006	2.507.000	2.300.081	2.386.018	2.030.336	2.299.207	2.477.561	155.537	2.255.929	2.034.296	2.421.744
2007	2.590.000	2.507.000	2.732.534	2.195.074	2.504.922	2.604.882	148.208	2.393.693	2.182.504	2.633.098
2008	2.581.000	2.590.000	2.675.748	2.403.580	2.589.149	2.640.422	118.943	2.470.934	2.301.447	2.753.089
2009	2.467.000	2.581.000	2.572.031	2.494.520	2.581.081	2.567.953	69.224	2.469.312	2.370.671	2.759.365
2010	2.586.979	2.467.000	2.358.035	2.536.250	2.468.141	2.604.312	60.688	2.517.835	2.431.358	2.637.177
2011	2.665.000	2.586.979	2.712.793	2.556.245	2.585.791	2.665.000	60.688	2.578.523	2.492.046	2.665.000
2012	2.824.000	2.665.000	2.745.374	2.574.995	2.664.208	2.790.053	77.406	2.679.753	2.569.452	2.725.688
2013	2.868.000	2.824.000	2.992.486	2.635.745	2.822.402	2.867.813	77.498	2.757.382	2.646.951	2.867.459
Forecast for 2014		**2.868.000**	**2.912.686**	**2.735.995**	**2.867.544**					**2.945.312**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
20,80%	24,75%	19,90%	20,76%	13,68%	212.762.632.644	301.120.147.524	194.632.292.412	211.918.287.106	92.056.116.496
3,60%	21,72%	17,12%	3,80%	2,44%	6.862.796.964	249.584.989.822	155.068.201.369	7.646.708.185	3.148.514.657
8,25%	4,83%	19,01%	8,29%	3,40%	42.815.472.561	14.636.596.061	227.208.807.228	43.178.119.768	7.268.526.790
3,20%	5,50%	15,25%	3,28%	1,66%	6.889.000.000	20.315.874.818	155.966.348.013	7.238.254.947	1.857.459.447
0,35%	3,67%	6,87%	0,32%	6,67%	81.000.000	8.977.165.666	31.477.856.400	66.409.797	29.614.789.408
4,62%	4,26%	1,12%	4,62%	11,85%	12.996.000.000	11.031.568.546	757.364.160	13.014.586.864	85.477.270.168
4,64%	8,85%	1,96%	4,59%	1,94%	14.394.960.441	52.415.237.160	2.573.431.441	14.122.514.233	2.519.865.967
2,93%	1,79%	4,08%	2,97%	0,00%	6.087.276.441	2.284.171.447	11.827.704.403	6.274.126.173	0
5,63%	2,78%	8,82%	5,66%	3,48%	25.281.000.000	6.182.040.894	62.003.614.528	25.533.513.247	9.665.321.930
1,53%	4,34%	8,10%	1,59%	0,02%	1.936.000.000	15.496.839.869	53.942.501.153	2.079.170.394	292.445

5,56%	**8,25%**	**10,22%**	**5,59%**	**4,51%**	**181.688**	**261.160**	**299.242**	**181.954**	**152.187**
2	**4**	**5**	**3**	**1**	**2**	**4**	**5**	**3**	**1**

Museum of Natural History (SEH0010)
Type of attraction: Museums or galleries
Form of experience: Culture
Total number of visitors from 2000 - 2013

					Alpha 0,99					Alpha 0,54829655
						LES				
Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	a	b	S1	S2	LES
2000	356.767				1.350.000	347.170	9.597	339.264	331.357	
2001	366.364	356.767			366.699	364.406	12.482	354.123	343.840	356.767
2002	362.738	366.364	376.219		366.367	365.625	8.228	358.846	352.068	376.888
2003	316.000	362.738	359.148		362.774	327.804	- 9.164	335.354	342.904	373.853
2004	318.640	316.000	275.284	350.467	316.468	318.640	- 9.164	326.190	333.739	318.640
2005	338.897	318.640	321.302	340.936	318.618	332.894	- 319	333.157	333.420	309.476
2006	368.801	338.897	360.442	334.069	338.694	361.410	10.571	352.701	343.992	332.575
2007	397.140	368.801	401.344	335.585	368.500	392.007	18.135	377.067	362.126	371.981
2008	372.778	397.140	427.657	355.870	396.854	380.402	6.902	374.715	369.029	410.142
2009	392.149	372.778	349.910	369.404	373.019	391.160	8.359	384.274	377.388	387.304
2010	527.744	392.149	412.527	382.717	391.958	501.582	46.907	462.938	424.295	399.519
2011	552.997	527.744	710.224	422.453	526.386	552.077	48.262	512.317	472.557	548.489
2012	564.512	552.997	579.458	461.417	552.731	571.822	37.492	540.935	510.049	600.339
2013	726.207	564.512	576.267	509.351	564.394	702.357	72.633	642.519	582.682	609.314
Forecast for 2014		**726.207**	**934.217**	**592.865**	**724.589**					**774.990**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
0,83%	13,61%	9,99%	0,68%	0,00%	6.969.600	1.879.734.989	1.012.973.843	4.718.701	0
5,98%	5,19%	0,60%	5,98%	8,68%	410.346.049	309.582.065	4.155.482	411.226.589	865.604.945
8,11%	2,27%	9,42%	8,16%	9,82%	894.249.216	69.876.148	1.206.329.190	906.418.637	1.312.343.619
7,14%	1,06%	15,50%	7,21%	6,34%	803.098.921	17.671.136	3.789.079.580	820.253.488	632.980.189
6,54%	14,72%	4,54%	6,46%	10,02%	593.507.044	3.011.660.102	285.897.372	579.634.483	1.396.035.909
4,94%	10,77%	5,80%	4,88%	1,24%	375.235.641	1.784.094.857	517.335.025	365.966.236	23.475.350
25,69%	21,83%	27,48%	25,73%	24,30%	18.386.004.025	13.275.050.928	21.032.830.729	18.437.919.930	16.441.558.902
4,57%	28,43%	23,61%	4,81%	0,82%	637.714.009	24.720.408.241	17.041.801.208	708.138.031	20.326.071
2,04%	2,65%	18,26%	2,09%	6,35%	132.595.225	223.394.202	10.628.579.025	138.794.521	1.283.608.628
22,27%	20,65%	29,86%	22,28%	16,10%	26.145.273.025	22.482.070.873	47.026.741.592	26.183.385.832	13.664.047.907

8,81%	**12,12%**	**14,51%**	**8,83%**	**8,37%**	**69.559**	**82.325**	**101.265**	**69.682**	**59.699**
2	**4**	**5**	**3**	**1**	**2**	**4**	**5**	**3**	**1**

Appendix 7: Forecasts Vorarlberg

Bregenz, Pfänder, Wildpark (SEH0141)
Type of attraction: Zoos and other animal attractions
Form of experience: Entertainment, Tradition, Landscape and buildings
Total number of visitors from 2000 - 2013

					Alpha 0,908370478					Alpha 0,298583792
						LES				
Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	a	b	S1	S2	LES
2000	494.000				1.350.000	472.000	22.000	420.319	368.638	
2001	516.000	494.000			572.435	505.176	23.961	448.888	392.599	494.000
2002	533.673	516.000	538.980		521.171	531.442	24.366	474.203	416.965	529.138
2003	556.273	533.673	551.951		532.527	556.044	24.407	498.708	441.372	555.807
2004	565.476	556.273	579.830	524.987	554.097	572.844	23.072	518.644	464.444	580.451
2005	533.953	565.476	574.831	542.856	564.433	564.438	17.548	523.215	481.992	595.916
2006	499.922	533.953	504.187	547.344	536.746	540.296	10.232	516.260	492.224	581.986
2007	550.528	499.922	468.060	538.906	503.296	550.528	10.232	526.492	502.456	550.528
2008	551.000	550.528	606.257	537.470	546.200	555.802	9.362	533.810	511.818	560.760
2009	575.463	551.000	551.472	533.851	550.560	570.396	10.280	546.247	522.097	565.163
2010	541.030	575.463	601.012	544.228	573.181	560.535	6.745	544.689	528.843	580.676
2011	586.757	541.030	508.657	554.505	543.976	577.175	8.482	557.250	537.325	567.281
2012	582.837	586.757	636.349	563.563	582.837	584.224	8.230	564.890	545.555	585.657
2013	558.042	582.837	578.943	571.522	582.837	574.973	5.162	562.845	550.718	592.455
Forecast for 2014		**558.042**	**534.302**	**567.167**	**560.314**					**580.135**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
1,63%	2,54%	7,16%	2,01%	2,65%	84.695.209	206.039.195	1.639.399.610	129.476.925	224.254.113
5,90%	7,66%	1,67%	5,71%	11,60%	993.699.529	1.671.031.712	79.254.506	929.052.751	3.839.370.889
6,81%	0,85%	9,49%	7,37%	16,42%	1.158.108.961	18.192.611	2.248.822.373	1.355.999.717	6.734.450.200
9,19%	14,98%	2,11%	8,58%	0,00%	2.560.967.236	6.800.981.865	135.070.884	2.230.847.041	0
0,09%	10,03%	2,46%	0,87%	1,77%	222.784	3.053.306.610	183.067.665	23.038.380	95.254.175
4,25%	4,17%	7,23%	4,33%	1,79%	598.438.369	575.548.664	1.731.579.350	620.149.759	106.081.126
6,36%	11,09%	0,59%	5,94%	7,33%	1.185.631.489	3.597.851.726	10.228.803	1.033.697.588	1.571.785.186
7,79%	13,31%	5,50%	7,29%	3,32%	2.090.958.529	6.099.561.764	1.040.175.378	1.830.214.291	379.331.393
0,67%	9,18%	3,31%	0,00%	0,48%	15.366.400	2.863.509.927	371.506.350	0	7.950.876
4,44%	3,75%	2,42%	4,44%	6,17%	614.792.025	436.859.689	181.703.660	614.792.012	1.184.234.937

4,71%	**7,75%**	**4,19%**	**4,65%**	**5,15%**	**30.501**	**50.322**	**27.606**	**29.610**	**37.607**
3	**5**	**1**	**2**	**4**	**3**	**5**	**1**	**2**	**4**

Inatura Erlebnis Naturschau, Dornbirn (SEH0146)
Type of attraction: Natural Parks and reserves
Form of experience: Entertainment, Culture
Total number of visitors from 2000 - 2013

					Alpha					Alpha
					0,99					0,672333371
	Arrivals	Naive 1	Naive 2	SMA (4)	SES	LES				
Period	absolute					a	b	S1	S2	LES
2000	15.160				1.350.000	12.871	2.289	11.755	10.640	
2001	17.449	15.160			28.508	17.203	3.324	15.583	13.964	15.160
2002	12.670	17.449	20.084		17.560	13.514	- 228	13.625	13.736	20.527
2003	101.062	12.670	9.200		12.719	91.638	39.450	72.412	53.186	13.286
2004	120.642	101.062	806.119	36.585	100.179	121.764	34.728	104.839	87.914	131.088
2005	88.979	120.642	144.015	62.956	120.437	96.228	4.210	94.176	92.124	156.492
2006	83.000	88.979	65.626	80.838	89.294	84.872	- 3.672	86.662	88.452	100.438
2007	81.200	83.000	77.423	98.421	83.063	81.200	- 3.672	82.990	84.779	81.200
2008	77.000	81.200	79.439	93.455	81.219	77.057	- 3.911	78.963	80.869	77.528
2009	86.128	77.000	73.017	82.545	77.042	84.734	1.958	83.780	82.826	73.146
2010	114.769	86.128	96.338	81.832	86.037	111.754	14.649	104.615	97.476	86.692
2011	89.000	114.769	152.934	89.774	114.482	93.016	- 2.258	94.117	95.217	126.404
2012	89.071	89.000	69.017	91.724	89.255	89.252	- 3.021	90.724	92.196	90.758
2013	104.818	89.071	89.142	94.742	89.073	102.822	5.381	100.200	97.577	86.231
Forecast for 2014		**104.818**	**123.349**	**99.415**	**104.661**					**108.203**

Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
16,23%	568,19%	69,67%	16,96%	8,66%	383.376.400	469.878.729.864	7.065.537.221	418.752.010	109.112.463
35,58%	61,85%	29,25%	35,35%	75,87%	1.002.545.569	3.029.013.830	677.209.541	989.628.772	4.557.944.507
7,20%	20,93%	2,60%	7,58%	21,01%	35.748.441	301.852.838	4.673.163	39.609.195	304.073.862
2,22%	4,65%	21,21%	2,29%	0,00%	3.240.000	14.267.522	296.554.231	3.470.530	0
5,45%	3,17%	21,37%	5,48%	0,69%	17.640.000	5.948.897	270.775.253	17.796.834	278.565
10,60%	15,22%	4,16%	10,55%	15,07%	83.320.384	171.891.992	12.839.681	82.552.011	168.535.436
24,96%	16,06%	28,70%	25,03%	24,46%	820.306.881	339.698.705	1.084.845.969	825.519.672	788.333.741
28,95%	71,84%	0,87%	28,63%	42,03%	664.041.361	4.087.591.704	599.463	649.316.088	1.399.048.320
0,08%	22,51%	2,98%	0,21%	1,89%	5.041	402.167.135	7.039.736	33.789	2.844.346
15,02%	14,96%	9,61%	15,02%	17,73%	247.968.009	245.735.200	101.525.776	247.910.121	345.463.508

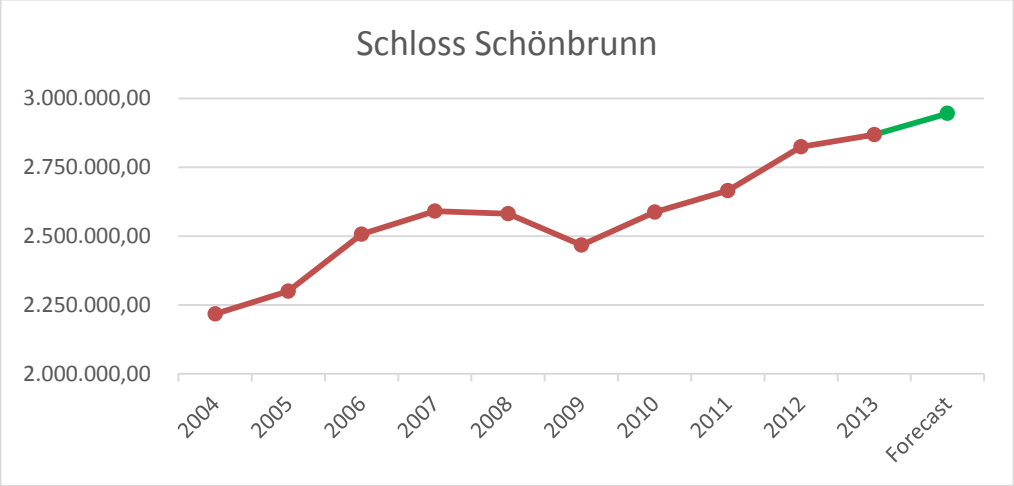
14,63%	**79,94%**	**19,04%**	**14,71%**	**20,74%**	**18.050**	**218.741**	**30.857**	**18.096**	**27.705**
1	**5**	**3**	**2**	**4**	**1**	**5**	**4**	**2**	**3**

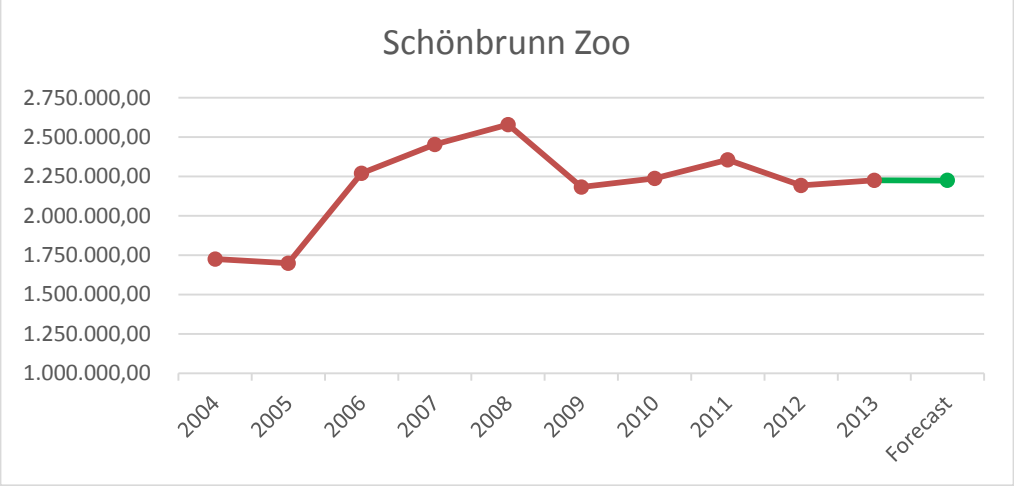
Silvretta-Stausee und Bielerhöhe
(SEH0142)
Type of attraction: Natural Parks and reserves
Form of experience: Landscape and buildings
Total number of visitors from 2000 - 2013

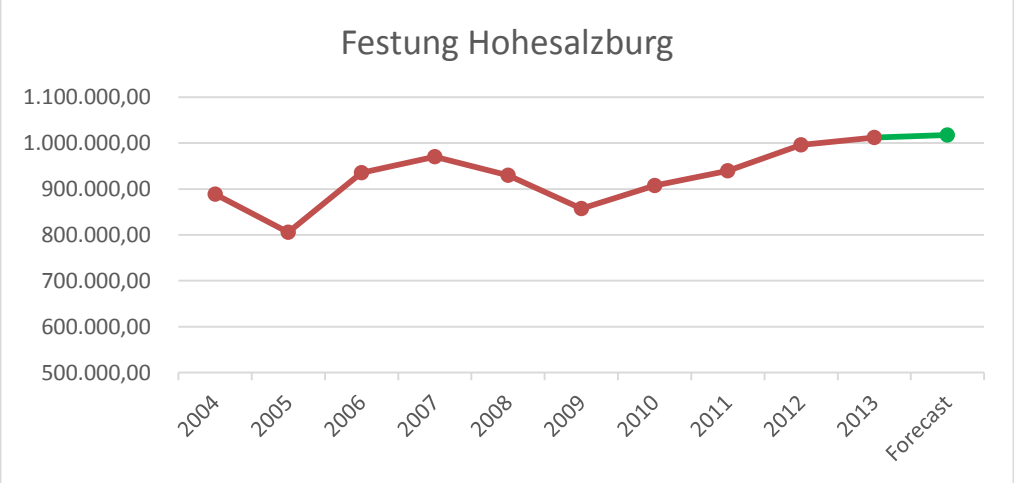
					Alpha 0,648681426					Alpha 0,237567234
						LES				
Period	Arrivals absolute	Naive 1	Naive 2	SMA (4)	SES	a	b	S1	S2	LES
2000	394.032				1.350.000	428.064	- 34.032	537.284	646.504	
2001	360.000	394.032			729.881	379.783	- 35.953	495.167	610.551	394.032
2002	389.000	360.000	328.907		489.946	362.743	- 33.403	469.945	577.148	343.830
2003	410.000	389.000	420.336		424.464	363.112	- 28.851	455.704	548.297	329.339
2004	357.000	410.000	432.134	388.258	415.082	343.781	- 27.568	432.255	520.729	334.261
2005	302.000	357.000	310.851	379.000	377.405	310.263	- 28.370	401.311	492.359	316.214
2006	350.000	302.000	255.473	364.500	328.491	310.409	- 24.526	389.121	467.833	281.893
2007	346.108	350.000	405.629	354.750	342.444	311.099	- 21.127	378.903	446.706	285.883
2008	278.000	346.108	342.259	338.777	344.821	284.959	- 21.803	354.931	424.904	289.972
2009	321.739	278.000	223.294	319.027	301.475	287.685	- 18.496	347.046	406.407	263.157
2010	265.177	321.739	372.360	323.962	314.620	267.509	- 18.723	327.597	387.684	269.188
2011	305.212	265.177	218.559	302.756	282.547	272.411	- 15.538	322.279	372.146	248.786
2012	293.221	305.212	351.291	292.532	297.249	272.092	- 13.487	315.376	358.659	256.873
2013	258.605	293.221	281.701	296.337	294.636	258.605	- 13.487	301.889	345.173	258.605
Forecast for 2014		**258.605**	**228.076**	**280.554**	**271.263**					**245.118**

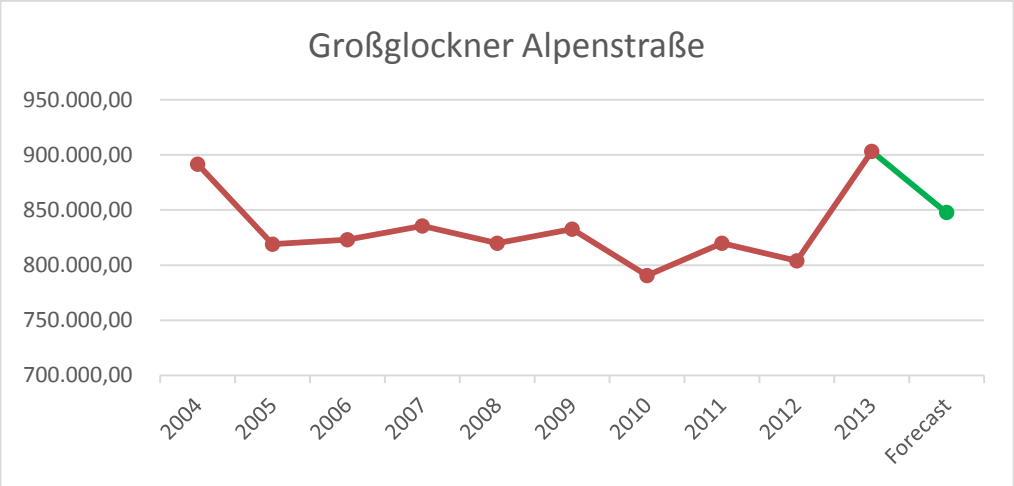
Mean Absolute Percentage Error (MAPE)					Root Mean Squared Error				
Naive 1	Naive 2	SMA (4)	SES	LES	Naive 1	Naive 2	SMA (4)	SES	LES
14,85%	21,05%	8,76%	16,27%	6,37%	2.809.000.000	5.645.069.283	977.062.564	3.373.468.255	517.082.965
18,21%	2,93%	25,50%	24,97%	4,71%	3.025.000.000	78.344.087	5.929.000.000	5.685.934.051	202.031.702
13,71%	27,01%	4,14%	6,15%	19,46%	2.304.000.000	8.935.280.120	210.250.000	462.627.456	4.638.612.007
1,12%	17,20%	2,50%	1,06%	17,40%	15.147.664	3.542.765.997	74.684.164	13.428.066	3.627.061.080
24,50%	23,11%	21,86%	24,04%	4,31%	4.638.699.664	4.129.254.943	3.693.843.729	4.464.994.824	143.326.410
13,59%	30,60%	0,84%	6,30%	18,21%	1.913.100.121	9.691.326.865	7.354.944	410.616.573	3.431.896.880
21,33%	40,42%	22,17%	18,65%	1,51%	3.199.259.844	11.488.121.557	3.455.646.833	2.444.609.673	16.091.460
13,12%	28,39%	0,80%	7,43%	18,49%	1.602.801.225	7.508.803.154	6.031.936	513.691.245	3.183.889.641
4,09%	19,80%	0,23%	1,37%	12,40%	143.784.081	3.372.156.187	474.721	16.228.406	1.321.167.059
13,39%	8,93%	14,59%	13,93%	0,00%	1.198.267.456	533.429.640	1.423.722.690	1.298.252.358	0
13,79%	**21,94%**	**10,14%**	**12,02%**	**10,28%**	**45.661**	**74.111**	**39.722**	**43.225**	**41.329**
4	**5**	**1**	**3**	**2**	**4**	**5**	**1**	**3**	**2**

Appendix 8: Development of Attractions (Diagrams)





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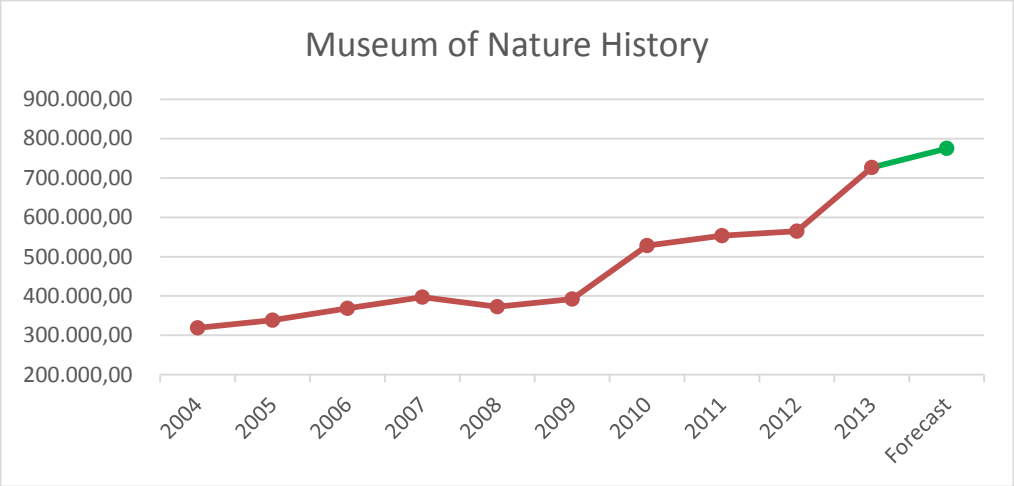
Forecast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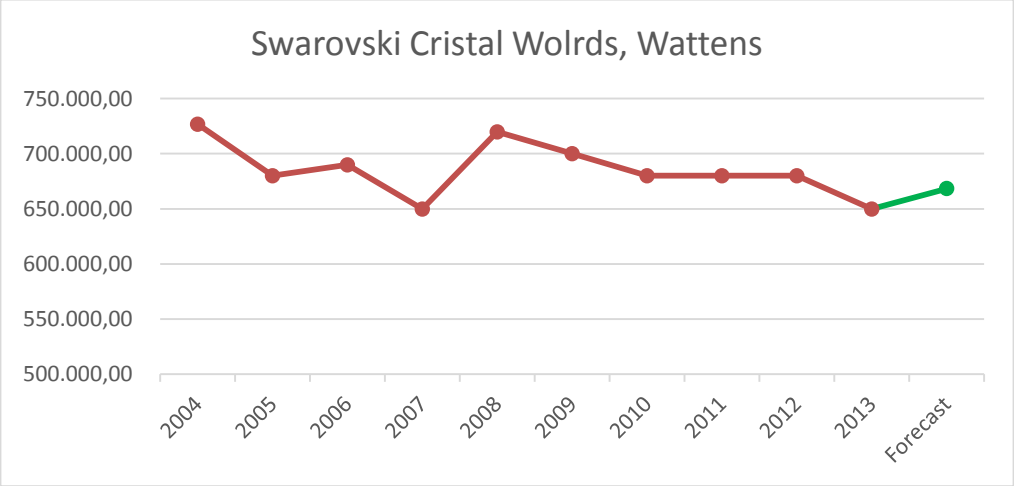
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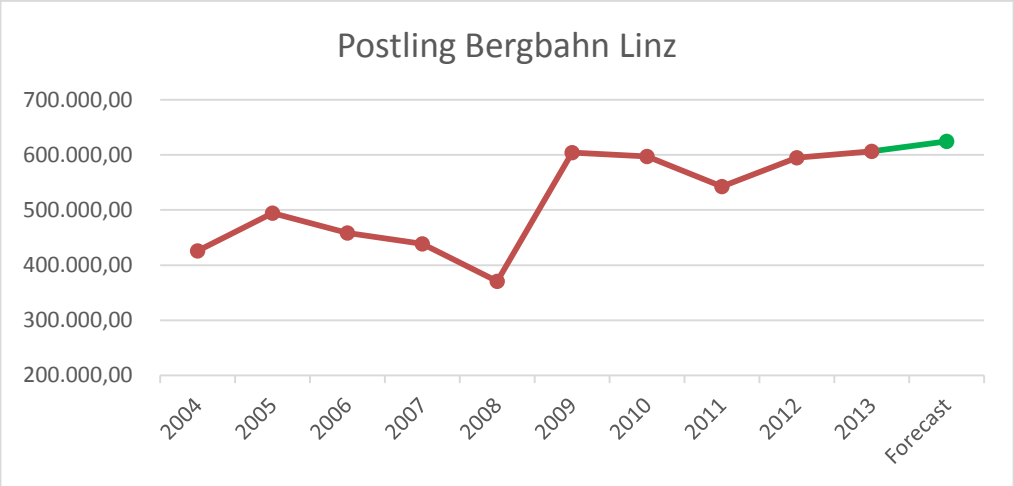
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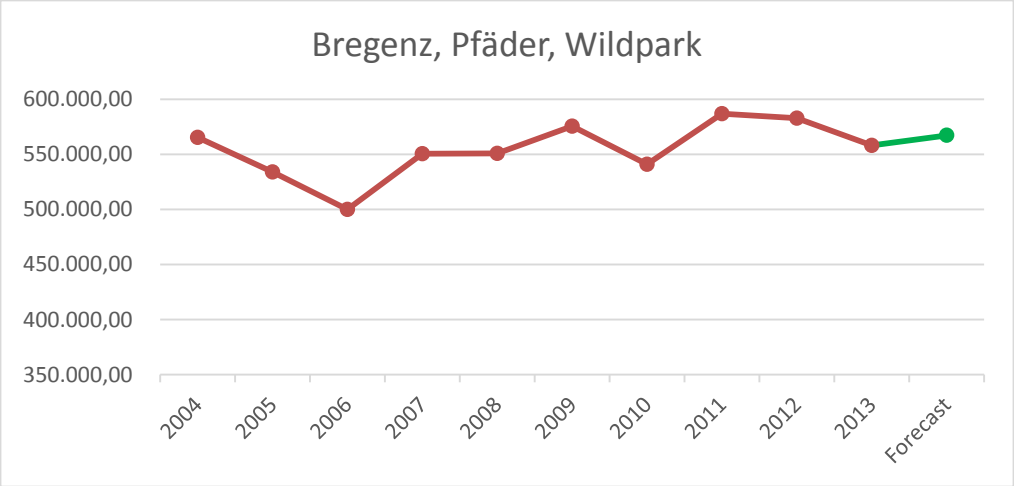
Forecast


Bregenz, Pfäder, Wildpark
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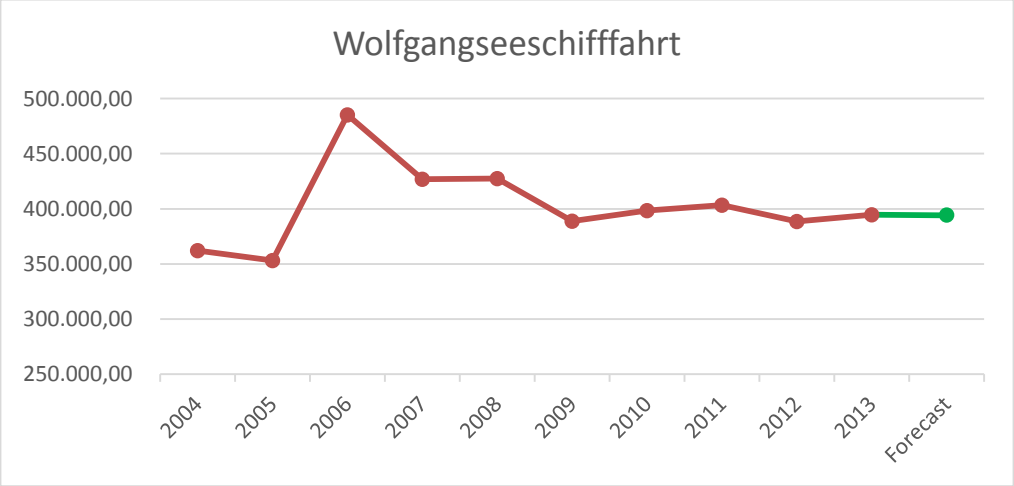
Forecast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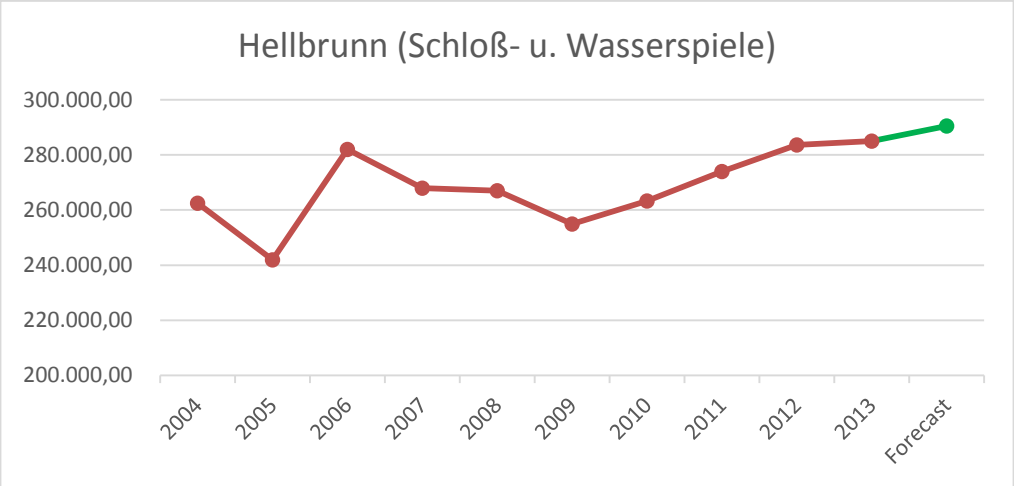
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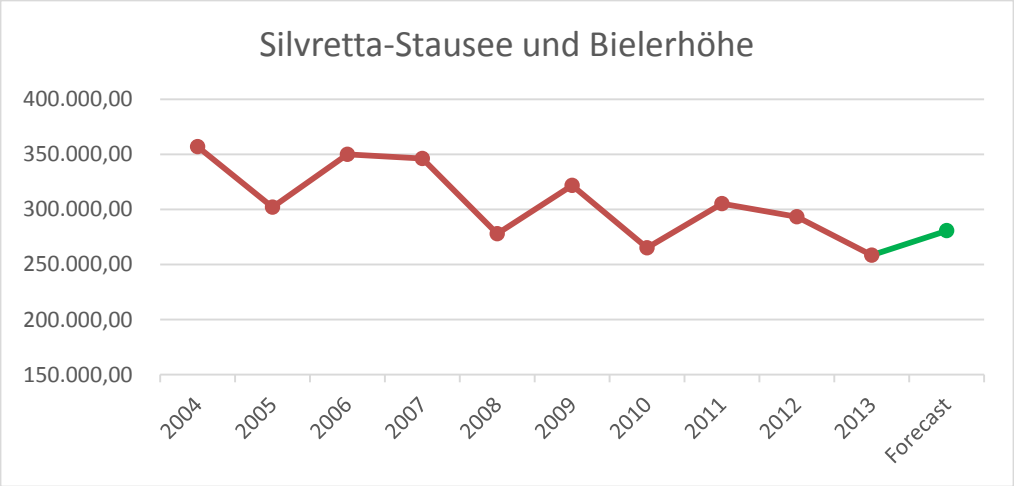
Forecast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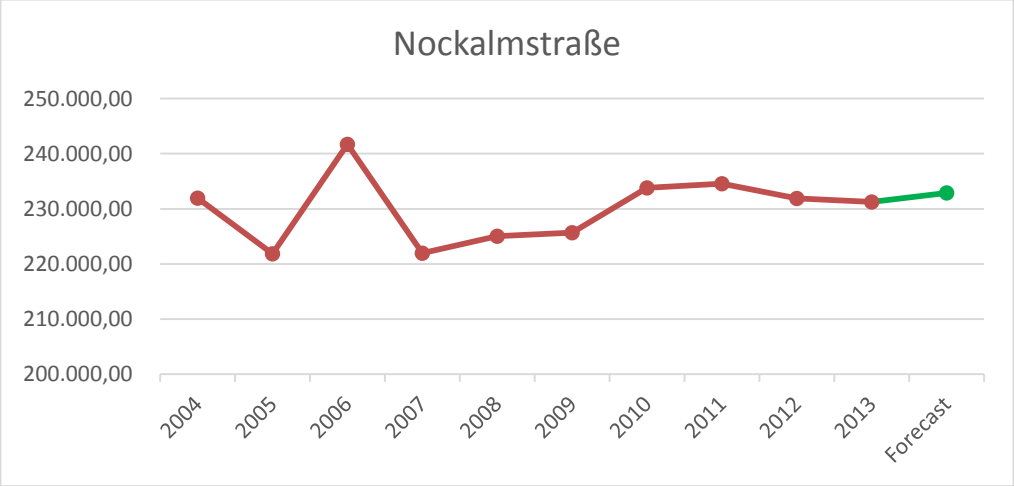
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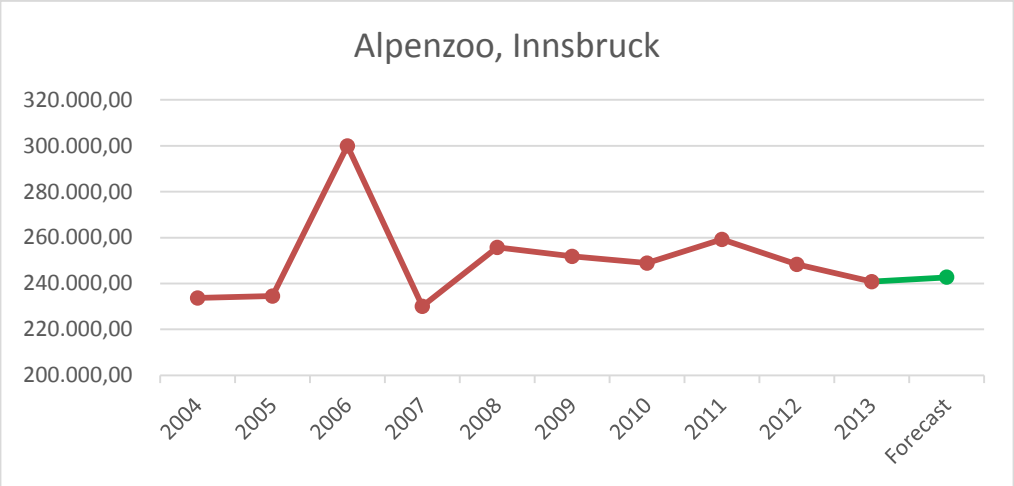
Forecast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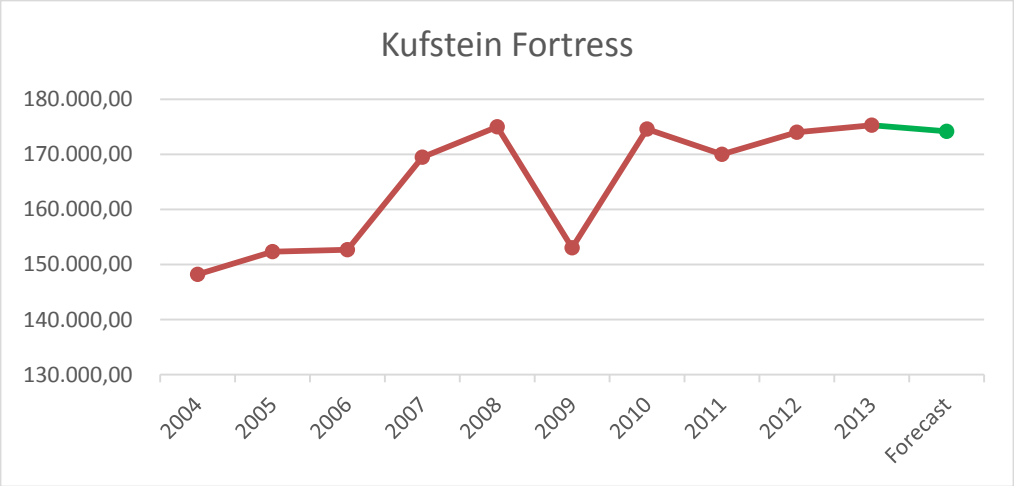
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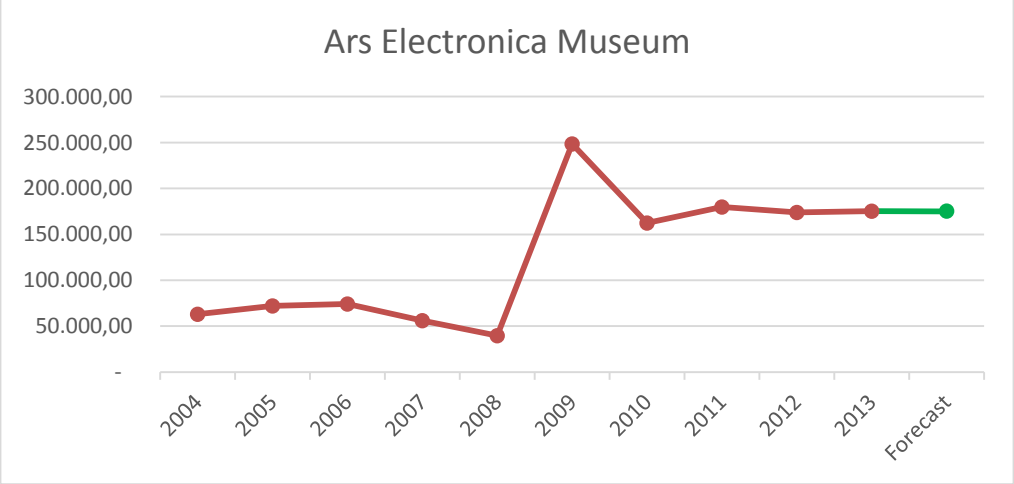
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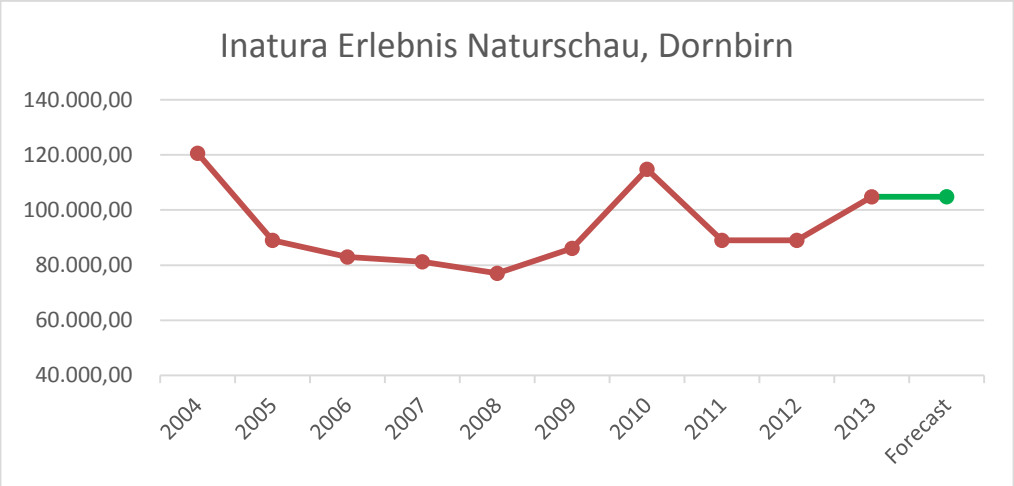
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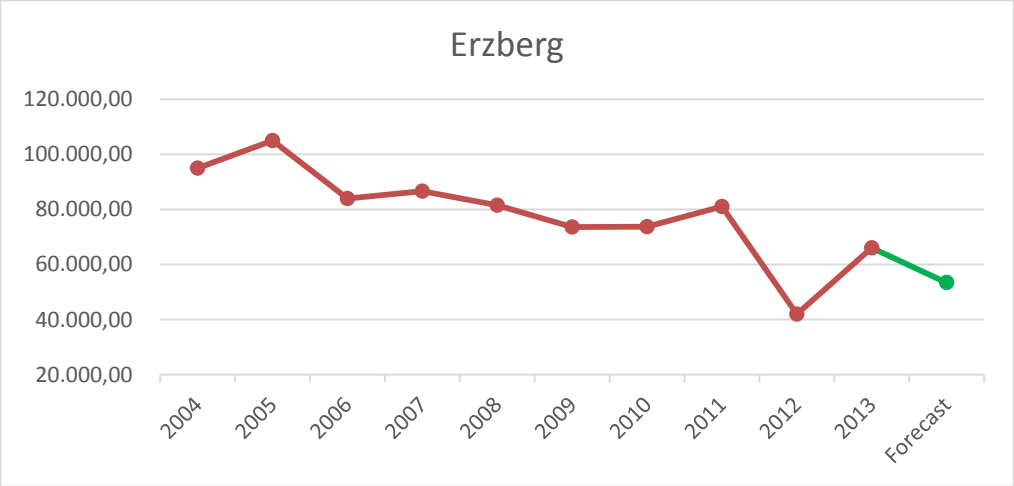
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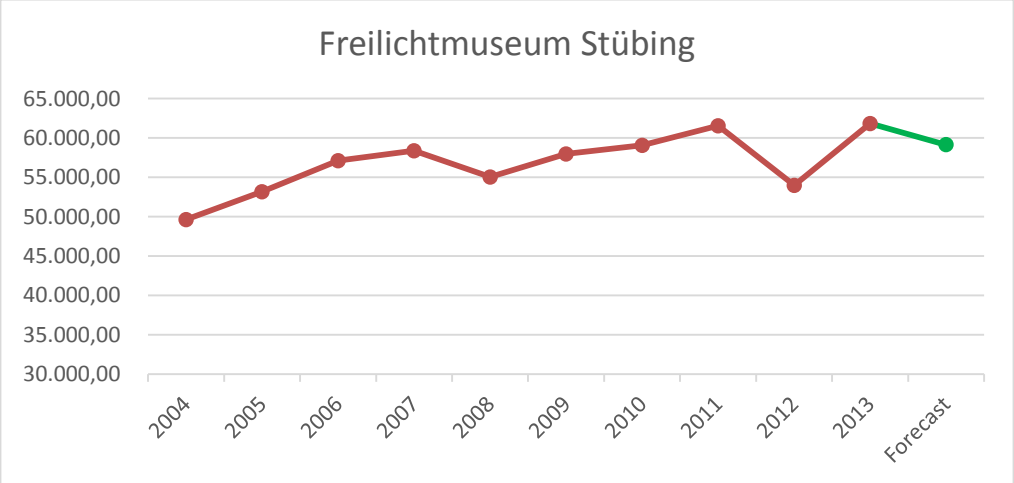
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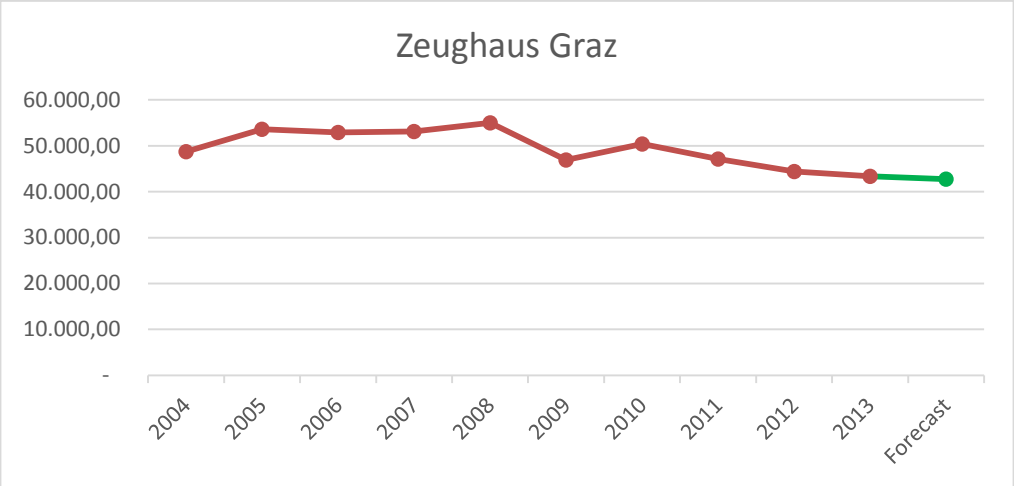
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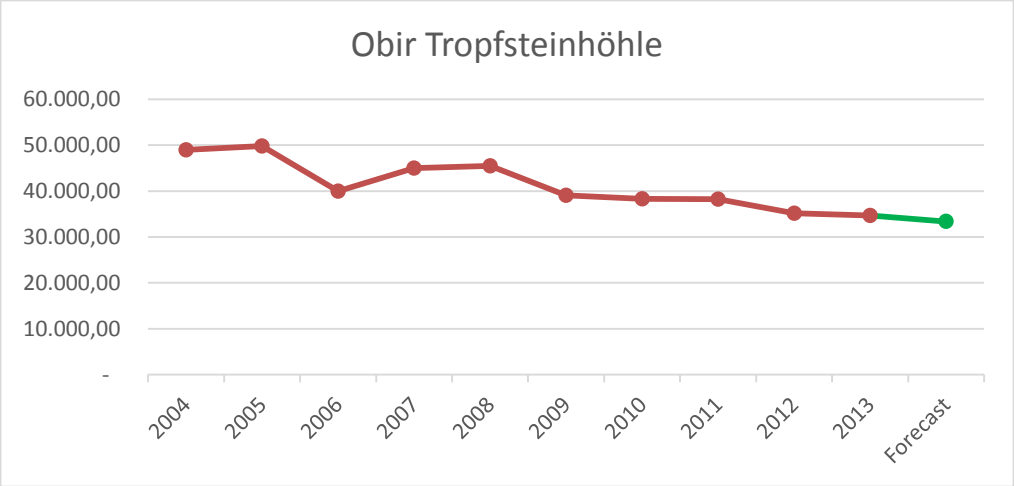
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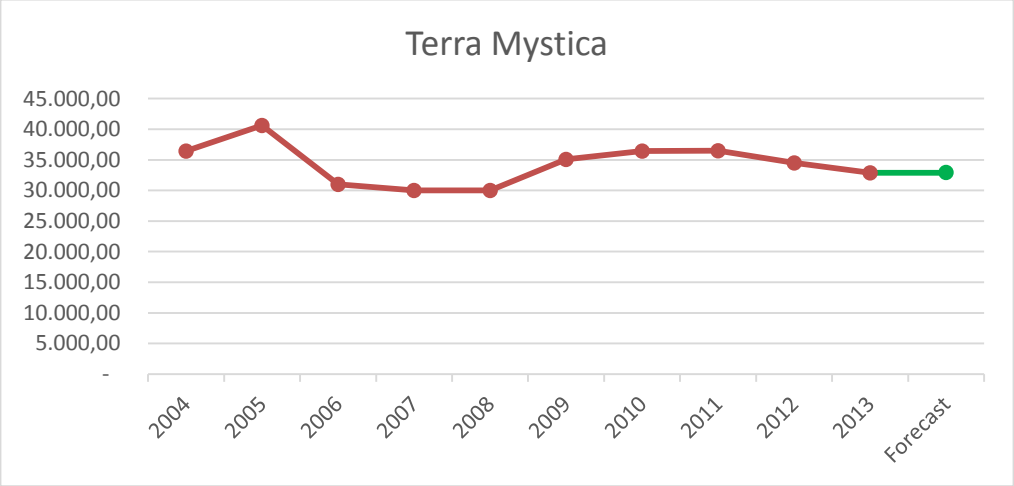
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Forecast