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Introduction

Successful development of tourism can be an important contributor to regional development, economic growth and local quality of life (Barros et al. 2011). In order to achieve these benefits, many destinations commit resources to develop tourism, but these efforts are not always producing the desired results. The challenges faced by destinations include intensifying competition for tourists, limited resources, the need to take into account multiple stakeholders and often a lack of effective management and planning approach (Bornhorst et al. 2010). In light of these challenges, the issue of performance evaluation in tourism destination settings has become a strategic matter and the need for its better understanding is widely recognized in the industry and the academia. The tourism research has been increasingly providing theories and tools to aid in conceptualization and evaluation of tourism destination competitiveness (e.g. Crouch and Ritchie 1999; Buhalis 2000), productivity (e.g. Peypoch 2007), quality and performance (e.g. Assaf and Tsionas 2015).

The research on tourism destination performance faces a number of challenges, related to conceptualizing destinations, understanding their production process, and identifying determinants of their performance. In response, different approaches related to performance evaluation of tourism destinations have been proposed, ranging from individual indicators, through composite indices, to applications of frontier models. In recent years, frontier methods have become increasingly popular, because of their ability to combine multiple inputs and outputs into one performance model and provide a measure of performance relative to the optimal performance that a destination can achieve (Assaf and Josiassen 2016). The effectiveness of applying frontier methods is closely related to identification of the relevant inputs and outputs. However, identification of inputs and outputs of the tourism production function is still an open question (Cuccia et al., 2016) and there is a lack of agreement on the role of different measures, demonstrating a need for further conceptual work to model tourism destinations.

In response to this need, this paper proposes a two-stage model of tourism destination production process that captures relationships between multiple inputs and outputs. Secondly, following the conceptual model, this study uses DEA approach to assess the relative performance of tourism regions in Ontario, Canada. The results can be used by RTOs to improve decision-making processes and planning policy in order to increase tourist satisfaction and improve effectiveness of resource allocation.

Literature Review

Performance measurement is a well-established research area in the tourism and hospitality field. Several reviews of the literature on this topic have been published in the recent years (Assaf and Josiassen 2016; Sainaghi et al. 2017; Assaf and Tsionas 2019) and discuss the different approaches and techniques applied to assess performance in the tourism context. The importance of performance assessment is linked to its role in strategy formulation and deployment (Assaf and Magnini 2012). According to strategic management literature, a well-developed performance measurement system helps organizations monitor their progress towards their goals, evaluate their resource allocation decisions, gain competitive advantage and improve market position.

The studies on performance in the tourism context adopt either microeconomic approach and focus on a specific tourism sector, such as accommodation or food service, or macroeconomic approach where the main unit of analysis is a tourism destination. Tourism destination performance assessment faces two main challenges: the concept of destination itself and the presence of multiple determinants of tourism performance (Assaf and Josiassen 2012). A tourism destination can be defined as “a geographical area where the tourist enjoys various types of experiences” (Barros et al. 2011) and has been conceptualized at different levels, such as a country, region or a city. Some of the most popular measures of tourism performance are financially-driven and include accounting-based indicators, such as number of visitors, occupancy rate, tourism receipts, or average room rates (Phillips and Louvieris 2005; Bornhorst et al. 2010). However, these measures are limited to providing only partial perspective on performance and do not take into account multi-input and multi-output nature of destinations.

In response to the limitations of traditional indicators, other more comprehensive methods have been proposed, with especially frontier methods, including the Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA), gaining popularity in recent years (Assaf and Josiassen 2016). The application of DEA methodology to measure efficiency of tourism destinations was first proposed by Fuchs (2004) and was subsequently used in a number of other studies (Tsionas and Assaf 2014). The papers differ in terms of geographical scope, theoretical foundations, scope of analysis, selected inputs and outputs and DEA methodology applied. In terms of scope, previous studies mostly addressed performance of cities, regions or countries. The studies of tourism regions focused initially on regions in European countries, such as Italy (Cracolici et al. 2008; Suzuki et al. 2011; Detotto 2014; Cuccia et al. 2016; 2017) and France (Botti et al. 2009; Barros et al. 2011); however, the last decade has seen an emergence of studies looking at regions in other parts of the world. These include regions in Spain (Benito et al. 2014; Herrero-Prieto and Gómez-Vega 2017), China (Wu et al. 2014; Yi and Liang 2015; Huang 2018), Chile (Figueroa et al. 2017), or Taiwan (Huang et al. 2017). A scarcity of research on regions in North America has been noticed.

The previous studies evaluating performance of tourism regions differ in their identification of inputs and outputs of the tourism production function (Cuccia et al. 2017). The definition of the proper set of inputs and outputs is a key element of the DEA approach. Some studies (Barros et al. 2011; Botti et al. 2009; Cuccia et al. 2016) consider the accommodation capacity and tourist arrivals as inputs and bed-nights as output. On the other hand, some studies (Assaf and Josiassen 2012; Fuchs 2004) prefer to analyze both tourism arrivals and bed-nights as output variables. The challenges with assigning the role to different indicators can be overcome by using network DEA models. Network models recognize several stages in production process and allow for presence of intermediate variables, which are outputs in the first stage and inputs in the second stage. Only a few previous papers applied network DEA to tourism regions (Bi et al. 2011; Huang et al. 2017; Huang 2018) and mostly focused on a specific aspect of destination performance. Huang (2018) assessed performance of supply chains while Huang et al. (2017) focused on cultural tourism.

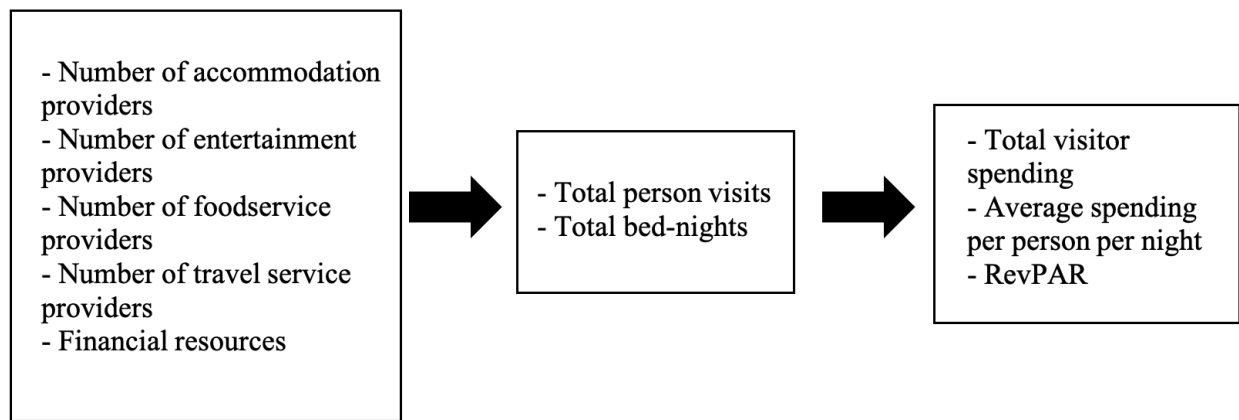
Methodology

Model of Destination Production Process

This paper proposes a two-stage network model of tourism destination production process, in order to reconcile conflicting roles of different inputs and outputs in the previous literature, see Figure 1.

The model assumes that the primary objective pursued by tourism destinations is to maximize their tourist appeal and the economic benefits generated by tourist flows (Benito et al. 2014). In order to achieve their goals, tourism destinations depend on resources that they have at their disposal. These resources include the tourism businesses operating in the region, including accommodation, entertainment, foodservice, and travel services. Additionally, tourist regions have financial resources they can use to promote and develop tourism. These inputs lead to intermediate outputs, which include tourist arrivals (total person visits) and total bed-nights. In turn, tourist arrivals and number of bed-nights get converted into tourist spending (measured by total visitor spending and average spending per person per night) and revenues for tourism industries (captured by a proxy variable of RevPAR for the hotel industry). The proposed model of tourism destination production process is applied to a case study of tourism regions in Ontario and evaluated using DEA approach.

Figure 1. Model of a production process at a tourism destination.



Case Study

In 2010, the Province of Ontario established 13 tourism regions, each with its own Regional Tourism Organization (RTO), see Table 1. Region 13 was divided into three regions due to its size.

Table 1. Tourism regions in Ontario, Canada.

Region Code	Description
RTO1	Southwest Ontario
RTO2	Niagara Canada
RTO3	Hamilton, Halton and Brant
RTO4	Huron, Perth, Waterloo and Wellington
RTO5	Greater Toronto Area
RTO6	York, Durham and Headwaters
RTO7	Bruce Peninsula, Southern Georgian Bay and Lake Simcoe
RTO8	Kawartha's Northumberland
RTO9	South Eastern Ontario
RTO10	Ottawa and Countryside
RTO11	Haliburton Highlands to the Ottawa Valley
RTO12	Algonquin Park, Almaguin Highlands, Muskoka and Parry Sound
RTO13a	Northeastern Ontario
RTO13b	Sault Ste. Marie – Algoma
RTO13c	Northwest Ontario

RTOs are independent, industry-led and not-for-profit organizations which coordinate the development and implementation of tourism strategies for their respective regions, undertake research, develop and deliver regional marketing campaigns, attract tourism investment, and offer training to tourism operators and stakeholders. The main goals of RTOs are to increase number of visitors, generate more economic activity and create more jobs. Performance assessment of regions is a necessary step in strategy evaluation to verify if the actions undertaken by the RTOs are effective in reaching their goals.

For each of the 15 regions, data on the variables identified in the model of tourism destination production process were collected for years 2016 and 2017, resulting in 30 total observations. Due to availability of data, financial resources included only the funding allocation received by the RTOs from the Ontario Ministry of Heritage, Sport, Tourism and Culture Industries. Data from 2015 were used as an estimate of funding allocation for year 2016, because data for 2016 was not available. Additionally, since funding allocation for RTO13 was given as a total, it was assumed that each sub-region received 1/3 of the total allocation. All monetary values were adjusted for inflation (2017 constant dollar value is used). The descriptive statistics for all the variables used in the model are provided in Table 2.

Table 2. Descriptive statistics for the variables.

Variable	Minimum	Maximum	Mean	SD
<i>Inputs:</i>				
Accommodation providers	158	814	373.00	164.31
Entertainment providers	131	3,508	834.10	812.46
Foodservice providers	253	12,921	2,410.93	3,112.65
Travel services providers	16	1,549	227.93	383.40
Funding allocation	950,500	10,115,911	2,529,390.76	2,154,127.75
<i>Intermediate variables:</i>				
Total person visits	1,474,900	26,995,900	8,976,473.41	5,999,369.65
Total bed-nights	1,937,300	46,971,129.20	10,528,575.30	9,913,634.02
<i>Outputs:</i>				
Total visitor spending (\$ million)	212.95	8,171.10	1,393.05	1,888.77
Av. spending per person per night	\$49.00	\$152.17	\$75.94	\$29.48
RevPAR	\$61.60	\$139.22	\$83.44	\$21.50

Data Envelopment Analysis

DEA is a non-parametric mathematical programming technique that has been developed to evaluate performance of various units, called decision making units (DMUs), with multiple inputs used to produce multiple outputs. It is based on concepts of technological efficiency proposed by Farrell (1957). It was developed by Charnes, Cooper and Rhodes (Charnes et al. 1978) as a tool for evaluating relative efficiency. DEA first identifies an ‘efficient frontier’ of best practices in the population and their linear combinations. Once the efficient frontier is determined, the relative efficiency of DMUs is measured as their distance from the frontier. Over the years, many modifications of DEA approach have been developed. Given the current study’s two-stage model of tourism destination production function, a centralized two-stage network DEA model (Liang et al. 2008) is used to evaluate efficiency. Under this model, in the first stage, each decision making unit DMU_j (j=1,...,n) uses inputs x_{ij} (i=1,..., m) to produce outputs z_{dj} (d=1,..., D) and then these outputs are used as inputs in the second stage to produce outputs y_{rj} (r = 1,..., s). The intermediate

measures z_{dj} are outputs in stage 1 and inputs in stage 2. The efficiency at stage 1 (e_j^1) and efficiency at stage 2 (e_j^2) are defined, using the CRS model of Charnes et al. (1978), as follows:

$$e_j^1 = \frac{\sum_{d=1}^D w_d z_{dj}}{\sum_{i=1}^m v_i x_{ij}} \quad \text{and} \quad e_j^2 = \frac{\sum_{r=1}^S u_r y_{rj}}{\sum_{d=1}^D \tilde{w}_d z_{dj}} \quad (1)$$

where v_i , w_d , \tilde{w}_d , and u_r are unknown non-negative weights. In order to find the efficiency of DMUs, the centralized model approach determines a set of optimal weights on the intermediate factors that maximizes the aggregate efficiency score (Liang et al., 2008), given as:

$$e_o^{centralized} = \text{Max } e_o^1 * e_o^2 = \frac{\sum_{r=1}^S u_r y_{ro}}{\sum_{i=1}^m v_i x_{io}} \quad \text{s.t. } e_j^1 \leq 1 \text{ and } e_j^2 \leq 1 \text{ and } w_d = \tilde{w}_d. \quad (2)$$

Model (2) can be converted into a linear program and solved to determine the overall efficiency of the two-stage process. Next, efficiencies for the first and second stage can be obtained (Liang et al., 2008). In this study, we calculate the output-oriented efficiency scores, assuming that tourism regions aim to maximize their outputs, given their inputs.

Results

The results (using DEA Frontier software) indicate that none of the regions was efficient with respect to both stages of the production process, see Table 3. The average centralized efficiency was 0.545 for 2016 and 0.543 for 2017, indicating that there is room for improvement with respect to efficient use of resources by the analyzed tourism regions and their transformation into financial results.

Table 3. DEA efficiency scores using two-stage network model.

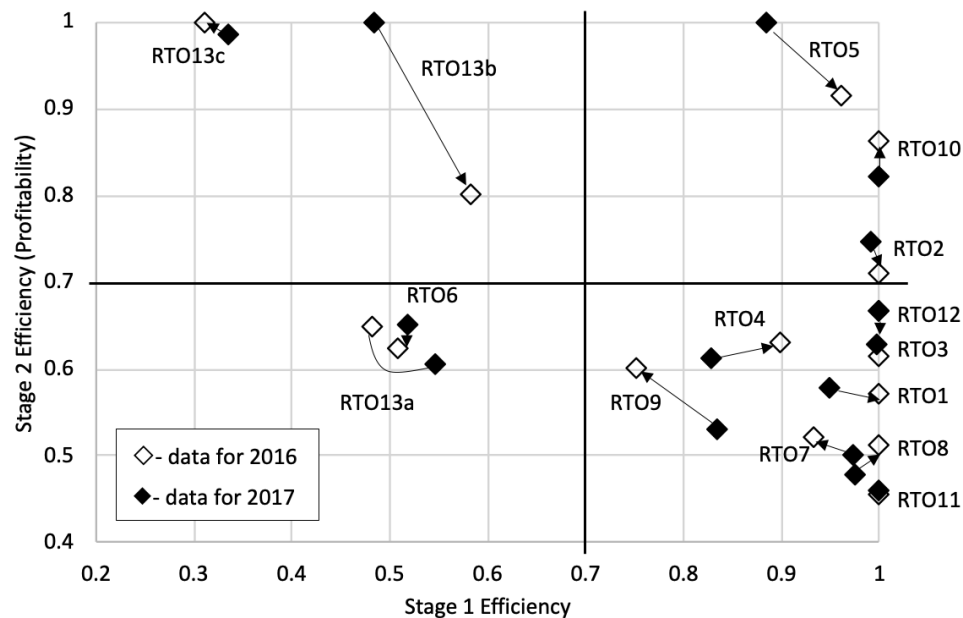
Region code	Centralized Efficiency 2016	Centralized Efficiency 2017	Stage 1 Efficiency 2016	Stage 1 Efficiency 2017	Stage 2 Efficiency 2016	Stage 2 Efficiency 2017
RTO1	0.549	0.571	0.948	1.000	0.579	0.571
RTO2	0.740	0.711	0.992	1.000	0.746	0.711
RTO3	0.667	0.627	1.000	0.998	0.667	0.628
RTO4	0.507	0.567	0.828	0.898	0.612	0.631
RTO5	0.884	0.880	0.884	0.960	1.000	0.916
RTO6	0.338	0.316	0.519	0.507	0.651	0.623
RTO7	0.488	0.486	0.972	0.932	0.502	0.521
RTO8	0.466	0.513	0.974	1.000	0.479	0.513
RTO9	0.442	0.453	0.834	0.752	0.530	0.602
RTO10	0.822	0.862	1.000	1.000	0.822	0.862
RTO11	0.461	0.455	1.000	1.000	0.461	0.455
RTO12	0.667	0.616	1.000	1.000	0.667	0.616
RTO13a	0.331	0.312	0.546	0.482	0.605	0.648
RTO13b	0.484	0.467	0.484	0.583	1.000	0.802
RTO13c	0.331	0.311	0.335	0.311	0.985	1.000
Average	0.545	0.543	0.821	0.828	0.687	0.673

For stage 1 (transformation of resources into tourist visits and bed-nights), 3 regions (RTO10, RTO11 and RTO12) were efficient in both 2016 and 2017, while RTO3 was efficient in 2016 and RTO1 and RTO2 were efficient in 2007. With respect to stage 2 (transformation of visits and bed-nights into financial results), none of the regions was efficient during both 2016 and 2017. Only 2 regions (RTO5 and RTO13b) were efficient in 2016 and one region (RTO13c) in 2017.

The efficiency scores range from 0.311 to 1 for stage 1 and from 0.455 to 1 for stage 2, indicating significant diversity among the regions in the sample. Four distinct groups of regions can be identified, based on the efficiency achieved in stage 1 and stage 2, see Figure 2. Group I, consisting of RTO2, RTO5 and RTO10, encompasses regions with high efficiency (above 70%) at both stages identified in the model. These regions represent 30% of the sample. Group II includes regions with high stage 1 efficiency (transformation of resources into visits) but low stage 2 efficiency (transformation of visits into revenues). This group is the largest group and consists of 53% of the regions in the sample. The next group, Group III, includes 13.3% of the regions which have high stage 2 efficiency but low stage 1 efficiency. Finally, Group IV includes two regions (13.3% of the sample) with low efficiency scores at each stage. This distribution of efficiency scores points out two important observations: the efficiency of regions in Ontario is very diverse and majority of regions transform their resources into visits efficiently, but find it more challenging to transform the visits into revenues.

In terms of change from 2016 to 2017, several patterns can be observed. The largest group of regions (46.7%) either maintained or increased their efficiency at stage 1, but experienced decrease of efficiency at stage 2, pointing out to increasing difficulties in transforming visits and bed-nights into financial results. However, an opposite trend can be observed for 33.3% of the sample, with some regions increasing their stage 2 efficiency, while seeing a decrease or no change in stage 1 efficiency. Only two regions experienced increase in efficiency at both stages and one region saw decline in efficiency at both stages.

Figure 2. Change in efficiency scores.



We further analyzed efficiency scores with respect to spatial distribution of regions, see Table 4. Average efficiency scores were calculated separately for three distinct geographical areas in Ontario: Northern Ontario, Eastern Ontario and Southwestern and Central Ontario. The regions in Southwestern and Central Ontario had the highest average centralized efficiency. The highest average efficiency at stage 1 (0.956) was observed in Eastern Ontario, with 70% of observations in this part of Ontario having full efficiency. Finally, Northern Ontario had the highest average efficiency at stage 2 and the largest percentage of observations with full stage 2 efficiency. It can be concluded that the three areas differ greatly in terms of their efficiency and further research is needed to determine the factors that affect these differences.

Table 4. Regional distribution of efficiency scores.

Indicator	Southwestern and Central Ontario	Eastern Ontario	Northern Ontario
Regions	RTO1, RTO2, RTO3, RTO4, RTO5, RTO6, RTO7	RTO8, RTO9, RTO10, RTO11, RTO12	RTO13a, RTO13b, RTO13c
Average centralized efficiency	0.595	0.575	0.373
Stage 1 efficiency	0.888	0.956	0.457
Percentage of observations with Stage 1 efficiency =1	20%	70%	0
Stage 2 efficiency	0.668	0.600	0.817
Percentage of regions with Stage 2 efficiency =1	6.7%	0	33.3%

Conclusion and Discussion

This study presents an application of DEA approach to measure regional tourism organizations' efficiency at two stages. First, a two-stage model of a regional tourism destination production function was proposed and then, the efficiency of 15 tourism regions in Ontario in 2016-2017 was examined using a two-stage network DEA model.

The study contributes to the literature by offering new insights into the performance evaluation of tourism destinations. It proposes a two-stage model of tourism destination production process which takes into account the dual role of visitor arrivals and bed-nights as both output and input in destination production processes. This approach allows to identify regional differences and provide valuable benchmark for destination marketing organizations regarding their use of resources. Secondly, the paper evaluates efficiency of tourism destinations in a region that has so far received little attention in the literature, filling a gap identified by Assaf and Josiassen (2016).

The paper has some limitations. Due to data availability, only funding allocation from the provincial government was considered as one of the resources available to RTOs. Future studies would benefit from including the total financial resources available to RTOs. Additionally, the study only compares efficiency across two time periods. Longer time series would provide more insight into trends in RTO efficiency.

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