Quantitative methods in tourism and hospitality: A perspective article

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Abstract

Purpose: The manuscript provides an overview of past perspectives and future trends in tourism and hospitality research.

Design/methodology/approach: The study grounds the discussion on the timeline evolution of quantitative research methods.

Findings: Although still under-recognized by scholars, mixed methods represent the future of research in tourism and hospitality.

Research limitations/implications: The investigation is confined to quantitative methods.

Originality/value: No other surveys sketch a period of 150 years of quantitative analyses in tourism and hospitality.

Keywords: Quantitative methods, tourism and hospitality research, emerging perspectives.

Paper type: General review.

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Introduction

Tourism and hospitality are two strictly intertwined economic sectors whose dynamics, opportunities, and (cor)related activities have long been studied both from a qualitative and quantitative point of view.

The use and acknowledgment of qualitative methods in both the research fields has brought a deeper understanding of the social, cultural and political ties within and between tourism and hospitality. In this context, social sciences, in particular anthropology and sociology, have covered many theoretical and philosophical positions in order to raise the attention to tourism and hospitality as two cultural and socio-material phenomena, as opposed to their measurable business, economics, and management processes. Quantitative research in

tourism and hospitality points to the importance of grounding any analysis of a phenomenon (or system) into a reliable and as wide as possible set of data.
This paper focuses on quantitative methods applied to tourism and hospitality and attempts to identify in which form the main quantitative methods have contributed to research since 1946, including a discussion of the emerging perspectives up to 2095.

Past perspective 75 years of developments 1946-2020

Quantitative research method in tourism and hospitality have gained momentum since 1945 when a "quantitative revolution" in the discipline of geography, led by a number of academic institutions from the U.S.A. (mainly the University of Iowa, Wisconsin, and Washington) and the United Kingdom (the University of Cambridge and Bristol amongst the first), brought to a change in the techniques and practices used by researches. From a "subjective" analysis of social phenomena based on interviews, focus group methods, case studies, textual analysis, and direct observation, the research paradigm shifted into statistical procedures and mathematical reasoning and representation.
In the domain of tourism and hospitality research, crucial to this transition was the rapid expansion of the industry and the growing importance of tourism for the economy of the destinations, which favoured the collection of quantitative data and the maintenance of tourism data sets. The new paradigm of quantitative analysis was initially used for studying the general characteristics of tourists and their consumption behaviour by descriptive and inferential statistics, strictly followed by statistical testing performed to obtain robust findings and conclusions (Witt et al., 2003). In a survey about the analytical methods used in tourism research in the period 1988-2008, Mazanec et al. (2010) report that regression-based methods and exploratory factor analysis accounted for 45% of all the applications analysed; structural equation modelling and clustering techniques occupied the third and fourth place, respectively. Similarly, a longitudinal analysis of 140 articles carried out by Nunkoo et al. (2013) document that statistical techniques, from descriptive statistics to confirmatory factor analysis and structural equation modelling were preferentially used in tourism and hospitality research in the period 1984-2010. Broadly discussed in the tourism and hospitality literature is also the diffusion of time series analysis (Peng et al., 2014). From the basic models to the more sophisticated technique of autoregressive integrated moving average (ARIMA) and generalized autoregressive conditional heteroskedasticity (GARCH), all time series models have been applied for predicting the future value of tourist arrivals and departures, expenditure levels, number of nights spent at a destination, price of hotel room, airfare, and so on.
As far as policy measures for supporting tourism demand and supply are concerned, the most effective contribution to the analysis of the causal relationships between the tourism (dependent) variable under study and its influencing factors (explanatory variables) came from the introduction of econometric models (Song et al., 2009). Based on the economic theory that underlies tourists' decision-making processes, static econometric models, such as traditional regressions, gravity models, and almost ideal demand system (AIDS; Deaton and Muellbauer, 1980) have marked the route to the dynamic techniques of vector

autoregressive models (VAR; Sims, 1980), time varying parameter models (TVP), and error correction models (ECM).

Tourism and hospitality literature of late 1990s is characterized by the rapid emergence of artificial intelligence (AI) technique favoured by sophisticated computers and easy-to-use interfaces. Not requiring additional information or preliminary hypothesis about the data investigated, neural networks (Mazanec, 1992), genetic algorithms (Hurley et al., 1998), fuzzy time series, and rough set theory have shown a higher degree of modelling capabilities in tourism and hospitality research, compared to both time series analysis and econometric models.

The last collection of quantitative methods applied in tourism and hospitality research is represented by complex network analysis (Baggio, 2017), which has proved to be a new and effective paradigm for investigating destination structure and dynamics (Baggio and Klobas, 2017; Dwyer et al., 2012).

Table 1 summarizes the techniques mentioned.

Technique	Analysis/model	Main application in tourism	References
Statistical	exploratory factor analysis (EFA)	Tourism information value	Mazanec et al. (2010)
	confirmatory factor analysis (CFA)	Tourists' perception of a destination	Nunkoo et al. (2013)
	autoregressive (AR)	Modelling and forecasting of tourist arrivals and departures, expenditure levels, number of nights spent at a destination, price of hotel room, airfare	Peng et al. (2014)
	integrated (I)		
	moving average (MA)		
	autoregressive integrated moving average (ARIMA)		
	autoregressive fractionally integrated moving average (ARFIMA)		
	generalized autoregressive conditional heteroskedasticity (GARCH)		
Econometric	gravity models	Tourist's behaviour	Song et al. (2009)
	almost ideal demand system (AIDS)	Tourism demand forecasting	Deaton and Muellbauer (1980)
	vector autoregressive models (VAR)		Sims (1980)
	time varying parameter models (TVP)		
	error correction models (ECM)		
Artificial Intelligence (AI)	neural networks	Tourist's behaviour	Mazanec (1992)
	genetic algorithms	Tourists' perception of a destination	Hurley et al (1998)
	machine learning algorithms	Tourism demand forecasting	Mariani et al (2018)
	fuzzy time series		Gerard et al (2016)
	rough set theory		
Complexity science	complex systems analysis	Destination structure and dynamics	Baggio (2017)
	network analysis		
	visibility graph		

Table 1.: Main quantitative methods in tourism and hospitality research

Future perspective 75 years 2020-2095

Tourism and hospitality research in the last decade has been characterized by an increasing availability of data collected by available online applications and platforms. More and more accurate and up-to-date information about the behaviour, feelings, and preferences of millions of tourist all over the world (Hepp, et al., 2018) have contributed to innovative research designs, better policy making, and customized managerial

decisions (Gerard et al., 2016). Many academics, practitioners and institutions have started to work, more or less intendedly, with the techniques able to manage the volume, velocity, and variety typical of "big data" (Mariani et al., 2018). However, analytical investigations, no matter how advanced and data-driven, may well fall prey to methodological pitfalls and to the biases in data collection. As commented in Dolnicar (2015) "Complicated methods do not necessarily lead to better results, but they most certainly increase the risk of methodological mistakes which can render results invalid altogether." (Dolnicar, 2015, p. 1).

The growing complexity of the issues related to tourism sustainability and development has stressed the importance of (re)using qualitative methods. Machine learning techniques have gained popularity in tourism and hospitality research (Guo et al., 2017; Stamolampros, et al., 2019) as methods to extract qualitative dimensions from unstructured data, while offering at the same time reproducibility of the results. A new perspective of mixed methods has also been regarded as a crucial approach to increase the informative power of the data collected and provide stronger evidence of the results obtained (Johnson and Onwuegbuzie, 2004). From a technical viewpoint a rigorous methodological approach to the combination of diverse sources is still under exploration, mainly by institutional statistical bodies (CROS, 2019). In the meantime, principles and guidelines have already been set out (see the EU Commission communication on Artificial Intelligence for Europe, 2018) to deal with the new and little anticipated ethical, legal and socio-economic problems posed by the new technological approach to data science.

Conclusions

Quantitative research in tourism and hospitality has been characterized by an increasing complexity of the techniques used over time. Yet, the most sophisticated method has not represented the most appropriate approach in all cases. Recently, the growing complexity of the analyses has elicited an interest for emergent qualitative and mixed approaches, which have already opened ontological, epistemological and methodological opportunities in the tourism and hospitality investigations (Matteucci and Gnoth, 2017; Wilson and Hollinshead, 2015). The future development of tourism and hospitality research depends on a proper and well implemented analysis, along with a full and effective integration between qualitative and quantitative approaches (Baggio, 2019).

References

Baggio, R. (2017), “Network Science and Tourism – the state of the art”, *Tourism Review*, Vol. 72 No. 1, pp. 120-131.

Baggio, R. (2019), "Measuring Tourism: Methods, Indicators, and Needs", in Fayos-Solà, E. and Cooper, C. (Eds.) The Future of Tourism: Innovation and Sustainability, Springer, Cham, CH, pp. 255-269.

Baggio, R., and Klobas, J. (2017), “Quantitative Methods in Tourism: A Handbook (2nd ed.)”, Channel View Publications, Bristol, UK.

CROS, (2019), “Collaboration in Research and Methodology for Official Statistics”, European Commission, https://ec.europa.eu/eurostat/cros/, accessed 02/07/2019.

Deaton, A. and Muellbauer J. (1980), “An almost ideal demand system”, *American Economic Review*, Vol. 70 No. 3, pp. 312–326.

Dolnicar, S. (2015), "In future, I would love to see… a reflection on the state of quantitative tourism research", *Tourism Review*, Vol. 70 No. 4, pp. 259-263.

Dwyer, L., Gill, A., Seetaram, N. (2012), Handbook of Research Methods in Tourism: Quantitative and Qualitative Approaches, Edward Elgar Publishing, Cheltenham, UK, pp.528.

European Commission (2018), Communication from the Commission: Artificial Intelligence for Europe (COM(2018) 237, 25.4.2018).

Gerard, G., Osinga, E.C., Lavie, D. and Scott, B.A. (2016), “Big data and data science methods for management research”, *Academy of Management Journal*, Vol. 59 No. 5, pp. 1493-1507.

Guo, Y., Barnes, S. J., and Jia, Q. (2017), “Mining meaning from online ratings and reviews: Tourist satisfaction analysis using latent dirichlet allocation”, *Tourism Management*, Vol. 59, pp. 467-483.

Hepp, A., Breiter, A. and Friemel, T. N. (2018), “Digital Traces in Context| Digital Traces in Context—An Introduction”, *International Journal of Communication*, Vol. 12, pp. 439-449.

Hurley, S., Moutinho, L., and Witt, S. F. (1998). “Genetic algorithms for tourism marketing”, *Annals of Tourism Research*, Vol. 25 No. 2, pp. 498-514.

Johnson, R. B., and Onwuegbuzie, A. J. (2004), “Mixed methods research: A research paradigm whose time has come”, *Educational Researcher*, Vol. 33 No. 7, pp. 14-26.

Mariani, M., Baggio, R., Fuchs, M. and Höpken, W. (2018), “Business Intelligence and Big Data in Hospitality and Tourism: A Systematic Literature Review”, International Journal of Contemporary Hospitality Management, Vol. 30 No. 12, pp. 3514-3554.

Matteucci, X., Gnoth, J. (2017), “Elaborating on grounded theory in tourism research”, *Annals of Tourism Research*, Vol. 65, pp. 49-59

Mazanec, J.A. (1992), “Classifying tourists into market segments: A neural network approach”, *Journal of Travel and Tourism Marketing*, Vol. 1 No. 1, pp. 39-59.

Mazanec, J.A., Ring, A., Stangl, B. and Teichmann, K. (2010), “Usage patterns of advanced analytical methods in tourism research 1988–2008: A six journal survey”, *Information Technology & Tourism*, Vol. 12 No, 1: pp. 17-46.

Nunkoo, R., Smith, S.L., and Ramkissoon, H. (2013), "Residents' attitudes to tourism: A longitudinal study of 140 articles from 1984 to 2010", *Journal of Sustainable Tourism*, Vol. 21 No. 1, pp. 5-25.

Peng, B., Song, H., and Crouch, G.I. (2014), "A meta-analysis of international tourism demand forecasting and implications for practice" *Tourism Management* ,Vol 45, pp. 181-193.

Sims, C.A. (1980), "Macroeconomics and Reality", *Econometrica*, Vol. 48 No. 1, pp. 1-48.

Stamolampros, P., Korfiatis, N., Chalvatzis, K., and Buhalis, D. (2019), "Job satisfaction and employee turnover determinants in high contact services: Insights from Employees Online reviews", *Tourism Management*, Vol. 75, pp. 130-147.

Wilson, E., and Hollinshead, K. (2015), "Qualitative tourism research: Opportunities in the emergent soft sciences", *Annals of Tourism Research*, Vol. 54, pp. 30-47.

Witt, S. F., Song, H. and Louvieris, P. (2003), "Statistical testing in forecasting model selection", *Journal of Travel Research*, Vol. 42, pp. 151-158.