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Accuracy and bias of experts' adjusted forecasts

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ABSTRACT

This study investigates whether experts' group-based judgmental adjustments to econometric forecasts of tourism demand improve the accuracy of the forecasts and whether the adjusted forecasts are unbiased. The Delphi method was used to aggregate experts' judgmental adjustments and a range of error measures and statistical tests were employed to evaluate forecast accuracy. Regression analysis was used to investigate whether the statistical and judgmentally-adjusted forecasts were unbiased. The hypothesis tests suggested that, on average, the adjustments of the Delphi panel improved forecast accuracy though the group-adjusted forecasts were found to be biased for some of the individual markets. In-depth interviews with the Delphi panellists provided further insights into the biases that were associated with the Delphi surveys.

Research background

Tourism is a demand-driven, service-oriented industry that is experiencing rapid growth and innovation (Chu, 2008). Along with the phenomenal growth in demand over the past six decades, there has been a corresponding interest in tourism research. Within this context, tourism demand modelling and forecasting has received intensive attention (Song & Li, 2008). Tourism demand studies mainly focus on two aspects: the analysis of the effects of various determinants on demand and the provision

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of accurate forecasts of future tourism demand. The majority of the published studies on this topic have focused on statistical (time series and econometric) forecasting approaches, with very limited attention being paid to judgmental forecasting approaches in the tourism forecasting literature.

However, it is difficult, if not impossible, to capture such a diverse, dynamic, and changeable phenomenon as tourism demand using the statistical models that incorporate only a limited number of variables (UNWTO & ETC, 2011). Sociological and psychological factors are difficult to express quantitatively, and crises and disasters are impossible to forecast. For their forecasts to be of any practical value, tourism planners and decision-makers must adjust their forecasts and models to deal with a bundle of qualitative factors (Croce & Wöber, 2011). Judgmental inputs to the forecasting process are thus designed to incorporate the knowledge of experts into tourism forecasts in order to improve their quality (Armstrong & Collopy, 1998; Croce & Wöber, 2011). A big challenge in achieving accurate forecasts is to utilize the best aspects of statistical predictions while also exploiting and capitalizing on the value of knowledge and judgmental information which are not taken into account by the statistical forecasts (Armstrong & Collopy, 1998). It would therefore seem to be advantageous to bring these two methods together. The general forecasting literature suggests that combining methods improves forecast accuracy, a finding that holds true for quantitative forecasting, judgmental forecasting, and the averaging of these two forecasts (Clemen, 1989).

To date, the combination of multiple methods is still not widely accepted as a viable research strategy by academics in the tourism demand forecasting field. However, tourism demand forecasters and practitioners have indicated that such research is necessary to develop and strengthen our understanding of many tourism-related issues. Most tourism forecasting research has been devoted to the area of single-equation modelling approach (i.e. modern econometric models) (Song & Li, 2008; Witt & Witt, 1995), and it is surprising that the considerable advances in judgmental forecasting achieved in other domains have still not received much attention in the tourism forecasting literature. Given the knowledge capital possessed by tourism analysts, the industry could benefit from attempts to exploit this resource to achieve more accurate forecasts.

This study contributes to the tourism forecasting literature by providing empirical evidence on the efficiency of integrating judgmental and statistical forecasts with a particular focus on judgmentally adjusting statistical forecasts using a Web-based forecasting support system designed by the research team of this study. The aims of the study are to build up a systematic framework to integrate judgmental and statistical forecasts in the tourism context which (a) applies econometric forecasting models to generate statistical forecasts; (b) uses a forecasting decision support system, which have never before been used in the general and tourism forecasting literature, to structure experts' knowledge and quantify managerial intuition; (c) measures statistical and judgmentally adjusted forecasts using formal measures of accuracy; and (d) explores the reasons for bias. Moreover, this study provides theoretical and practical evidence to further develop a tourism demand forecasting system in support of collaborative forecasting tasks for tourism practitioners, to enhance the system's effectiveness and efficiency, and to improve its forecasting performance. The remainder of this paper is structured as follows: Section 'Literature review and hypotheses' reviews the literature on the proposed hypotheses. Section 'Methodology' presents the methodological details in this study. Section 'Findings and discussions' summarizes the hypothesis testing results, together with findings from in-depth interviews with the participating tourism experts. Section 'Conclusions' concludes the study.

Literature review and hypotheses

Judgmental adjustment of statistical forecasts is a major alternative to combining statistical and judgmental approaches (combining can involve methods ranging from simple means of the component forecasts to Bayesian forecasting). Numerous industry surveys have revealed that judgmentally adjusted statistical forecasting is a common practice. Klassen and Flores (2001) surveyed 117 Canadian firms and found that senior management frequently revised the forecasts. They also found that 80% of the respondents used computer-generated statistical forecasts and then judgmentally adjusted them. Similarly, in a study of 96 corporations in the USA, Sanders and Manrodt (1994) found that 45% of the respondents claimed that they always adjusted statistical forecasts and that 37% did it