Institution: University of Surrey

Unit of Assessment: UOA 26 Sport and Exercise Sciences, Leisure and Tourism

Title of case study:

Modelling and Forecasting International Tourism Demand: Methodological Advancements and Innovations

1. Summary of the impact (indicative maximum 100 words)

The University of Surrey has a longstanding reputation in the world of tourism demand modelling and forecasting research. The continuous advancements and innovations in forecasting methodologies have been widely applied by international organisations, government agencies and tourism-related enterprises and so contributed to "evidence based policy/strategy movement".

This research has provided the scientific foundation for more effective policy making, strategic planning and operation management particularly in terms of planning investments in visitor infrastructure, human resource management, marketing resource allocation and new product development. In addition, the risks of project failures are minimised through improved understanding of tourism demand.

2. Underpinning research (indicative maximum 500 words)

The University of Surrey has been one of the world leaders in tourism demand modelling and forecasting research. Since the 1990s the research in this area has become increasingly active, led by a research team consisting of Prof Haiyan Song (employed from 1997-2004 and Visiting Professor thereafter), Prof Stephen Witt (employed from 1998-2004 and Emeritus Professor thereafter) and Dr Gang Li (employed since 2003). The research team have still retained close collaborations since the departure of Prof Haiyan Song to Hong Kong Polytechnic University (HKPU), and Surrey, led by Dr Li, has continued to play a significant role in the collaborative research.

Over the past 15 years, Surrey's research team have been making continuous endeavours to advance tourism demand modelling and forecasting methodologies to improve the explanatory power and forecast accuracy of tourism demand models. For example, the team has introduced the general-to-specific approach to tourism demand modelling, which is a scientific procedure to identify significant influencing factors of tourism demand (see Song and Witt, 2000; 2003). In addition, the team has developed a number of advanced econometric models including the time-varying-parameter (TVP) model, TVP almost ideal demand system (AIDS) models, and TVP structural time series models (Li et al, 2005). Scientific evidence shows that the above TVP methods improved tourism forecast accuracy significantly (Song and Li, 2008). Meanwhile, the combination between the AIDS model and more advanced econometric techniques leads to more powerful tools for international tourism demand analysis. The above models represent the most advanced econometric methods for tourism demand modelling and forecasting in the present literature. Much of this research programme won public funding from sources such as the Hong Kong government and European Commission during the period 2003-2013.

A recent methodological innovation is the development of a web-based forecasting system for Hong Kong inbound tourism. It is the first and still the only online tourism forecasting system in the world. Launched in 2008, this innovation is based on a two-step rigorous methodology including statistical forecasting and judgemental forecasting. The statistical forecasting methodology of the system was developed at Surrey (e.g., Song and Witt, 2000; Li, et al., 2005), and we continue to play a key role in further development of the project. The system provides forecasts of Hong Kong inbound tourist arrivals and expenditures, hotel room nights and occupancy rates. The user-friendly web interface enables non-expert users to access the instantly updated forecasts, and to adjust the

forecasts based on their own judgement. Such an intelligent, interactive forecasting system greatly benefits tourism-related organisations' strategic decision making and relevant policy making.

Currently Surrey is undertaking a European Commission funded project on forecasting the demand for accessible tourism in Europe, based on which the economic impact of accessible tourism will be estimated too. The development of the methodology is based on the combination of forecasting methods described in Section 2.

3. References to the research (indicative maximum of six references)

1) Song, H. and Witt, SF. (2000). Tourism Demand Modelling and Forecasting: Modern Econometric Approaches, Pergamon, Oxford (Research Monograph).

2) Song, H. and Li, G. (2008) 'Tourism Demand Modelling and Forecasting: A Review of Recent Research'. Tourism Management, 29 (2), pp. 203-220. doi: 10.1016/j.tourman.2007.07.016 (ABS Grade 4)

3) Li, G., Song, H. and Witt, SF. (2005) 'Time Varying Parameter and Fixed Parameter Linear AIDS: An Application to Tourism Demand Forecasting'. International Journal of Forecasting, 22 (1), pp. 57-71. doi: 10.1016/j.ijforecast.2005.03.006 (ABS Grade 3)

4) Song, H. and Witt, SF. (2003). 'Tourism Forecasting: The General-to-Specific Approach', Journal of Travel Research, 42(1), pp. 65-74.doi: 10.1177/0047287503253939 (ABS Grade 3)

5) Li G, Wong KKF, Song H, Witt SF. (2006) 'Tourism Demand Forecasting: A Time Varying Parameter Error Correction Model'. Journal of Travel Research, 45 (2), pp. 175-185. doi: 10.1177/0047287506291596 (ABS Grade 3)

6) Song H, Li G, Witt SF, Athanasopoulos G. (2011) 'Forecasting Tourist Arrivals Using Time-Varying Parameter Structural Time Series Models'. International Journal of Forecasting, 27 (3), pp. 855-869. doi: 10.1016/j.ijforecast.2010.06.001 (ABS Grade 3)

Evidence of quality:

The Google scholar citations for publications (1) and (2) have both exceeded 300. In addition, publication (2) is the third most cited article published in the journal since 2008. The other articles were all published in leading tourism or forecasting journals rated Grade 4 or 3 by ABS.

Grants received for the above research:

1. "Tourism Demand Modelling and Forecasting: The General-to-Specific Approach", the Competitive Earmarked Research Grant, Hong Kong University Grants Committee, 2003-2004, approximately £16,000, PI: Dr Kevin Wong (HKPU), Co-I: Prof Haiyan Song (Surrey).
2. "Assessment of the Policy Impact on Chinese Outbound Tourism Demand: Developing an Advanced Econometric Approach", the Pump-Priming Award (£3,300) funded by University Research Support Fund, University of Surrey, August - December, 2007, PI: Dr Gang Li.
3. "Econometric Modelling and Forecasting UK Tourism Demand Using a New Econometric Model", the Pump-Priming Award (£5,700) funded by University Research Support Fund, University of Surrey, 2004–2005, PI: Dr Gang Li.
4. "Modelling and Forecasting Seasonal Tourism Demand in Hong Kong using Structural Time Series Models with Time Varying Demand Elasticities", the Competitive Earmarked Research Grant, Hong Kong University Grants Committee, 2007–2009, approximately £25,600, PI: Prof Haiyan Song (HKPU), Co-I: Dr Gang Li (Surrey), Prof Stephen Witt (Emeritus at Surrey).
5. "Econometric Analysis of Tourist Expenditures in Hong Kong", the Competitive Earmarked Research Grant, Hong Kong University Grants Committee, 2006–2008, approximately £30,000, PI: Prof Haiyan Song (HKPU), Co-I: Dr Gang Li (Surrey), Prof Stephen Witt (Emeritus at Surrey).
6. "Developing a Tourism Demand Forecasting System for Hong Kong" (Phase I), funded by the

Public Policy Research Institute, The Hong Kong Polytechnic University, 2005–2009, approximately £120,000, PI: Prof Haiyan Song (HKPU), Co-I: Dr Gang Li (Surrey), Prof Stephen Witt (Emeritus at Surrey).

7. "Further Development and Maintenance of the Web-Based Hong Kong Tourism Demand Forecasting System" (Phase II), funded by The Hong Kong Polytechnic University, 2008–2011, approximately £80,000, PI: Prof Haiyan Song (HKPU), Co-I: Dr Gang Li (Surrey), Prof Stephen Witt (Emeritus at Surrey).
8. "Economic Impact and Travel Patterns of Accessible Tourism in Europe", funded by European Commission, DG Enterprise and Industry, 2012-2013, project code: 68/PP/ENT/PPA/12/6470, project partners: GfK (Belgium), University of Surrey, NeumannConsult (Germany) and ProAsolutions (Spain), value: 250,000 euros. http://ec.europa.eu/enterprise/newsroom/cf/itemdetail.cfm?item_id=5925

4. Details of the impact (indicative maximum 750 words)

The main beneficiaries of our research are the organisations that commissioned the team to conduct consultancy projects or directly adopted our forecasting methodologies and reports. This research has **reached** organisations such as the European Commission, tourist destination governments, industry associations and individual tourism-related enterprises across the world. Based on the developed methodology (e.g., Song and Witt, 2000 and 2003, Li et al, 2006), the Surrey team (has been commissioned by the Pacific Asia Tourism Association (PATA) to produce annual tourism forecasting reports. The reports are made available to all PATA members including over 80 governments, 50 airlines, airports and cruise lines and hundreds of travel companies around the world. The research team have been invited to give over 50 presentations at international conferences and workshops, and attended various media releases of the commissioned projects over the past 10 years.

To date, over 370 tourism-related organisations and government agencies from 39 countries have subscribed to the system.

Accurate tourism forecasts provide a scientific foundation for formulating tourism policies (e.g., planning investments in infrastructure, marketing resource allocation and tourist taxation) and business strategies (e.g., operation management and new product development). The common benefit these organisations gained is strongly associated with the improved effectiveness of their strategic planning and the reduced risks of decision failures. Below are some examples of the impacts of our research.

PATA annual forecasting reports supports tourism policy change and improved corporate planning. Many tourist destination governments use PATA forecasts as a key reference to assist their tourism planning and revising tourism policies (letter of support from PATA). For example, the Philippines Department of Tourism revised their tourism strategy according to PATA forecasts. It is noted explicitly in their tourism policy that "**to achieve the projected growth in tourist numbers and expenditures** over the next decade, the Central Philippines will have to move to an investment-driven strategy".

Cathy Pacific is another example that applied the findings of the PATA forecasting report (2011), which highlighted emerging, fast-growing tourist markets and destinations. As a direct result Cathy Pacific announced a new expansion in 2012: to add about 1,000 cabin crew, 300 pilots and 600 ground staff to those popular routes in order to "**meet rising demand**". Consequently, the passenger revenue increased by 3.5% compared to 2011 despite the increase of fuel prices. The more accurate tourism forecasts provided by Surrey's research ensure a solid basis and greater confidence for Cathy Pacific's successful strategic planning.

The web-based forecasting system supports improved tourism operation management. Since 2011

Hong Kong Disneyland (HKD) has built its attendance demand projection model by applying the forecasts provided by the Surrey-designed system. HKD benefited from the system in two major areas: attendance projection and pricing execution. In addition, the system allowed HKD to quickly react to the changing business environment and business needs. According to the letter of support from HKD, by using better quality forecasts of arrivals the Park Operations team has been able to significantly improve the level of guest satisfaction (by 5 percentage points to 80% overall in 2012). In the same year HKD generated record revenues of HK$4,272 million, 18% higher than 2011, and a net profit of HK$109 million, the first annual profit since the resort's opening.

Finally, the application of the methodologies developed has allowed the Surrey team to assess the demand for accessible tourism across Europe, responding to the European Parliament's Preparatory Action "Tourism Accessibility for All". While the impact of this project is yet to be felt, the impact of the methodological work described above is in being able to bring more advanced understanding to other areas of tourism demand.

5. Sources to corroborate the impact (indicative maximum of 10 references)

C1) The Philippines' Tourism Policy: "Destination Strategy: Move to an Investment-driven strategy" online: http://www.tourism.gov.ph/SitePages/tourismpolicy.aspx

C2) Hong Kong Disneyland Annual Business Review for the Fiscal Year 2012. http://ahongkongdisneyland.disney.go.com/media/hkdlcorp_v0100/en_US/aboutOurCompany/AnnualBusinessReview12.pdf

C3) Web-based forecasting system: http://www.tourismforecasting.net/hktdfs/home/project/teams.jsp

C4) Cathay Pacific's business expansion strategy and annual financial report (2012)

http://www.bloomberg.com/news/2012-03-07/cathay-pacific-to-hire-1-900-workers-in-2012.html

http://www.cathaypacific.com/content/dam/cx/about-us/investor-relations/interim-annual-reports/en/2012_annual-report_en.pdf

C5) Economic Impact and Travel Patterns of Accessible Tourism in Europe, project funded by European Commission, DG Enterprise and Industry. http://ec.europa.eu/enterprise/newsroom/cf/itemdetail.cfm?item_id=5925

C6) Media release about the web-based forecasting system winning a Silver award in the 6th International Exhibition of Inventions in 2008:

http://www.polyu.edu.hk/cpa/text/index.php?search=&press_section=&press_category=All&press_date=&mode=pressrelease&Itemid=170&option=com_content&page=1&order=desc&orderby=news_date&press_id=1609

Contact details can be provided at the following user/beneficiary organisations:

C7) Contact at Disneyland Hong Kong (Provided statement)

C8) Contact at Pacific Asia Tourism Association (PATA) (Provided statement)

C9) Contact at the Department of Tourism, the Philippines (Contact details provided)