

CATHOLIC UNIVERSITY OF PORTUGAL . PORTO

FACULTY OF ECONOMICS AND MANAGEMENT

MASTER

Master in Services Management

Master's Final Work Type

Internship report

Subject

Nations and Regions Branding at Bloom Consulting; Development of New Internal Projects and Improvement of Existing Projects

Student name

Joana Lourenço Coleta Gradim

Date

March 2013



CATÓLICA
UNIVERSIDADE CATÓLICA PORTUGUESA | PORTO
Faculdade de Economia e Gestão

Acknowledgments

Sincere gratitude is hereby extended to the following who contributed and helped in the elaboration of this manuscript.

Prof. Conceição Portela, the thesis supervisor, for all useful critics, constant support and excellent guidance during the different phases of this Master's Final Work;

Jose Torres and Gonzalo Vilar, CEO and partner of Bloom Consulting, for the opportunity of developing this study in an incredible work environment and for all demonstrated support;

For the motivation, encouragement and many clarifications provided by my colleagues at Bloom Consulting;

My family and friends who always supported me moral and emotionally.

List of abbreviations

B2B: Business to Business

B2C: Business to Consumer

CAGR: Compound Annual Growth Rate

CRS: Constant Returns to Scale

DEA: Data Envelopment Analysis

DMU: Decision Making Unit

EMS: Efficiency Measurement System

EG: Economic Growth

EP: Economic Performance

EU: European Union

FCTY: Fashion City

FDI: Foreign Direct Investment

HDM: Hierarchical Decision Model

IPA: Investment Promotion Agency

ISYDS: Integrated System for Decision Support

MICE: Meetings, Incentives, Conferences and Exhibitions

OECD: Organisation for the Economic Co-operation and Development

OP: Online Performance

RT: Rating

SM: Social Media

TBO: Tourism Board Organization

VRS: Variable Returns to Scale

WR: Weight Restrictions

Abstract

This manuscript develops a study performed during a four months internship at Bloom Consulting firm, aiming to build a tourism ranking based on a construction of a composite indicator. This ranking measures the effectiveness of brand strategies used by each of the fifty US States to attract tourism. The final goal relies on comparing Bloom Consulting results with a new ranking, obtained through the application of the Data Envelopment Analysis (DEA) methodology. Additionally, in this thesis, it was also performed a distinct analysis which relies on evaluating the ability of local Tourism Board Organizations (TBOs) to promote tourism according to the level of the budget provided.

After a detailed characterization of Bloom Consulting methodology (which ranks the nations based on the aggregation of their ranking performance on five different criteria using pre-specified weights), it was applied a different model based on DEA in order to build a new ranking of US States. Hence, using Bloom Consulting data, distinct scenarios were settled with real or rank values for the five variables and with or without weight constraints. Besides that, this manuscript also contains an analysis of the literature on the construction of nations or regions rankings, including academic studies and rankings build by other consulting firms.

The use of DEA allowed a more accurate and less subjective evaluation, where each state is able to optimize its performance score. The choice of applying the real data instead of the rank values has also contributed to a more precise analysis.

Table of contents

1. Introduction	1
2. Work carried out during the internship	2
2.1. Characterization of Bloom Consulting	2
2.2. Main tasks	2
2.2.1. US State Tourism and Trade Ranking Project	2
2.2.2. India Tourism Ranking Project	4
2.2.3. Fashion City Brasil Project	6
3. Methodologies for ranking nations or regions	8
3.1. Characterization of composite indicators	8
3.2. Data Envelopment Analysis (DEA) approach	9
3.3. Bloom Consulting approach	13
4. Country Branding – concepts and previous studies	21
4.1. Review of previous studies on countries and regions rankings	22
4.1.1 Existing nations or regions brand rankings build by consulting firms	23
Future Brand	23
Anholt–Gfk	25
4.1.2 Academic studies regarding nations or regions rankings	27
5. Case study – using Bloom Consulting data to produce a ranking for US states using a DEA methodology	29
5.1. Evaluation of state efficiency in the promotion of tourism	30
5.1.1. DEA model based on rank values	30
5.1.2. DEA model based on real values	33
5.2. Applying virtual weights restrictions	38
5.2.1. DEA model with weight restrictions in scenario I	38
5.2.2. DEA model with weight restrictions in scenario II	42
5.3. Parallel with Bloom Consulting ranking	44
5.4. Recommendations	56

5.5. Efficiency of Tourism Board Organizations in the promotion of tourism	58
6. Conclusion.....	61
References.....	63
Annexes	67
Annex 1: Example of Alabama clustering process for tourism.....	67
Annex 2: Rank and real values databases including Economic Performance (EP), Economic Growth (EG), Social Media (SM), Online Performance (OP) and Rating (RT) values.....	69
Annex 3: DEA model based on rank values without weight restrictions	71
3.1. Efficiency scores and peers	71
3.2. Virtual weights.....	73
Annex 4: DEA model based on real values without weight restrictions	75
4.1. Efficiency scores and peers	75
4.2. Virtual weights.....	77
Annex 5: DEA model based on real values with weight restrictions in scenario I..	79
5.1. Efficiency scores and peers	79
5.2. Virtual weights.....	81
Annex 6: DEA model based on real values with weight restrictions in scenario II .	83
6.1. Efficiency scores and peers	83
6.2. Virtual weights.....	85
Annex 7: Database used to analyse the ability of local TBOs in promoting tourism including TBO Budget, Online Performance (OP) and Rating (RT) values	87
Annex 8: DEA model based on the budget TBO, online Performance and rating values aiming to evaluate the ability of local TBOs in promoting tourism	89
8.1. Efficiency scores and peers	89
8.2. Virtual weights.....	91

Tables Index

Table 1: Examples of Alabama clustering process.....	3
Table 2: Rating scale classification	18
Table 3: Relative normalisation process of the economic performance variable for the 50 US states	19
Table 4: Comparison of the 13 benchmarks of DEA model based on rank values without WR in terms of virtual weight of each variable.....	31
Table 5: Comparison of the 13 benchmarks of DEA model based on rank values without WR in terms of rank data.....	32
Table 6: Comparison of the 9 benchmarks of DEA model based on real values without WR in terms of virtual weight of each variable.....	34
Table 7: Original and normalised data of the 9 efficient states in DEA model based on real values without WR	36
Table 8: Scenario I - Attributed virtual weights restrictions to each variable.....	39
Table 9: California as a peer in the DEA model with WR in scenario I (CA - California; NY - New York).....	41
Table 10: Scenario I Ranking	42
Table 11: Scenario II - Attributed virtual weights restrictions to each variable.....	42
Table 12: Comparison of scenario I and II in terms of efficiency score and variables attributed weight regarding New York and Florida	43
Table 13: Scenario II Ranking	44
Table 14: Comparison between Bloom Consulting ranking and DEA rankings with and without weight restrictions (WR)	45
Table 15: Correlations between DEA (with and without WR) and Bloom Consulting rankings	47
Table 16: Comparison of Illinois, New Jersey and Hawaii attributed weights in Bloom Consulting and scenario I	48
Table 17: Comparison of real and rank values of New Jersey and its peer (New York).....	50

Table 18: Inverted ranking and normalised rank and real values for New Jersey and its peer (New York)	50
Table 19: Comparison of real and rank values of Illinois and its peer (New York).	53
Table 20: Inverted ranking and normalised rank and real values for Illinois and its peer (New York).....	53
Table 21: Original and normalised data of Delaware, West Virginia and Road Island	57
Table 22: Comparison between Maryland TBO original data and its peers (Utah, West Virginia and North Dakota TBOs)	60

Figures Index

Figure 1: Top 10 of Bloom Consulting Country Brand Ranking Tourism Edition 2012 (Source: Bloom Consulting, 2012a, pp. 7)	15
Figure 2: The Nation Brand Hexagon (Source: adapted from Anholt 2005)	25
Figure 3: Comparison of the 5 variables average virtual weight for DEA model based on rank values.....	32
Figure 4: Comparison of the 5 variables average virtual weight for DEA model based on real values.....	35
Figure 5: Comparison of the 9 benchmarks of DEA model based on real values without WR in terms of original data	37
Figure 6: Efficiency score variation of the benchmarks of the DEA model without weight restrictions (WR) and of the benchmarks in scenario I	39
Figure 7: Graphical comparison of rank and real values between New Jersey and its peer (New York)	51
Figure 8: Graphical comparison of rank and real values between Illinois and its peer (New York).....	54
Figure 9: Comparison of the original data between the three worst states in DEA ranking with WR in Scenario I.....	57

1. Introduction

This report aims to provide an overview of the research conducted in country branding field, associating an internship carried out at Bloom Consulting firm with an analysis of the ranking of US states using Bloom Consulting data. The main goal encompasses a critical analysis on Bloom Consulting methodology for ranking nations/regions and the suggestion of a new one.

After a brief introduction in the first part of this manuscript, section 2 describes the activities carried out during the internship at Bloom Consulting, including some of the key projects and details regarding the main tasks carried out. In the third section it is conducted a description of the main steps to build a composite indicator, focusing on Data Envelopment Analysis (DEA) methodology. It also includes a detailed explanation of the approach followed by Bloom Consulting in order to construct nations/regions rankings. A detailed analysis on country branding and nations/regions rankings is provided in section 4 with a literature review on this subject. Lastly, section 5 presents an alternative approach to nations/regions brand rankings, particularly to US states brand ranking released by Bloom Consulting in 2012. It is also possible to find a comparison between the two methodologies. In this last section the ability of local Tourism Board Organizations (TBOs) to promote tourism given their level of budget is also evaluated.

2. Work carried out during the internship

This section contains a brief description of the firm and the main tasks carried out during the internship at Bloom Consulting in Madrid, performing activities as an analyst.

2.1. Characterization of Bloom Consulting

Bloom Consulting is a strategy consulting firm founded in 2003, specialized in country branding working for both nations and cities around the world. Every year Bloom Consulting launches the Country Brand Ranking for both tourism and trade. Besides development of countries, Bloom Consulting also works on business strategy projects such as positioning, strategy and business plans, innovation and internationalization, as well as human asset management.

2.2. Main tasks

During the internship at Bloom Consulting it was possible to participate in several projects, performing very different tasks. However, the more relevant ones were US State Tourism and Trade Ranking, India Tourism Ranking and Fashion City Brasil. The US and India projects are associated to the development of countries, namely regions brand ranking. Fashion City as a strategy and positioning project belongs to the business strategy area.

2.2.1. US State Tourism and Trade Ranking Project

The US project relies on ranking the 50 American states in terms of tourism and trade. It is an internal project, in the sense that no client commissioned this project. The 2012 edition is the first edition of the US State Ranking released by Bloom

Consulting, which evaluates the last five years of all fifty states' branding performance.

The elaboration of the ranking includes different variables as will be explained later in this manuscript. Some of the tasks performed during the internship regard the collection of hard and soft data to be used in the ranking analysis. In particular, the author was involved during the internship in the collection of soft data relating to one of Bloom Consulting's variables called rating or state brand strategy. The collection of data for constructing this variable is complex and time-consuming and requires numerous tasks, most of them performed during the internship. The rating variable assesses the efficiency of the communication strategies used by states in order to promote tourism or trade. In order to analyse the country state strategy, Bloom Consulting studies the communication strategy used by states and tries to understand if the state is really promoting what people are looking for. In other words, Bloom Consulting studies the supply - Tourism Board Organizations (TBOs) or Investment Promotion Agencies (IPAs) - and demand - tourists or investors. Therefore, the promotion messages used online through the official website of each TBO or IPA are collected and assigned to a certain category (named cluster) for identification.

There are four main clusters for tourism: (1) Cultural Tourism, (2) Holiday, Leisure and Recreation Tourism, (3) Nature and (4) Sport. In terms of trade, the key clusters are (1) Sectorial Expertise, (2) Economic Characteristics, (3) Workforce and (4) General Country's Characteristics. Inside each one there are sublevels (namely levels 1 and 2). Two examples, one for tourism and another for trade, are illustrated in Table 1.

Table 1: Examples of Alabama clustering process

State	Message	Cluster Level 1	Cluster Level 2	Cluster Level 3
Alabama	Museums and galleries	Art Museums	Cultural Archives	Cultural Tourism
Alabama	Quality workforce	Trained Workforce	Trained, Skilled, Talented Workforce	Workforce

Alabama promotes museums and galleries in its TBO website in order to attract tourists. This message is associated to the Art Museums cluster (level 1), which belongs to Cultural Archives (level 2) which consequently belong to the main cluster of Cultural Tourism (level 3). On the other hand, in terms of trade Alabama promotes quality workforce. This message belongs to the trained workforce cluster 1, which is associated to Trained, Skilled, Talented Workforce (cluster level 2) and consequently Workforce (cluster level 3). Annex 1 presents the entire clustering process for Alabama in terms of tourism as an example.

The description presented before only reflects the supply perspective. In order to study the demand (tourists or investors) it is performed a study using Google Analytics which will be explained later in section 3.

During the internship it was possible to join both the tourism and trade US projects. The main tasks relied on collecting messages from the official websites, categorize each message using the predefined clusters, search for hard data and performing Google Analytics. The empirical part of this work details on the analysis undertaken to rank US states, based on the approach used by Bloom Consulting and on an alternative approach proposed in this manuscript. Therefore in the remaining of this section we will mainly detail on the tasks performed for the two other projects (India Tourism rating and Fashion City Brasil).

2.2.2. India Tourism Ranking Project

The project carried out with India is about positioning the 35 Indian regions only in terms of tourism. In fact, there are 28 states and 7 union territories, but here they are referred as regions. It is called the India State Brand Ranking and Bloom Consulting is currently developing it. This is an internal project as well.

Most of the activities performed during the internship, as far as this project is concerned, are related to the collection of soft data. Such as the US project, Bloom Consulting analyses the communication strategies launched by each Indian TBO

and verify if they match with what tourists are looking for. The methodology is exactly the same as the one used in the US states project. However, in this case the clusters are not the same. As it can be perceived, the messages used by Indian regions to promote their tourism are occasionally different from the US. Therefore, it was developed a new list of clusters adapted to Indian tourism. An example of this difference is the religious heritage such as Buddhism, Hindu and Islamic religions which have a huge impact on Indian tourism. Other cases are for instance meditation, yoga and Bollywood tourism. After collecting, gathering and categorizing the messages, demand behaviour is analysed using Google Analytics. Finally, the two sides are compared and it is verified if they match.

As an intern it was possible to participate on the creation of the new data base of clusters, contributing with ideas and suggestions in several brainstorming meetings. Some of the performed activities include the selection of the promotion messages on TBOs' website and the use of Google Analytics tool. Besides the collection of data to create the state brand strategy variable, the internship has also involved searching and gathering hard data for the other variables (which will be introduced in section 3), such as tourism receipts, international and national tourist arrivals per region for the last five years.

The final report produced by Bloom Consulting includes the ranking of the 35 Indian regions and also their rating position. At this point, it is important to clarify the difference between a ranking and a rating. In fact, a ranking consists of an ordered list of entities based on a quantitative metric, while a rating is a qualitative classification of that entity. In this case, the rank of an Indian region reflects an aggregate of all variables applied by Bloom Consulting. Nevertheless, the rating focuses on one single variable - the rating or the state brand strategy variable. Thereby, besides the rank in the final report it is also possible to consult the performance of the communication strategies of regions.

2.2.3. Fashion City Brasil Project

Fashion City Brasil (FCTY) is a marketing and brand positioning external project aiming to create a wholesale shopping in Belo Horizonte, Brazil. Apart from shopping, the vision is to make this project a role model for society. It should be sustainable in social, economic and environmental terms. “After analysing all the variables, Bloom Consulting understood that Fashion City Brasil was about to become a destination, meaning, a place where visitors would come from all over the country and as a consequence bring both good things to the region, such as business activity and opportunities”. (Bloom Consulting, 2013)

Fashion City project (FCTY) was divided into three phases: Research, Strategy and lastly Programs and Activities.

The first phase is about Bloom Consulting **Research** methodology. At this stage, Bloom Consulting identified nine main criteria necessary for FCTY to become a destination: ‘To be safe and politically stable’, ‘To have good infrastructure’, ‘To be accessible by good transportation’, ‘To offer quality services’, ‘To be known’, ‘To be perceived for something’, ‘To align perceptions with reality’, ‘To be loved’ and ‘To offer a unique experience’. Bloom Consulting studied each criterion using stakeholder interviews, industry expert interviews, desk research and online surveys. FCTY ranked positively in four of the nine main criteria. Therefore Bloom Consulting proposed some recommendations for each negatively ranked criterion.

The **Strategy** phase encompasses the definition of FCTY’s brand strategy, target market, brand identity and economic impact. Bloom Consulting identified ‘inspiring’ as the main idea of FCTY. Therefore, all involved parties should feel inspired and admire everything that happens in this wholesale shopping. Consequently, all activities, products and marketing campaigns should be inspiring too. Bloom Consulting defined three requirements crucial to transform a place, object or person into something inspiring: ‘To be the first or unique’, ‘To be new or different’ and/or ‘To be a reference or a leader’.

Regarding target market, FCTY's tourism strategy aims to attract not only more retailers but also other target markets such as the MICE (Meetings, Investment, Conferences and Exhibitions) tourism and local Belo Horizonte community. Bloom Consulting was also responsible for defining the brand identity. Again, all the creativity outputs are aligned with FCTY's central idea of inspiration, from the logotype to the advertising campaign. The economic impact of Fashion City project on local GDP was also analyzed. The expected economic output of FCTY will represent 0,88% of the gross domestic product (GDP) of the Metropolitan Region of Belo Horizonte and 1,99% of the GDP of Belo Horizonte.

The last phase represents the **Activities** necessary to activate the brand idea. This includes an activity map, the activities in detail and the chronogram required to execute the programs. Instead of departments, FCTY will have 'Secretarias' of (1) Inspiration, (2) External Relations, (3) Intern Relations, (4) Sustainability, Education, Culture, (5) Tourism and Logistics and (6) Economy, Finance and Justice. 'Secretarias' should be represented by one person who may or may not have a team of people working for them according to the workload. Moreover each 'Secretaria' may have outsourcing needs. These needs were marked by Bloom Consulting in the chronogram.

As an intern it was possible to join the last two phases of FCTY project. The main tasks involved the elaboration of the final reports of phases II and III, as well as the presentations to the client. During the internship, it was also possible to participate in brainstorming meetings regarding the elaboration of the activity map, proposing new inspiring programs and activities which FCTY could apply, as well as suggesting the FCTY's chronogram.

3. Methodologies for ranking nations or regions

This section describes the methodologies used to construct composite indicators, including the Data Envelopment Analysis (DEA) approach and Bloom Consulting method.

3.1. Characterization of composite indicators

According to OECD (2008) composite indicators are useful in comparing countries, regions, states or cities performances, facilitating policy analysis and public communication. As a general definition an indicator is a quantitative or qualitative measure derived from observed facts. Indicators are helpful in identifying trends, monitoring performance and benchmarking. “A composite indicator is formed when individual indicators are compiled into a single index on the basis of an underlying model” (OECD, 2008, pp. 13).

Using composite indicators involves some pros and cons as mentioned by OECD (2008). As strengths OECD mentions the ability of summarise complex reality, helping decision-makers and facilitating communication with general public, the ease of interpretation, the ability of assessing countries’ progress over time and the capacity of not losing the underlying information base. On the other hand, applying composite indicators may lead to misinterpreted policy messages, may conduct to simplistic conclusions and may be misused if the construction process is not transparent. The selection of variables, indicators and weights is also subjective and may not be understood or some variables may be ignored.

OECD (2008) presented several steps to be followed when building a composite indicator. The first step relies on developing a theoretical framework since it provides the basis for selecting indicators, which constitutes the step number two. The variables should be relevant, measurable and easy to access. Then, imputation of missing values is needed. This problem can be solved using means or removing the variables with missing data, for instance. Thereafter, a multivariate analysis is necessary in order to study and assess the overall structure of the

dataset. This step is followed by the normalisation process, where indicators are normalised in terms of measurement units with the purpose of becoming more comparable between them. The sixth step relies on aggregating and weighting the indicators according to the lines of the underlying theoretical framework. There are different weighting and aggregation methods that will be discussed further on this manuscript. The next step consists in assessing the robustness and sensitivity of the composite indicator, in order to check if some indicators should be added or excluded, if the treatment of missing data was adequate and if the selection of weights was the most appropriate. At the end, it is important to guarantee that the composite indicator is transparent, to check correlation and causality, to correlate the composite indicator with others and to decide about the way the indicator should be presented and visualised.

Some of these steps need subjective judgement such as the selection of variables, the weights for each indicator, the treatment of missing values and the choice of the aggregation model (Cherchye, et al., 2008). Thus it is important to identify the sources of the subjective assessment and potential data errors and use sensitivity analysis and uncertainty during the construction of the composite indicator.

3.2. Data Envelopment Analysis (DEA) approach

OECD (2008) presents several methods for weighting indicators such as Data Envelopment Analysis (DEA), Benefit of the Doubt Approach (BOD), Unobserved Components Model (UCM), Budget Allocation Process (BAP), Public Opinion, Analytic Hierarchy Process (AHP), among others. In this study we will only address the first two methods.

First introduced by Charnes et al. (1978), DEA is a linear programming technique used to compare the efficiency of a relatively homogeneous set of organizational Decision Making Units (DMUs). This tool derives a single summary measure of efficiency for each unit, which is a result of the comparison of each unit with other

units in the sample. DEA identifies the efficient units, estimating an efficiency frontier which contains the examples of best practices (i.e. 100% efficient) which are used as benchmarks (also named peers). It detects inefficient units as well, where the distance to the frontier constructed from the benchmarks constitutes the magnitude of their inefficiency (Morais and Camanho, 2010). As mentioned by Storrie and Bjurek (2000), the main advantage of benchmarking relies on the observation of the real world. This means that the best performance is not theoretical or abstract but it is defined by observing the best performer(s).

DEA looks for endogenous weights which “maximize the overall score for each decision-making unit (DMU) given a set of other observations” (Cherchye et al., 2008, pp. 239). Model (1) presents the DEA linear programming model, where y_{rj} corresponds to the value of the output r of DMU j , and x_{ij} to the value of the input i of DMU j . The DMU being evaluated is DMU o . u_r ($r=1, \dots, s$) represents the weight attributed to output r and v_i ($i=1, \dots, m$) the weight assigned to input i . The composite indicator is scored between 0 efficiency (the worst scenario) and 1 or 100% efficiency (the best scenario). A unit can reach the best score following the best practices observed in peer units (i.e. the units considered good performers when evaluated with the weights of the unit under assessment).

$$\begin{aligned} \text{Max } h_0 &= \frac{\sum_{r=1}^s u_r y_{r0}}{\sum_{i=1}^m v_i x_{i0}} \\ \text{S. to: } \frac{\sum_{r=1}^s u_r y_{rj}}{\sum_{i=1}^m v_i x_{ij}} &\leq 1; \quad j=1, \dots, n, \\ u_r, v_i &\geq 0; \quad r=1, \dots, s; \quad i=1, \dots, m. \end{aligned} \tag{1}$$

The DEA model can be input or output oriented. According to Cooper et al. (2000), an input oriented model aims to reduce the input amounts as much as possible while keeping at least the present output levels. On the other hand, an output oriented model maximizes output levels under at most the present input consumption. DEA methodology also allows the use of Constant Returns to Scale (CRS) or Variable Returns to Scale (VRS). The first one is based on the

assumption that CRS predominates at the efficient frontier. As the name suggests, VRS relies on allowing for increasing, decreasing or constant returns to scale (Cooper et al., 2000).

An example of an application of the DEA methodology is a study performed by Morais and Camanho (2010) where 206 European cities, belonging to 25 countries, are evaluated regarding the ability of local authorities to promote urban quality life. In this case, Gross Domestic Product (GDP) per capita is considered an input in the DEA model and nine dimensions as outputs (demography, social aspects, economic aspects, civic involvement, training and education, environment, transport and travel, culture and leisure, innovation and technology).

Besides measuring the relative efficiency of the DMUs, DEA is also useful on the construction of composite indicators in terms of defining weights for the indicators to aggregate. This methodology is called Benefit of the Doubt (BOD). Despite the fact of using DEA techniques, it compares all the DMUs only based on outputs. This is equivalent to consider that all DMUs have the same input levels. Therefore, the inputs are represented by a single “dummy” input equal to one in the DEA formulation (Morais and Camanho, 2010). Unlike the traditional DEA efficiency analysis, the BOD approach only considers the achievements, without taking into account the resources used.

Thus, the new linear programming model (2) selects the weights (u_r) that maximize the performance/scores for the DMU (j) under consideration and where y_{rj} corresponds to the value of the output indicator r . If a DMU scores less than 100% of efficiency using this procedure, it means that the remaining units perform better even when all weights are chosen to maximise its efficiency level.

$$\text{Max } h_0 = \sum_{r=1}^s u_r y_{r0}$$

$$\text{s. to: } \sum_{r=1}^s u_r y_{rj} \leq 1; \quad j=1, \dots, n, \quad (2)$$

$$u_r \geq 0; \quad r=1, \dots, s.$$

This method is very popular in constructing countries, regions and cities' rankings. For instance, Morais and Camanho (2010) applied this methodology to evaluate the performance of 206 European cities, regarding urban quality of life in order to measure the performance of each one (level of urban quality life) and to create a cities' ranking. For this purpose, the authors used the nine dimensions previously presented (demography, social aspects, economic aspects, civic involvement, training and education, environment, transport and travel, culture and leisure, innovation and technology), excluding GDP per capita (the input) from this analysis. Another example is the evaluation of 23 countries regarding the Technology Achievement Index by Cherchye et al. (2008). This index was firstly introduced by the United Nations in 2001. The goal is to analyse the ability of a country to create and diffuse new or existent technologies and to provide qualified human resources for technology creation, using this methodology.

As mentioned before, DEA makes use of optimization procedures that emphasize the countries, regions and cities' strengths, allowing them to attach higher weights to those dimensions in which they perform relatively well (Cherchye et al., 2004). Nevertheless, this fact could lead to wrong interpretations since some attributed weights (to an indicator of a certain city or country) could be ignored and in reality that indicator can be imperative in the study. On the other hand, if the number of outputs is too high when compared with the amount of DMUs, this can lead to a situation where many DMUs can reach 100% of efficiency but with no space for discrimination between good and bad performances. In order to overcome this limitation, Wong and Beasley (1990) applied additional restrictions to weights. They introduced for the first time the concept of virtual weight restrictions (WR), i.e. restrictions on the variable value multiplied by the respective weight. Imposing constraints reduces the flexibility of DMUs in choosing their value system. These restrictions, shown in (3), limit the importance attributed to indicator r , for the DMU (j) under consideration, where y_{rj} corresponds to the value of the output indicator and u_r to the weight.

$$\alpha_r \leq \frac{u_r y_{rj}}{\sum_{r=1}^s u_r y_{rj}} \leq \beta_r \quad (3)$$

The addition of restrictions in the DEA model deteriorates the efficiency scores, since DMUs do not have the same flexibility weighting their variables. An example is specifying a minimum weight for each dimension in order to avoid indicators of being ignored, as Morais and Camanho (2010) did, imposing a minimum of 1.5% for all indicators' weight to evaluate the urban quality of life of 206 cities. When Cherchye et al. (2004) evaluated 15 EU countries for social inclusion, they also restricted the weights for the four established dimensions (the low income rate, the income quintile ratio, the long-term unemployment rate and early school leavers) giving a minimum of 10% and a maximum of 50% to each one.

In fact, there are various types of weight restrictions. According to Thanassoulis et al. (2008), besides restricting virtual weights, there are constraints such as the absolute weight restrictions, the assurance regions of type I (involving relative weight restrictions) and assurance regions of type II (regarding input/output weight restrictions).

3.3. Bloom Consulting approach

In terms of aggregation methods, OECD (2008) has also introduced several methods such as the Additive Aggregation Methods, the Geometric Aggregation, the Multi-criteria Decision Analysis and the Non-compensatory Multi-criteria Approach (MCA). Bloom Consulting method to build a composite indicator is somehow close to the first one.

Bloom Consulting is one of the global specialists in country branding. Every year, they launch the Bloom Consulting Country Brand Ranking for tourism and trade, using new and different dimensions from their competitors. These full reports are free of charge. Bloom Consulting works with several governments of countries and regions. However, additionally they also collaborate with private companies (such as IKEA and McDonalds) developing strategies of internationalisation, positioning and innovation, for instance.

In its perspective, Bloom Consulting uses a 3T Approach:

T1 – Attraction of Trade

T2 – Attraction of Tourism

T3 – Attraction of Talent

According to Bloom Consulting perspective, these three concepts are completely antagonistic and they automatically repeal each other. Therefore, countries need to treat each dimension individually. They cannot adopt the same arguments to promote tourism and trade (Bloom Consulting, 2011a). For instance, we can mention gastronomy and relaxation to promote tourism, whereas the most valuable messages for Foreign Direct Investment (FDI) are available workforce, innovation and legal framework characteristics. Moreover, the 3T Approach has also different audiences. For example, the relationship between a nation and tourists is called Business to Consumer (B2C) and the relationship between a nation and investors is called Business to Business (B2B).

Bloom Consulting analyses annually 161 countries regarding their communication and branding strategies and the impact that this communication has on their economy. Despite the fact of distinguishing three different targets (trade, tourism and talent), Bloom Consulting only develops rankings for trade and tourism. In order to do so, the Consultancy analyses some of the country's hard data and its official Investment Promotion Agencies (IPAs) in the case of trade, and the official Tourism Board Organizations (TBOs) for tourism. According to the top 10 in 2012, the US leads the ranking for tourism followed by Spain and France (Bloom Consulting 2012a, pp. 7). In terms of trade, the scenario is the same for the first position, but now Luxembourg and China occupy the second and third places (Bloom Consulting 2012b, pp. 7).

In the published report, besides the ranking it is also possible to find a rating classification (one of the variables considered by the Consultancy in their final ranking, to which special attention is devoted), as mentioned in section 2.2.2. "This rating reflects the effective use of different countries' communication strategies"

(Bloom Consulting, 2011b, pp. 11), also elaborated for both tourism and trade. The reader will understand if a country is communicating the best messages in order to increase its FDI or tourism receipts (depending if it is trade or tourism). If a country is not using the most effective communication strategy, it does not mean necessarily that it attracts less investment or tourists. In 2012 Tourism Edition, China is an example. Despite the fact that China has received a poorer rating than Macao (where AAA is the best score and A is the third best level), China is able to attract more tourists since its rank position is 4th and Macao is number 8, as illustrated in Figure 1. This means that China TBO is not using the best messages to promote the country, but even so it is able to attract more tourists than countries with more efficient communication strategies as Macao.






Rank		CBS Rating ©
1.	 United States of America	AA
2.	 Spain	AAA
3.	 France	AA
4.	 China	A
5.	 Turkey	AAA
6.	 Thailand	AAA
7.	 Germany	BBB
8.	 Macao	AAA
9.	 United Kingdom	BBB
10.	 Australia	BBB

Figure 1: Top 10 of Bloom Consulting Country Brand Ranking Tourism Edition 2012 (Source: Bloom Consulting, 2012a, pp. 7)

The methodology used by Bloom Consulting to build the trade and tourism rankings is similar. However, the variables considered and their importance have some differences. For instance, in the case of trade the ranking takes into account the values of FDI, instead of tourism receipts. Tourism receipts have more influence in the final tourism score than the FDI in the trade ranking results. The two rankings have three dimensions in common, however for trade it is also considered an additional variable which is job creation. Since this report will detail on tourism ranking, the remaining of this manuscript will detail the methodology and variables applied by Bloom Consulting in order to build tourism rankings.

Bloom Consulting considers five dimensions in order to build the country brand ranking for tourism:

Economic Performance – the value of country’s tourism receipts for the last five years;

Economic Growth – economic growth rate of tourism receipts for the last five years. For this purpose, it is applied a Compound Annual Growth Rate (CAGR) as represented in formula (4) where V represents the value and n the number of years.

$$CAGR = \frac{\text{Ending } V}{\text{Beginning } V}^{\frac{1}{n \text{ years}}} - 1 \quad (4)$$

Social Media Performance – the number of followers on Twitter social network and the number of likes on Facebook social network. Each indicator has an impact of 50% on the social media performance;

Online Performance or Web Analytics – page views (estimated percentage of global page views on the website), page viewers per user (estimated daily unique page views per user for the website), reach (estimated percentage of global internet users who visit the website) and bounce rate (estimated percentage of

visits to the website that consist of a single page view) of the TBO's website of the last three months. Each indicator weights 25% on the online performance variable; **Rating or Country/State Brand Strategy** – effectiveness of the communication strategies and messages used by the official TBO.

As discussed before, the rating is the most complex variable that requires more time to be calculated. It consists in collecting the messages promoted by the official TBO and finding out if these messages meet people's online search. Bloom Consulting compares the supply (TBOs) with the demand (tourists) and sees if they meet each other.

Thus, from the demand perspective, Bloom Consulting uses Google Analytics in order to study the online search demand. In other words, the purpose of using Google Analytics relies on finding out the Google's search of keywords, i.e. words and expressions that people use in Google when they are searching for a region's tourism. On the other hand, from the supply angle, Bloom Consulting analyses each TBO's website and collects every message that they promote. Thereafter, the messages are classified, i.e. each message or keyword is categorised and associated to a certain cluster, as explained in section 2.2.1. Later, Bloom Consulting compares and computes the difference between supply and demand, i.e. the actual number of communicated messages and the number of messages in Google universe.

The more accurate a country is (there is no gap between supply and demand) the better the rating. The rating scores from AAA (very strong) until D (poor) (Bloom Consulting, 2012a, pp. 6). Moreover, as illustrated in Table 2, if the rating is between 7 and 5,5 it has a AAA scale, between 5,5 and 5 is AA, between 5 and 4,5 is A and in every 0,5 falls down to the level below, until the lowest level D which goes from 1,5 to 0.

Table 2: Rating scale classification

Rating scale	Minimum range	Maximum range
AAA	5.50	7.00
AA	5.00	5.50
A	4.50	5.00
BBB	4.00	4.50
BB	3.50	4.00
B	3.00	3.50
CCC	2.50	3.00
CC	2.00	2.50
C	1.50	2.00
D	0.00	1.50

The five dimensions (from economic performance to rating) have different weights in the final score of Bloom Consulting ranking. The economic performance represents 55% of the final score, the rating influences 20%, the social media and the online performance weight 10% each and finally the economic growth represents 5%.

After gathering all data, the values used by Bloom Consulting are normalised in order to become comparable between them. All variables are normalised through a relative normalisation process. However, the economic performance and economic growth dimensions are geometrically normalised through a relative and an absolute normalisation process.

In terms of relative normalisation, Bloom Consulting considers the actual value (the number of followers on Twitter, for instance) or the average data (in the case of the economic performance and economic growth) of each country or region for the period being analysed. Consider as an example a study of the economic performance variable for the 50 US states. The value of this variable is the average value of the last five years for each state. Then, the relative normalisation distributes the 50 values of this variable into six predefined percentile intervals, as represented in Table 3 in the second column. Bloom Consulting distinguishes six percentiles, which are the best 5%, 15% and 30% states (the highest values), and the worst 30%, 15% and 5%.

Table 3: Relative normalisation process of the economic performance variable for the 50 US states

Total No. states	Percentage of states	No. of states in each interval	No. of states rounded	Accumulated No. of states	Min. Eco. Perf.	Max. Eco. Perf.	Range of the interval	Score
50	5%	2.5	2	2	66826	92031	25205	6
	15%	7.5	7	9	18416	66826	48410	5
	30%	15	15	24	8962	18416	9454	3,5
	30%	15	15	39	3312	8962	5650	2
	15%	7.5	7	46	1919	3312	1393	1
	5%	2.5	4	50	1436	1919	483	0

In order to calculate the minimum and maximum values of each interval, Bloom Consulting follows the logic illustrated in Table 3. That is, Bloom Consulting calculates the number of states in each interval, i.e. how many states are for instance in the best 5%. Since there is a total of 50 states, only two states belong to this category (5% of 50). Thereafter, the minimum value of each interval is calculated. In the case of the best 5% it is selected the minimum value of the two states. Regarding the maximum level for this percentile it is selected the maximum economic performance value of all 50 states. Concerning the other intervals, the maximum corresponds to the minimum of the prior interval, as represented in Table 3.

Thereafter, Bloom Consulting associates the value of the economic performance of a certain state with the correspondent score (from 0 to 6 – see last column in Table 3 where the score that corresponds to each percentile is shown), depending on its position throughout the intervals. For example to California with an economic performance of 92031 a value of 6 is assigned. To Connecticut with a value of economic performance of 8681 a value of 2 is associated. As these values do not discriminate between some states, Bloom Consulting further computes the distance of each value to the minimum of the interval using equation (5). That is, if the value is close to the minimum it receives an additional score around zero, and close to 1 if it is close to the maximum.

$$\frac{\text{Observed Value} - \text{Minimum}}{\text{Range}} \quad (5)$$

Therefore California receives an additional score of one 1 since it is actually the maximum of the interval (is the best state in terms of economic performance) and Connecticut obtains a score of 0.95 because it is very close to the maximum. Thereby, California and Connecticut obtain a final score equal to 7 and 2.95 respectively.

The absolute normalisation is only applied to economic performance and economic growth since these variables include values for a period of five years. This process follows exactly the same procedure. However, the absolute score considers in the definition of the range in each percentile, the maximum and the minimum of the observed values during the five years, i.e. 250 values, instead of the maximum and minimum of the average numbers. Hence, the geometric mean between relative and absolute values (6) provides the final score for these two variables.

$$\text{Final Score} = \sqrt{\text{Relative Score} * \text{Absolute Score}} \quad (6)$$

In the end Bloom Consulting ranks each state according to their performance on this relative or geometric mean of relative and absolute rankings, and uses the rank values of the variables to aggregate them and construct its ranking.

Besides the annual world ranking, Bloom Consulting also elaborates rankings for regions and states. An example is the US State Brand Ranking for tourism and trade launched for the first time in 2012, where the same dimensions and methodology are applied in order to construct the ranking. Another example is the Indian Regions Ranking for tourism expected to be released in 2013.

4. Country Branding – concepts and previous studies

According to Porter (1990) leaving in a world of global increasingly competition, the role of the nation has grown. Countries try to create and sustain their competitive advantage in order to differentiate themselves in some way. Porter (1990) mentioned several sources of national competitiveness. Some authors identify this national competitiveness as a macroeconomic effect related to exchange rates, interest rates and government deficits. It is also associated to government intervention such as protection, imports promotion and subsidies. Others classify national competitiveness as a result of cheap and abundant labour, or related to management labour practices. Some authors also associate it to natural resources. After setting the nation's competitive advantage, the next step relies on promoting itself, i.e. applying country branding strategies.

A brand is a name with power which influences buyers (Kapferer, 2004). In country branding country names constitute brands, evoking certain meanings and associations about that place (Akotia, et al. 2011). According to Anholt (2003) country branding is used to promote a country's identity to gain a competitive edge. This identity is projected for internationally recognition to improve the country's image.

According to Kotler and Gertner (2002) a country's image affects its ability to attract investment, businesses, tourism and the perception people have regarding its products and services.

There are countries who manage consciously their name as a brand. Kotler and Gertner (2002) refer Colombia as an example. Colombia used its high-quality coffee to promote itself as a country. People associate a country, a city or a place to certain beliefs, impressions and images, even when this is not done intentionally. In fact, most country images are stereotypes and extreme simplifications of reality, based on people's perceptions and expectations. The media and the entertainment industry have a huge impact in shaping people's perceptions of places. On the other hand, sometimes a positive perception of a

country is created but this does not happen intentionally. For example, the key technology cluster in India led by Wipro and Infosys is modernizing the image of the country, as innovative, entrepreneurial and talented (Akotia, et al. 2011). Another example is New Zealand that became a very popular touristic destination thanks to the release of Lord of the Rings' movie (Croy, 2004).

Kotler and Gertner (2002) have also mentioned that a country name has an impact on attitudes toward products. Many consumers use country-of-origin label as an indicator of quality of products and services. For instance, products made in China have a negative connexion in terms of quality among many consumers.

According to Olins (2002) country branding seems to offer the most to unpopular countries that need to improve their reputation and image. This happens for instance with West African countries which are negatively perceived because of political instability, poverty, disease and corruption that they have been through.

Anyway, under Kotler and Gertner (2002)'s point of view all nations must manage and control their branding. Nations need to strive and find its competitive advantage among the intense market competition between countries. Today this is mandatory for nations' survival. Thus these authors suggest three different tasks which countries must deal with: managing the image, attracting tourists and attracting companies and factories. More specifically, countries should carry out a SWOT analysis in order to determinate their own strengths (S), weaknesses (W), opportunities (O) and threats (T). The country then should define a basis for strong branding and storytelling, choosing certain industries, personalities, historical landmarks and events and natural features which nations want to promote.

4.1. Review of previous studies on countries and regions rankings

In what follows our aim is to provide an overview of previous academic studies and existing methodologies used by specialists to develop countries, regions and cities rankings. Besides academic studies, it includes the perspective and methodologies

used by two other main players in the Country Branding's field: Future Brand and Anholt GfK.

4.1.1 Existing nations or regions brand rankings build by consulting firms

Future Brand

As well as Bloom Consulting, Future Brand is an expert in the field of country branding. This company provides an annual study of country brands named Country Brand Index.

Future Brand develops different types of rankings. In the general top 25, they rank the best 25 countries in the world regarding seven main variables (Country Brand Index 2012-13, pp. 6):

Awareness – Do key audiences know that the country exists? How top-of-mind is it?

Familiarity – How well do people know the country and its offerings?

Associations – What qualities come to mind when people think of the country?

Preference – How highly do audiences esteem the country? Does it resonate?

Consideration – Is the country considered for a visit? What about for investment or to acquire or consume its products?

Decision/visitation – To what extent do people follow through and visit the country or establish a commercial relationship?

Advocacy – Do visitors recommend the country to family, friends and colleagues?

In every annual report, Future Brand presents a brand ranking of all 118 studied countries, concerning these seven main variables and a comparison with the results of the two previous years. In 2012-13 Edition Switzerland occupies the first position, after being in the second place in 2011-12. Switzerland, Canada and Japan are the top 3 for 2012-13. Afghanistan and Pakistan are in the last two positions of 2012-13 ranking (Country Brand Index 2012-13).

Besides that, Future Brand also ranks the 25 best countries taking into consideration only one of the seven main variables - associations. They identify five sub dimensions for this variable (Country Brand Index 2012-13, pp. 70):

Value System – Political Freedom, Environmental Friendliness, Stable Legal Environment, Tolerance, Freedom of Speech;

Quality of Life – Education System, Healthcare System, Standard of Living, Safety, Job Opportunity, Most Like to Live In;

Good for Business – Investment Climate, Advanced Technology, Regulatory Environment, Skilled Workforce;

Heritage and Culture – History, Art and Culture, Authenticity, Natural Beauty;

Tourism – Value for Money, Attractions, Resort and Lodging Options, Food.

Thus, Future Brand constructs the top 25 best countries for each sub dimension: (1) value system, (2) quality of life, (3) good for business, (4) heritage and culture and (5) tourism. Additionally, it also develops the top 15 best countries for each indicator inside the sub dimensions (a ranking for (1) political freedom, (2) environmental friendliness, (3) stable legal environment, (4) tolerance and (5) freedom of speech, for instance).

In terms of methodology, Future Brand collects quantitative data from 3,600 opinion-formers and frequent international business or leisure travellers. They use Future Brand's proprietary Hierarchical Decision Model (HDM) to determine how residents, investors, tourists and foreign governments perceive a country's brand. Through HDM Future Brand can also measure the performance and progress of a country over time. This model takes into consideration the seven main variables discussed previously (Awareness, Familiarity, Associations, Preference, Consideration, Decision/visitation and Advocacy) (Country Brand Index 2012-13, pp. 5).

Besides HDM, Future Brand also counts with some global experts who provide their opinion in areas such as policy and governance, international relations, economics and trade, international law, national security, energy and climate

change, urban and regional planning, immigration and the media (Country Brand Index 2012-13, pp. 5).

Anholt-GfK

Every year Anholt-GfK launches a top 50 nation brand ranking measuring the power and quality of each country's image. This report is called Anholt-GfK Roper Nation Brands IndexSM or NBI. The NBI represents a "unique collaboration combining the heritage and authority of GfK Roper's three-quarters of a century of experience in public affairs research with the expertise of Simon Anholt to offer a unique barometer of global opinion." (Anholt-GfK, 2009, pp. 2). Their main clients include government ministries, public-private sector partnerships, foundations and cultural institutions, media and communication agencies around the world. The full reports are available for purchase.

The methodology relies on interviewing approximately 21,000 adults (age 18 or over) from twenty core panel countries. This panel encompasses developed and developing countries which play important and diverse roles in international relations, trade and the flow of business, cultural and tourism activities. In the 2012 NBI survey 20,378 online interviews have been conducted (Anholt-GfK, 2012).

In their research Anholt-GfK uses six different variables in order to measure the power of each country's brand image (Anholt-GfK, 2009, pp. 2). According to Anholt (2005), these dimensions can be seen as a hexagon known as the Nation Brand Hexagon, represented in Figure 2.

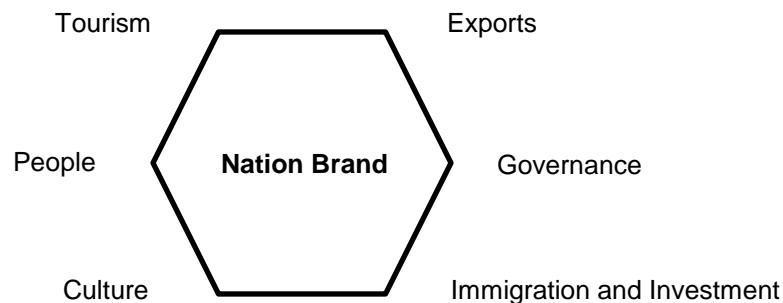


Figure 2: The Nation Brand Hexagon (Source: adapted from Anholt 2005)

The six hexagon's points represent the variables considered in the analysis, i.e. the different aspects of the intellectual property patrimony of a nation. All these dimensions together build up the idea of a nation. Being part of the intellectual property, the points of the hexagon need to be properly managed and developed (Anholt, 2005). These variables are described below:

Exports – the country-of-origin effect, i.e. whether knowing where the product is made influences people's decision of purchasing it. It is also considered whether a country has particular strengths in science, technology and creative energy;

Governance – competency and honesty of government, respect for citizens' rights and fair treatment, security, international peace, environmental protection and world poverty reduction;

Culture – cultural country's heritage such as traditions, music, films, art, literature and sports;

People – people's friendliness and human resources on a professional level;

Tourism – natural beauty, historic buildings and monuments, vibrant city life and urban attractions;

Immigration and Investment – a country's power to attract talent and capital.

The NBI score is an average of the scores from the six variables mentioned before. For each dimension there are between three and five ratings questions (from the survey). Ratings are based on a scale from 1 (the lowest and worst) to 7 (the highest and best), with 4 being the middle position which is neither positive nor negative. "Each hexagon point also has a word choice question which helps enrich the understanding of the properties of a nation's image". (Anholt-GfK, 2011, pp. 5)

Anholt-GfK also ranks the countries for each dimension separately. For illustration, Japan leads the ranking regarding Exports dimension, followed by the US and Germany. On the other hand, in terms of Governance, China is the 49th on the ranking and Canada and Switzerland are in the top of this list (Anholt-GfK, 2009, pp. 8).

With regards to the global ranking, in 2012 the US holds number 1 position, holding the top spot for the fourth year in a row as the nation with the best overall reputation. It is followed by Germany, United Kingdom, France and Canada. In 2012 NBI, two-thirds of measured nations suffered declines in their reputation over the past year (Anholt-GfK, 2012).

4.1.2 Academic studies regarding nations or regions rankings

One can find in the academic literature several performance evaluations of countries, regions or cities based also on a set of indicators. This literature is not directly related to country branding, but the methodologies involved are comparable.

An example is a study performed by Morais and Camanho (2010) where they assessed 206 cities regarding quality of life. In order to construct a composite indicator of urban quality of life, the authors applied the Benefit of the Doubt Approach (BOD) method. The results show that only four cities scored 100% of efficiency in terms of quality life. The best cities belong to Germany and Netherlands and the worst are in Romania and Italy. The average score is 51%. Morais and Camanho (2010) also evaluated the ability of local authorities to promote urban quality life. Thus, using Data Envelopment Analysis (DEA), they compared the national conditions with quality of life levels. According to the results, Dresden (Germany) and Helsinki (Finland) are the most efficient, i.e. these cities are able to transform national wealth into quality of life.

As mentioned before, Cherchye et al. (2008) analysed the Technology Achievement Index of 23 countries using the same DEA methodology. Firstly introduced in 2001, Desai et al. (2002) specified eight indicators to evaluate this index: number of patents granted, receipts of royalties, number of internet hosts, exports of high and medium technology products, number of telephone lines, electricity, mean years of schooling and gross enrolment ratio of tertiary students in

science, mathematics and engineering. In this case, Finland, Sweden, Japan and the US lead the ranking. Additionally, in a previous study Cherchye et al. (2004) investigated 15 EU countries regarding social inclusion, as introduced previously in section 3. In order to evaluate the countries and construct the ranking, it was considered four variables (low income rate, the income quintile ratio, early school leavers and long-term unemployment) as outputs, in a BOD model. Sweden, Austria and the United Kingdom present the best performances in the ranking.

Another example is a study performed by Kaufmann et al. (2002) associated with the evaluation of 175 countries regarding six governance indicators (government effectiveness, political stability, voice and accountability, control of corruption, rule of law and regulatory quality). The authors applied a different model – Unobserved Components methodology – in order to construct updates of the governance indicators covering the period 2000-01 and compare them with the previous results of 1997/98. The new results show that in terms of government efficiency, for instance, Switzerland is in the top with the best performance, followed by Luxembourg. The same happens with political stability, for example, where Switzerland is again in the top of the list. However it has deteriorated its score comparing to the previous study.

Furthermore, Storrie and Bjurek (2000) created a composite index of the unemployment and employment rates of the EU member states in 1999 (15 countries) in order to study the labour market performance. The authors benchmark the European countries with efficiency frontier techniques, i.e. using the DEA methodology. Denmark, Netherlands and Luxembourg present the best scores.

Another example is the measurement of the efficiency of 191 countries by Tandon et al. (2000) in terms of health systems. The authors identified health, health inequality, responsiveness-level, responsiveness-distribution and fair-financing as the five indicators in the composite indicator. They used public opinion, conducting surveys to the population, in order to establish the weight percentages. According to the results, France leads the ranking and Sierra Leon is at the bottom.

5. Case study – using Bloom Consulting data to produce a ranking for US states using a DEA methodology

This section describes the analysis of Bloom Consulting data in order to construct a composite indicator applying Data Envelopment Analysis (DEA) methodology. The goal of this study relies on building a new ranking of the 50 states of United States of America in terms of tourism branding. The ranking measures the effectiveness of brand strategies used by each state to attract tourism. Thereafter, the results will be compared with Bloom Consulting ranking and some suggestions for improvement will be proposed.

As previously said, DEA is a very rigorous method, applying linear programming techniques, that is able to compare the efficiency of several Decision Making Units (DMUs). For the matter of this study, there are 50 DMUs being analysed, representing the 50 US states. In terms of variables, it will be considered the same five dimensions used by Bloom Consulting – economic performance, economic growth, social media, online performance and rating. In terms of data, the analysis will be done considering Bloom Consulting data, using the real values collected for the study, but also the rank values, i.e. the numbers of order from 0 to 50 that are used in Bloom Consulting ranking.

Constructing a composite indicator implies comparing tourism branding of all states only based on outputs, as mentioned before. Thus, since all states have the same input levels, the inputs are represented as a single “dummy” input equal to one in the DEA formulation. Thus, the five variables are considered outputs in the DEA model. This is an example of a Benefit of the Doubt approach.

Nevertheless, regarding the analysis using the rank data, the value 1 represents the best score and 50 the worst (since the data represents a ranking, i.e. number of order). Therefore when rank data are used, the variables are considered inputs, since a small value corresponds to a better performance on that factor.

The advantage of using DEA is associated with the process of weighting the variables. Instead of attributing weights reflecting personal point of views, DEA calculates the best possible weights for each dimension in every scenario. In other words, DEA allows each state to select its own weighting system for the evaluation of performance, applying optimization techniques which emphasise the state's strengths.

In order to perform the analysis and to compute DEA efficiency measures, the software Integrated System for Decision Support (ISYDS) was used. This software allows the performance of models with different characteristics. For instance, it is possible to choose a model with constant or variable returns to scale, input or output oriented, with or without weight restrictions, the use of an inverted frontier, among many additional options, producing complete results (efficiency scores, weights, benchmarks, targets and slacks). The main advantage of using ISYDS relies on tackling virtual weight restrictions, condition that for instance Efficiency Measurement System (EMS) software is not able to calculate.

5.1. Evaluation of state efficiency in the promotion of tourism

As mentioned before, we performed two different analysis using Bloom Consulting data in order to evaluate the efficiency of all states in terms of tourism. The first one contemplates the rank values and the second analysis applies the real values for each variable.

5.1.1. DEA model based on rank values

For the analysis using rank values, an input oriented model with constant returns to scale was used, and results obtained through ISYDS.

The results demonstrated in Annex 3.1. show that there are 13 best performing states: California, Colorado, Florida, Illinois, Main, Massachusetts, Michigan, New

York, North Dakota, Oklahoma, Texas, Utah and West Virginia. The state of New Hampshire presents the worst performance with a score of 32%. The average efficiency score is 72%. Colorado is the 100% best performing state more times used as a benchmark (it is used 31 times by the other states).

However, looking at the results provided by ISYDS for the 13 best performing states in Table 4, it is possible to understand that the attributed weight for the social media and online performance variables is several times equal to zero. In fact, 8 out of 13 efficient states ignore social media and/or online performance in order to achieve the best performance. Economic growth is the variable weighted more times (with the highest percentages) by the efficient states.

Table 4: Comparison of the 13 benchmarks of DEA model based on rank values without WR in terms of virtual weight of each variable

Benchmarks	Economic Performance	Economic Growth	Social Media	Online Performance	Rating
California	8.44%	75.87%	0.00%	0.00%	15.68%
Colorado	39.25%	32.16%	0.00%	0.00%	28.59%
Florida	0.00%	14.80%	2.32%	21.97%	60.90%
Illinois	11.03%	85.44%	0.00%	0.00%	3.53%
Maine	69.14%	23.60%	3.19%	0.00%	4.08%
Massachusetts	0.00%	61.16%	8.67%	15.50%	14.66%
Michigan	0.00%	47.73%	24.82%	0.00%	27.45%
New York	6.54%	69.26%	0.00%	0.00%	24.20%
North Dakota	0.00%	3.57%	27.18%	41.19%	28.05%
Oklahoma	59.76%	5.56%	0.00%	0.00%	34.68%
Texas	8.72%	9.89%	0.00%	0.00%	81.38%
Utah	0.00%	41.13%	0.00%	49.19%	9.68%
West Virginia	23.74%	10.85%	0.00%	3.99%	61.41%

Considering the 50 states in terms of attributed weight to each variable, economic growth and rating are the variables with the highest average weight. As illustrated in Figure 3, the average of the 50 states' weight for economic growth is 35% and rating is 30%. Social media and online performance are weighted with the lowest percentages, 6% and 9% respectively.

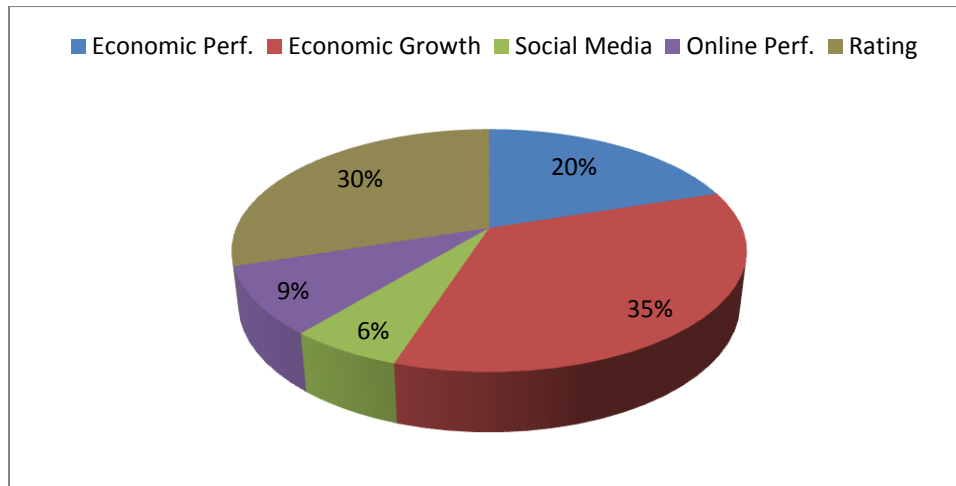


Figure 3: Comparison of the 5 variables average virtual weight for DEA model based on rank values

Additionally, an analysis regarding the rank values of each benchmark's variable was performed in order to understand with further detail what differentiates the 13 best performing states. Table 5 presents the rank values of each variable for the 13 benchmarks.

Table 5: Comparison of the 13 benchmarks of DEA model based on rank values without WR in terms of rank data

Benchmarks	Rank values				
	Economic Performance	Economic Growth	Social Media	Online Performance	Rating
California	1	37	17	34	10
Colorado	18	13	3	7	13
Florida	2	47	2	14	8
Illinois	6	43	20	37	1
Maine	43	7	13	43	2
Massachusetts	15	24	6	2	23
Michigan	14	40	4	42	5
New York	3	28	1	4	11
North Dakota	49	1	28	8	25
Oklahoma	34	2	41	38	14
Texas	4	4	19	5	37
Utah	35	27	47	9	3
West Virginia	21	5	40	1	34

Regarding Table 5, it is possible to conclude that the first two positions for each of the five variables belong to the best performing states. For instance, concerning online performance, West Virginia holds the 1st position and Massachusetts

number 2. In social media New York is the first in the ranking and Oklahoma the second. Furthermore, California is the leader in terms of economic performance, followed by Florida, New York, Texas and Illinois. However, among the 13 efficient states, it is also present the number 49 for this variable which is North Dakota. This also happens in economic growth where Florida is ranked 47th and in social media with Utah holding position 47th. This means that these 13 best states also contain the worst rank scores for some variables. Among the five dimensions, rating is the one which includes the best positions, led by Illinois and Maine.

5.1.2. DEA model based on real values

The second model run was similar to the previous one, but it considers the real values collected by Bloom Consulting, without the normalisation process and further ranking attribution. Despite the fact that DEA does not require the normalisation of data, it was necessary to adjust some values. The economic performance variable is now in millions of dollars in order to facilitate the calculation on ISYDS. Another problem is related to the economic growth rate that can assume negative values. Hence, the rate was transformed into a variable varying around 1 rather than around 0. For instance, a growth rate of -2% is now equal to 0,98.

As mentioned before, in the real values' case the 5 variables represent outputs in the DEA model. For this situation, it was applied an output oriented model with constant returns to scale on ISYDS.

According to results provided by ISYDS, there are 9 states 100% efficient, considered as benchmarks. In this list are included California, Florida, Illinois, Maine, New York, North Dakota, Texas, Utah and West Virginia, as demonstrated in Annex 4.1. Note that all these DMUs were also considered as the best performing states when the rank values were used. In this case, the results show that the efficiency score average is really high, assuming a value of 97%. This means that all states are very close to the efficient frontier. The worst performing

state is Nevada with a score of 91%. On the other hand, North Dakota outstands among the best performing states since it is used 41 times by other DMUs as a benchmark.

Regarding the variables weight, the results illustrated in Annex 4.2. show that all states, including the best performing states, ignore at least one dimension (i.e. weight equal to zero). Considering the 50 states, the variables online performance and rating are the ones ignored more times. In a total of 50 states, only 20 of them consider the online performance and 21 the rating.

Considering only the 9 benchmarks and taking Table 6 as a support, it is possible to conclude that the economic performance variable has a weight very close to zero in seven of the nine best states. It is important to mention that this variable is considered the most important (weight of 55%) by Bloom Consulting. Besides that, another curious fact is California and New York which focus the attention only in one dimension (economic performance and social media respectively), ignoring all other variables. The sum of the variables' virtual weight of some states is not exactly one. This can happen because of rounding errors.

Table 6: Comparison of the 9 benchmarks of DEA model based on real values without WR in terms of virtual weight of each variable

Benchmarks	Economic Performance	Economic Growth	Social Media	Online Performance	Rating
California	100.00%	0.00%	0.00%	0.00%	0.00%
Florida	36.62%	0.00%	6.50%	56.91%	0.00%
Illinois	0.31%	0.00%	0.30%	36.65%	62.73%
Maine	0.00%	85.61%	0.14%	2.23%	12.02%
New York	0.00%	0.00%	99.82%	0.00%	0.00%
North Dakota	0.11%	99.86%	0.03%	0.00%	0.00%
Texas	2.82%	97.07%	0.08%	0.00%	0.00%
Utah	0.13%	0.00%	0.03%	60.91%	38.94%
West Virginia	0.69%	0.00%	0.01%	99.30%	0.00%

Regarding the big picture in terms of attributed weight to each variable once again, the results for the 50 states revealed in Annex 4.2., demonstrate that economic growth stands out in terms of average weight. It is the dimension selected more

times by states (it is taken into consideration by 44 DMUs) with the highest percentage, in order to achieve the best performance. In fact, the average of the 50 states' weight for this variable is 81%, as demonstrated in Figure 4. On the other hand, the remaining dimensions are weighted with lower percentages. The average weight of online performance weight is 9%, rating is 5%, economic performance is 3% and the lowest average weight is social media with 2%. Despite the fact that online performance and rating are the variables ignored more times (as mentioned before), they have the second and the third average weight.

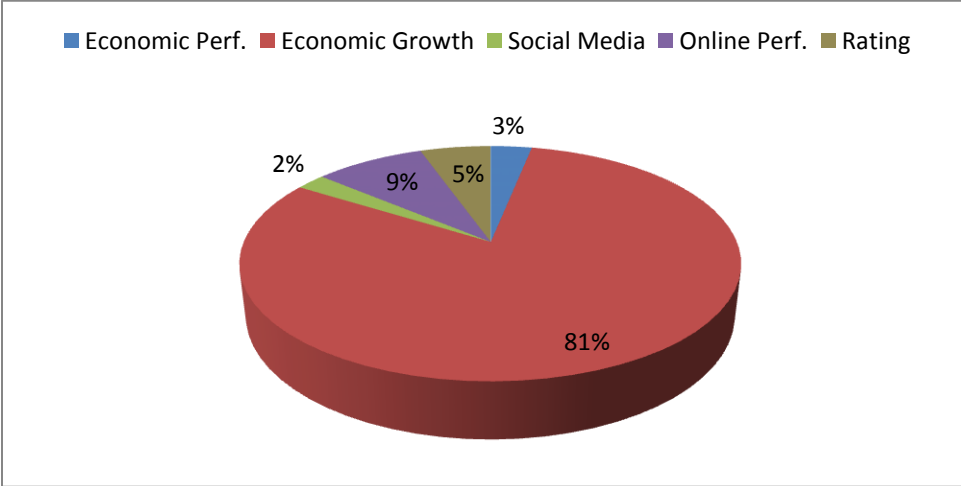


Figure 4: Comparison of the 5 variables average virtual weight for DEA model based on real values

It was conducted a graphical analysis in order to understand with further detail what differentiates the 9 best performing states. In Table 7 the real data of each output for the 9 benchmarks are presented and the respective normalised values in order to facilitate the comparison between the states. The normalisation process implies the division of the variables values of each state by one of them. In this case, New York was used as a reference. Thus, all other variables are divided by New York observed values.

Table 7: Original and normalised data of the 9 efficient states in DEA model based on real values without WR

Original data (real values)					
Benchmarks	Economic Performance	Economic Growth	Social Media	Online Performance	Rating
California	92031	1.01	31886	12.88	4.98
Florida	66826	1	282651	15.02	5.51
Illinois	19510	1.02	67922	12.22	3.14
Maine	15633	0.98	201566	15.43	3.8
New York	48987	1.02	623848	15.55	4.91
North Dakota	16277	1.02	34195	11.25	3.45
Texas	1727	1.07	10465	15.23	4.05
Utah	15349	1.01	12815	15.05	3.36
West Virginia	5696	1.04	8134	12.23	4.87
Normalised data					
California	1.88	0.99	0.05	0.83	1.01
Florida	1.36	0.98	0.45	0.97	1.12
Illinois	0.58	0.99	0.04	0.79	1.38
Maine	0.05	1.01	0.06	0.76	1.22
New York	1.00	1.00	1.00	1.00	1.00
North Dakota	0.04	1.05	0.02	0.98	0.82
Texas	0.94	1.02	0.06	1.00	0.66
Utah	0.11	1.00	0.01	0.98	1.20
West Virginia	0.05	1.01	0.00	1.23	0.73

Regarding Figure 5, it is possible to verify that in terms of economic performance California stands out from the remaining best performing states, followed by Florida, New York and Texas. Another notorious difference is perceived in social media values, where New York and secondly Florida present a number much larger than the other benchmarks. On the other hand, there are not significant differences between the benchmarks regarding the values of economic growth. In terms of online performance values West Virginia stands out, and Illinois is the best position in terms of rating.

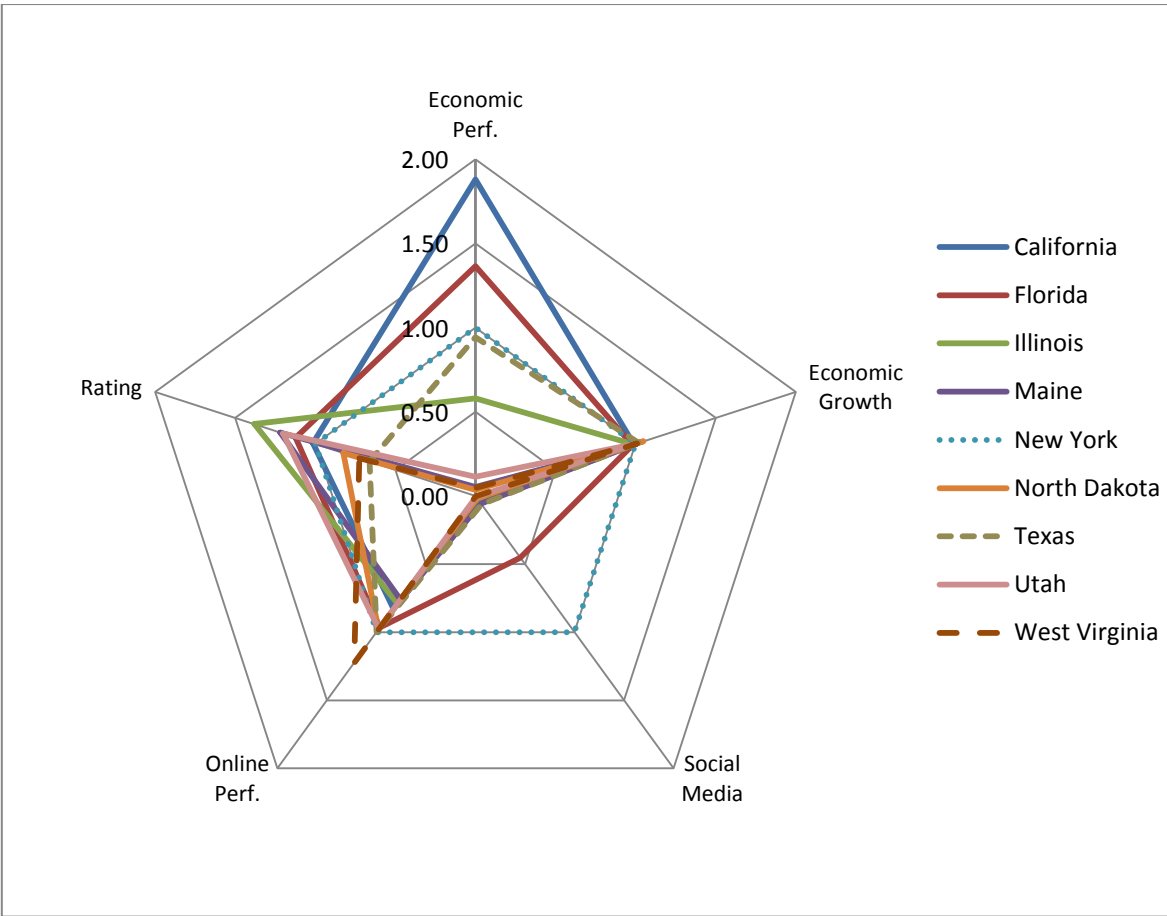


Figure 5: Comparison of the 9 benchmarks of DEA model based on real values without WR in terms of original data

In summary, when units are left free to choose their own factor’s weights, these end up being, on average, very different from those used by Bloom Consulting. Therefore one needs to proceed in the analysis in a way that makes the DEA and Bloom Consulting methods more comparable. This is achieved by restricting weight flexibility in DEA.

Before that, however, one needs to choose the type of data to proceed with: original values or rank values. Comparing the two analyses (with rank numbers and real values) in terms of ranking the difference is not very significant. Using the real values, the nine states considered efficient also assume the best score in the analysis with the rank values. Besides that, there is a 91% correlation between the rankings of states under the two analyses, revealing their similarity. However, the

analysis based on the rank numbers is not able to reveal the actual difference in terms of values from one state to another. For instance, the economic growth dimension assumes very similar values (around one) since it is a growth rate. A small difference from 1 to 1.02 growth can be converted into a huge difference in rank values (e.g. a difference from the 44th position to the 24th). Thus, the rank numbers do not discriminate reality as real values do. Furthermore, the study with real values will be more independent from Bloom Consulting since it will actually apply the raw numbers, not the normalised values. Hence, for further analysis, the case study will focus on real values.

5.2. Applying virtual weights restrictions

As mentioned before, according to the previous results, all 50 states ignore at least one variable (i.e. variable's weight is equal to zero) in order to reach the best score. Thus, in order to overcome this shortcoming, restrictions to the variables' virtual weights were applied. Two distinct DEA models were developed for separate scenarios (I and II) with different restrictions to virtual weights. For both analyses it was considered the real values.

5.2.1. DEA model with weight restrictions in scenario I

For the first scenario (I) the restrictions applied to the output virtual weights follow closely the weighting percentage used by Bloom Consulting, where we still allowed for some flexibility in weighting. Therefore, this scenario allows a better comparison with Bloom Consulting ranking. The imposed restrictions are demonstrated in Table 8, where one can see that economic performance, originally weighted by Bloom Consulting on 55% can be weighted in the DEA model with weights that vary between 25% and 60%. Economic growth on the other hand (originally weighted by Bloom Consulting with 5%) can be weighted in the DEA model at least in 5% and at most in 15%.

Table 8: Scenario I - Attributed virtual weights restrictions to each variable

Scenario I - Restrictions to virtual weights		
Lower Limit	Variable (Bloom Consulting weight)	Upper Limit
25%	Economic Performance (55%)	60%
5%	Economic Growth (5%)	15%
5%	Social Media (10%)	20%
5%	Online Performance (10%)	20%
10%	Rating (20%)	30%

According to the results provided by ISYDS, only Florida and New York are considered 100% efficient under this scenario, as demonstrated in Annex 5.1. In fact, the efficiency average is now around 27%. Rhode Island is at the bottom with the worst performance.

Regarding the states that were considered the best performances without these restrictions, it is possible to conclude that for some of them the efficiency score was abruptly reduced. These variations are represented in Figure 6.

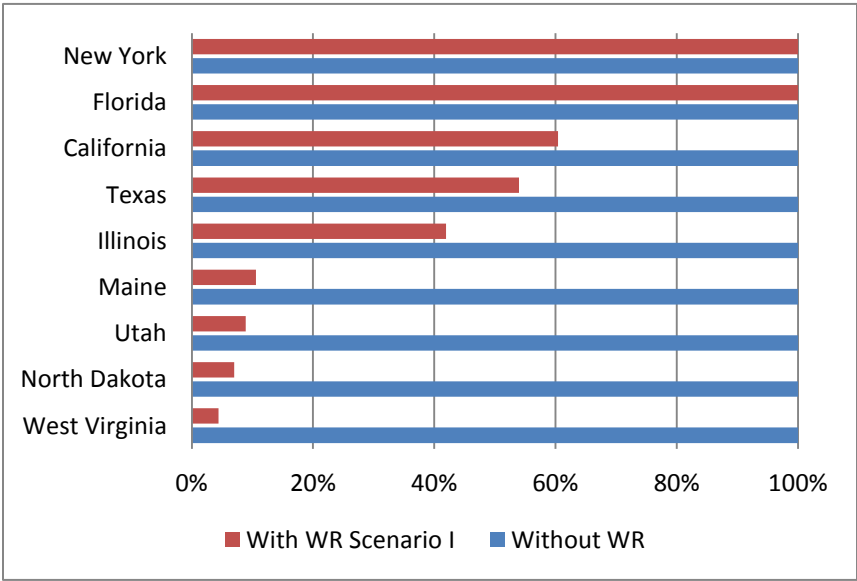


Figure 6: Efficiency score variation of the benchmarks of the DEA model without weight restrictions (WR) and of the benchmarks in scenario I

For instance, West Virginia without any restrictions weights online performance by 99% and achieves an efficiency score of 100%. With the weight restrictions that imposes a maximum of 20% for this variable weight and the remaining restrictions which require considering all dimensions, West Virginia loses its 100% of efficiency and scores only 4,4% in this scenario, weighting the online performance by the maximum possible: 20%. Other examples are Utah, North Dakota and Maine which have an efficient score around 10%. As illustrated in Figure 6, Illinois, Texas and California also lose their 100% of efficiency. However, these states hold better efficiency scores, from 40 to 60%.

After calculating the new virtual weights, the results, illustrated in Annex 5.2., demonstrate that all states are very close to the upper limit weight for economic growth, online performance and rating, i.e. 15%, 20% and 30% respectively (Table 8). This means that these dimensions are selected by states until the imposed limit (the restriction) in order to achieve the best score possible. In terms of economic performance and social media most of the states are closer to the lower limit (25% and 5% respectively) than to the maximum.

Considering these conditions New York and Florida are in the top of the ranking. In order to discriminate between the best two performing states, i.e. decide who leads the ranking, it is necessary to verify which of them is used more times as a peer. As demonstrated in Annex 5.1., in this case it is New York since it is a benchmark of 39 states, whereas Florida is not a peer for any state. Actually, considering the states used as benchmarks, it is possible to verify that California is a peer for many states, as demonstrated in Table 9, however it is not an efficient state.

Table 9: California as a peer in the DEA model with WR in scenario I (CA - California; NY - New York)

DMUs	Efficiency score	Peers
California	60.42%	NY(1.00)
Alaska	7.66%	CA(0.43) NY(0.57)
Arizona	38.27%	CA (0.73) NY(0.27)
Arkansas	19.43%	CA(0.44) NY(0.56)
Colorado	43.37%	CA(1.00)
Delaware	5.10%	CA(0.64) NY(0.36)
Georgia	45.44%	CA(0.61) NY(0.39)
Hawaii	47.92%	CA(1.00)
Idaho	11.94%	CA(0.45) NY(0.55)
Louisiana	27.17%	CA(0.57) NY(0.43)
Maine	10.60%	CA(1.00)
Massachusetts	43.19%	CA(0.44) NY(0.56)
Michigan	47.84%	CA(1.00)
Minnesota	29.90%	CA(0.65) NY(0.35)
Montana	10.99%	CA(1.00)
New Hampshire	12.58%	CA(1.00)
New Mexico	18.57%	CA(0.49) NY(0.51)
North Dakota	6.99%	CA(1.00)
Oregon	26.59%	CA(0.91) NY(0.09)
South Carolina	32.21%	CA(0.86) NY(0.14)
South Dakota	8.29%	CA(1.00)
Tennessee	32.93%	CA(0.68) NY(0.32)
Vermont	7.20%	CA(1.00)
Virginia	48.93%	CA(0.72) NY(0.28)
Wisconsin	30.71%	CA(0.94) NY(0.06)
Wyoming	9.06%	CA(0.47) NY(0.53)

This can be explained by the imposition of constraints to virtual weights of only the DMU being assessed. This means that California, e.g., achieves 100% efficiency for the weights chosen by other states, but these same weights do not allow California to weight their own values in the proportions specified in the virtual weight constraints. Therefore when the unit is itself assessed, it does not show up as 100% efficient. This is a problem of virtual weight constraints which has been already noted in the literature.

Regarding scenario I the states' top 10 is represented in Table 10.

Table 10: Scenario I Ranking

DMUs	Position
New York	1
Florida	2
California	3
Texas	4
Virginia	5
Hawaii	6
Michigan	7
Georgia	8
Pennsylvania	9
Colorado	10

5.2.2. DEA model with weight restrictions in scenario II

In addition to this analysis, it was considered a different perspective where all five variables' virtual weights have similar upper and lower limits (scenario II). The goal is to analyse a scenario where all dimensions have somewhat the same importance. Therefore, it was established a more controlled interval as a restriction, equal to all variables. This could not be a very representative situation of reality since in real life some variables are more important than others. However, it is interesting to analyse and figure out the states that present a high level of performance for all dimensions, when these are taken as having the same importance. Thus, it was tested again through a DEA output oriented model with constant returns to scale, but with new weights restrictions. As illustrated in Table 11, the imposed restrictions assume the same intervals for every output.

Table 11: Scenario II - Attributed virtual weights restrictions to each variable

Scenario II - Restrictions to virtual weights		
Lower Limit	Variable	Upper Limit
15%	Economic Performance	35%
15%	Economic Growth	35%
15%	Social Media	35%
15%	Online Performance	35%
15%	Rating	35%

The results illustrated in Annex 6.1. show that New York is the only 100% efficient state. This means that New York is more balanced, i.e. has a good performance in all dimensions. As expected, the addition of this restriction deteriorated the efficiency score average, since it reduces the flexibility of the states in choosing their best values. The score average is around 23% in this case. Rhode Island is once again the state with the worst performance.

Comparing to the previous scenario (I) using Table 12 as support, New York is now able to attribute more weight to social media (since the maximum virtual weight is now 35%), giving less weight to the other variables. The economic growth has in both scenarios the same virtual weight.

Table 12: Comparison of scenario I and II in terms of efficiency score and variables attributed weight regarding New York and Florida

DMUs	Virtual Weights					Rating
	Efficiency score	Economic Performance	Economic Growth	Social Media	Online Performance	
Scenario I						
New York	100%	25.38%	15.00%	19.96%	20.00%	19.65%
Florida	100%	27.13%	15.00%	7.91%	20.00%	30.00%
Scenario II						
New York	100%	19.99%	15.00%	34.94%	15.00%	15.00%
Florida	93%	35.02%	15.00%	14.98%	15.00%	20.00%

In this case, Florida is only 93% efficient. Considering the variables virtual weights for this state, it is possible to verify that in scenario I Florida weighed social media with approximately 8% in order to achieve the best performance. With the new conditions, it is obligated to weight a minimum of 15%. Thereby, the maximum efficiency score that Florida can achieve is 93%.

With regards to the virtual weights of all 50 states included in Annex 6.2., it is possible to conclude that they are very close to the lower limit weight in terms of economic performance and social media (i.e. 15%). This means that they want to weight these variables as low as possible. On the other hand, the economic growth is many times weighted with the maximum percentage (i.e. 35%).

Considering these conditions the first states in the ranking would be New York and Florida, as in the previous scenario. Nevertheless, the remaining states of top 10 are not the same, as demonstrated in Table 13.

Table 13: Scenario II Ranking

DMUs	Position
New York	1
Florida	2
Michigan	3
Hawaii	4
Colorado	5
Virginia	6
Massachusetts	7
Georgia	8
South Carolina	9
Wisconsin	10

5.3. Parallel with Bloom Consulting ranking

As discussed before in section 3, Bloom Consulting has a different approach in order to build the US state ranking for tourism brand. Although it is a different methodology, the objective of this section relies on analysing if it provides the same results when compared to the outcomes obtained through DEA.

Regarding the Bloom Consulting US State Brand Ranking (2012a), California, Florida, New York, Illinois and Texas are the top 5 in terms of tourism. On the other hand, Delaware, Rhode Island and West Virginia are in the bottom of Bloom Consulting ranking. According to the DEA model (considering the scenario of real values with no weight restrictions), it is possible to find some matches but also differences between the two approaches. In fact, the top 5 states of Bloom Consulting’s ranking are included in the 9 100% efficient states calculated by DEA model. On the other hand, the remaining four states are dispersedly distributed along the list, as demonstrated in the first columns of Table 14. Some of the best performing states belong to positions at the bottom of the ranking. An example is North Dakota and West Virginia that in Bloom Consulting’s ranking are numbers 44 and 49, as demonstrated in Table 14.

Table 14: Comparison between Bloom Consulting ranking and DEA rankings with and without weight restrictions (WR)

DMUs	Bloom Ranking	DEA scores without WR		DEA scores with WR scenario I		DEA scores with WR scenario II	
		Efficiency	Rank	Efficiency	Rank	Efficiency	Rank
California	1	100.00%	1	60.42%	3	27.39%	15
Florida	2	100.00%	1	100.00%	2	93.10%	2
New York	3	100.00%	1	100.00%	1	100.00%	1
Illinois	4	100.00%	1	41.93%	12	21.55%	22
Texas	5	100.00%	1	53.98%	4	29.39%	13
Michigan	6	98.53%	13	47.84%	7	62.06%	3
Georgia	7	96.59%	30	45.44%	8	38.56%	8
Pennsylvania	8	96.17%	36	44.78%	9	29.36%	14
Virginia	9	96.69%	28	48.93%	5	51.78%	6
New Jersey	10	90.47%	48	25.49%	23	11.78%	29
Colorado	11	99.41%	10	43.37%	10	58.29%	5
North Carolina	12	96.29%	35	37.47%	15	24.83%	18
Arizona	13	98.51%	14	38.27%	14	25.12%	17
Massachusetts	14	97.96%	16	43.19%	11	41.11%	7
Nevada	15	90.69%	47	41.57%	13	24.04%	19
Indiana	16	98.90%	12	21.07%	26	11.95%	28
Hawaii	17	94.05%	45	47.92%	6	59.21%	4
Minnesota	18	96.73%	27	29.90%	19	22.44%	21
Maryland	19	96.89%	25	19.18%	28	9.43%	34
Wisconsin	20	97.14%	24	30.71%	18	33.46%	10
Ohio	21	95.63%	42	23.88%	24	11.68%	30
Washington	22	97.80%	18	14.85%	31	6.53%	43
Missouri	23	97.43%	21	22.07%	25	11.17%	32
Tennessee	24	96.14%	37	32.93%	16	25.48%	16
Oregon	25	96.84%	26	26.59%	22	32.76%	11
Louisiana	26	97.17%	23	27.17%	21	22.79%	20
Oklahoma	27	98.91%	11	14.05%	34	7.39%	40
South Carolina	28	96.08%	38	32.21%	17	36.12%	9
Kentucky	29	97.89%	17	15.44%	30	7.78%	37
Arkansas	30	97.69%	20	19.43%	27	18.58%	24
Maine	31	100.00%	1	10.60%	38	16.19%	27
Connecticut	32	95.90%	39	28.94%	20	31.44%	12
Iowa	33	98.13%	15	14.46%	32	7.47%	38
Utah	34	100.00%	1	8.88%	41	3.84%	45
Alabama	35	95.68%	41	10.57%	39	4.59%	44
Mississippi	36	88.83%	49	14.06%	33	7.22%	41
New Mexico	37	96.54%	31	18.57%	29	17.24%	25
Montana	38	97.70%	19	10.99%	37	17.23%	26
Idaho	39	95.85%	40	11.94%	36	11.45%	31
New Hampshire	40	92.84%	46	12.58%	35	19.18%	23

South Dakota	41	97.23%	22	8.29%	42	8.59%	36
Wyoming	42	96.32%	34	9.06%	40	8.60%	35
North Dakota	43	100.00%	1	6.99%	46	7.19%	42
Nebraska	44	96.39%	33	7.05%	45	3.42%	47
Kansas	45	96.48%	32	5.17%	47	3.08%	48
Alaska	46	96.60%	29	7.66%	43	7.45%	39
Vermont	47	95.42%	43	7.20%	44	9.51%	33
West Virginia	48	100.00%	1	4.41%	49	1.97%	49
Rhode Island	49	83.24%	50	3.06%	50	1.32%	50
Delaware	50	94.39%	44	5.10%	48	3.75%	46

In fact, North Dakota and West Virginia are states that deserve a further analysis. It would be interesting to study the reason why DEA can provide results so similar and disperse to Bloom Consulting at the same time. After calculating the virtual weights of West Virginia it is possible to conclude that this state weights 99% the online performance, ignoring the other variables. That is the reason why it is able to achieve a 100% efficiency score. As soon as the virtual weight restrictions are imposed its efficiency becomes poorer. The same occurs in North Dakota case. This state only takes into consideration the economic growth, ignoring the other outputs. Thus, it is possible to understand the reason for these states being classified as 100% efficient, when Bloom Consulting includes them at the bottom of the list. That is why imposing weight constraints is so important in DEA models.

The analysis considering the virtual weight restrictions imposed in scenario I provides results more similar to Bloom Consulting. In fact, this was expected since the restrictions applied follow somehow the attributed weights selected by the Consultancy. The results show that Maine, Utah, North Dakota and West Virginia, i.e. the four states that did not belong to the Bloom Consulting top 5 in the first study (without virtual weight restrictions), lose their 100% of efficiency. Thus, as represented in Table 14 the results are more similar to Bloom Consulting ranking, although there are still some differences which will be analysed further in this section.

Scenario II is also represented in Table 14. Regarding these new conditions there is significant biased results when compared with Bloom Consulting ranking. This is

actually expected since the imposed restrictions for this analysis aim to rank the states according to their good performance for every variable. Thereby, the scenario II top 5 includes only two states (New York and Florida) of Bloom Consulting best 5. Looking at all 50 states, it is possible to identify significant differences between the rankings. For instance, New Jersey is number 10 in Bloom Consulting ranking, whereas under DEA scenario II, this state is in position 29th. Another example is South Carolina that under DEA scenario II is positioned in number 9, whereas Bloom Consulting approach ranks this state as number 28th.

Another interesting reflection consists on calculating the correlations between DEA and Bloom Consulting rankings and finding out how different they are between them. Table 15 demonstrates the results associating the four rankings: Bloom Consulting ranking, the ranking calculated with no weight restrictions (WR), the ranking with virtual WR in scenario I and finally the ranking with virtual WR in scenario II.

Table 15: Correlations between DEA (with and without WR) and Bloom Consulting rankings

<i>Correlations</i>	Bloom Ranking	DEA scores without WR	DEA scores with WR scenario I	DEA scores with WR scenario II
Bloom Consulting Ranking	100.00%			
DEA scores without WR	33.29%	100.00%		
DEA scores with WR Sc I	93.40%	20.58%	100.00%	
DEA scores with WR Sc II	76.00%	13.96%	90.52%	100.00%

Given these results it is possible to conclude that the ranking developed by Bloom Consulting and the first DEA ranking without weight restrictions (WR) are very different between them since they present a correlation of only 33.29%. On the other hand, the DEA ranking with virtual WR in scenario I has a 93.40% correlation with Bloom Consulting, meaning that they present similar rankings. In fact, this is expected since scenario I follows the weighting percentage used by Bloom Consulting. Nevertheless, putting Bloom Consulting ranking and DEA ranking with virtual WR in scenario II side by side, they present a correlation of 76%. It is a high correlation, however not so strong as with the scenario I. Moreover, the two

scenarios with WR (I and II) are not that different. They also present identical rankings because the correlation between them is 90.52%.

Thus, according to the correlations between rankings Bloom Consulting and scenario I are the most similar. However, at the same time they present some significant differences. At this point it would be interesting to analyse the reason for these main differences and decide which ranking is the best. The results of both rankings shown in Table 14 demonstrate that Illinois, New Jersey, Hawaii, Indiana, Maryland, Washington, South Carolina, Connecticut and New Mexico represent some of the main differences in the rankings. We will analyse the first three states since they belong to the top 10, at least in one of the two cases, in order to find an explanation for these differences: Illinois is number 4 in Bloom Consulting ranking but is the 12th in scenario I, New Jersey is position 10th in the Bloom Consulting ranking, however in scenario I is the 23rd and in Bloom Consulting Hawaii is the 17th but in scenario I is number 6th.

Table 16 reports the virtual weights applied by Illinois, New Jersey and Hawaii in scenario I, as well as Bloom Consulting weights for each variable.

Table 16: Comparison of Illinois, New Jersey and Hawaii attributed weights in Bloom Consulting and scenario I

Scenario I - Virtual Weight					
DMUs	Economic Performance	Economic Growth	Social Media	Online Performance	Rating
Illinois (12 th)	29.99%	15.00%	5.01%	20.00%	30.00%
New Jersey (23 rd)	29.99%	15.00%	5.00%	20.00%	30.00%
Hawaii (6 th)	25.00%	15.00%	19.96%	20.00%	20.00%
Bloom Consulting – Attributed Weight					
DMUs	Economic Performance	Economic Growth	Social Media	Online Performance	Rating
Illinois (4 th)	55%	5%	10%	10%	20%
New Jersey (10 th)	55%	5%	10%	10%	20%
Hawaii (17 th)	55%	5%	10%	10%	20%

Hawaii has increased its position with scenario I conditions, representing the inverse situation of Illinois and New Jersey. Hawaii stands out in social media and online performance scores (Annex 2). As represented in Table 16, Bloom Consulting attributes 10% of weight to each of them. On the other hand, scenario I

allows a maximum weight of 20% to each of these variables. This could be a reason to ascend in the ranking since Hawaii is able to weight more the dimensions where it has a better performance.

Illinois and New Jersey have both good levels of economic performance and rating (Annex 2). In terms of rating, the difference of the attributed weights for this variable in the two cases is not that significant. However, in scenario I economic performance weights around 30% for both states and 55% in Bloom Consulting, as illustrated in Table 16. Regarding economic performance, Illinois and New Jersey could have chosen the maximum of 60%, however they only weighted 30%. The reasons for differences in the ranking should be on the factors that they were forced to weight more than Bloom Consulting. However, this does not happen. Thus, the differences can be associated to the disparity of the type of data used, since Bloom Consulting applies rank numbers and DEA the original values. Therefore, a comparison between the two types of data and its peers is further described.

The use of rank values (from 0 to 50) by Bloom Consulting in order to build their ranking can hide the real differences between the values. On the other hand, scenario I works with the real numbers. With the purpose of understanding the differences in the ranking and finding out which ranking is the best, we analysed the original numbers of New Jersey and Illinois and compared their real and rank numbers with their peers. Thus, New Jersey was compared with New York and Illinois with its peer which is also New York.

New Jersey and its peer real and rank values are represented in Table 17. Looking at the real values, it is possible to conclude that economic growth and online performance represent a small difference between the states. However, in Bloom Consulting ranking economic growth and online performance assume very distinct values. A 0.02 difference in economic growth represents a variation of 16 positions for Bloom Consulting ranking of this variable. The same happens with online performance where a variation of 2.62 implies a difference of 29 rank numbers.

Table 17: Comparison of real and rank values of New Jersey and its peer (New York)

DMUs	Economic Performance	Economic Growth	Social Media	Online Performance	Rating
Rank values - Bloom Consulting					
New Jersey	10	44	42	33	7
New York	3	28	1	4	11
Real values - DEA					
New Jersey	18411	1	12654	12.93	5.53
New York	48987	1.02	623848	15.55	4.91

The same logic can be perceived graphically. In order to compare New Jersey and New York (its peer) rank and real values for every variable, data have been normalised by the New York values. Note that Bloom Consulting rankings have been inverted such that one can read both information on the same way (i.e. the highest the values the better the performance). Therefore to the original Bloom Ranking values we subtracted 51 (inverted score = 51 - original score). Therefore the position 1 in the original score will be position 50 in the inverted score and position 50 will be position 1 in the inverted score, as illustrated in Table 18.

Table 18: Inverted ranking and normalised rank and real values for New Jersey and its peer (New York)

DMUs	Economic Performance	Economic Growth	Social Media	Online Performance	Rating
Inverted ranking					
New Jersey	41	7	9	18	44
New York	48	23	50	47	40
Normalised rank values					
New Jersey	0.854	0.304	0.18	0.383	1.1
New York	1	1	1	1	1
Normalised real values					
New Jersey	0.38	0.98	0.02	0.83	1.13
New York	1	1	1	1	1

Figure 7 compares graphically New Jersey and New York regarding their rank and real values for each variable.

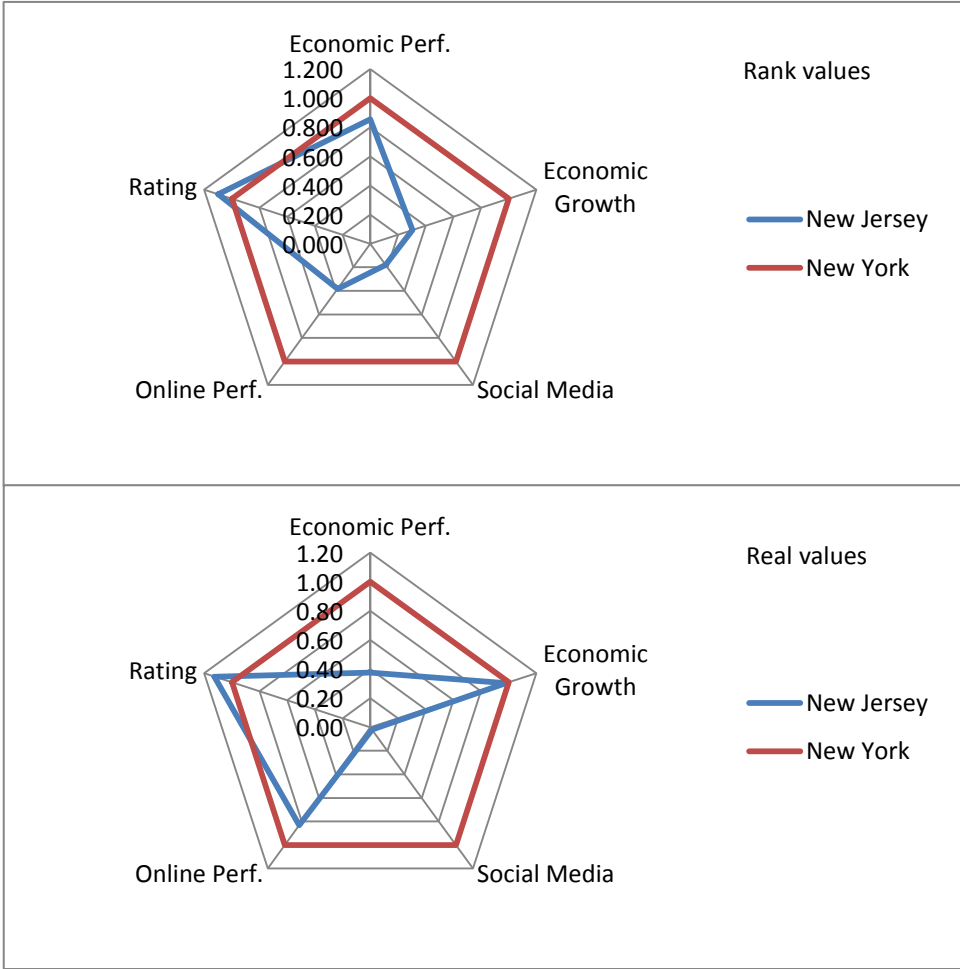


Figure 7: Graphical comparison of rank and real values between New Jersey and its peer (New York)

As illustrated in Figure 7, with the rank values New York is considerably better in economic growth than New Jersey. However, considering the real values scenario the figure represents pretty much the same value for both states in terms of this variable. Regarding online performance, the rank values used by Bloom Consulting determine a significant difference between the two states, where New York has a better score than New Jersey. Nevertheless, New York and New Jersey present similar values applying the real data, as demonstrated on the bottom of Figure 7. With regards to economic performance, the two states have similar results using

the rank values. However, applying the real numbers, the difference of New Jersey and New York performances increase. Furthermore, regarding social media, the real values show a larger difference between New Jersey and New York performances, than the scenario with rank values. The rating is the only variable where New Jersey and its peer present the same results for rank and real numbers. Concluding, the main differences belong to economic growth and online performance where the rank values show a significant difference between New Jersey and New York, but in real data scenario this does not happen. Another difference between the rankings is economic performance, where the rank values are not able to reflect the actual difference shown by the real numbers. This also happens with social media, but it is not so significant.

Therefore the DEA model penalises New Jersey (23rd position) for being very far away from the values of its benchmark in two of the indicators (economic performance and social media). New Jersey is not as penalised in the Bloom Consulting ranking (10th position) because it scores very well on the most weighted indicators (economic performance and rating). So the economic performance of New Jersey is 40% of that of its peer, but even so Bloom Consulting considers it as a good indicator since New Jersey is in the 10th position on this variable.

Finally, we performed the same analysis for Illinois, comparing it with its peer which is also New York. Considering the real data represented in Table 19, Illinois and New York have similar values in terms of economic growth, online performance and rating. Notwithstanding, the rank numbers do not reflect this. In fact, an economic growth variation of 0.01 is associated to a difference of 15 positions in the ranking. A difference of 3.27 in online performance impel to a huge distinction of 33 positions. The same happens with the rating, where 1.87 variation in real numbers is equivalent to skip 10 rank positions.

Table 19: Comparison of real and rank values of Illinois and its peer (New York)

DMUs	Economic Performance	Economic Growth	Social Media	Online Performance	Rating
Rank values - Bloom Consulting					
Illinois	6	43	20	37	1
New York	3	28	1	4	11
Real values - DEA					
Illinois	28428	1.01	25040	12.28	6.78
New York	48987	1.02	623848	15.55	4.91

A comparison of this data is again presented graphically. In order to compare Illinois and its peer New York, rank and real values for every variable data have been normalised by the New York values, calculating once again the Bloom Consulting inverted ranking as illustrated in Table 20.

Table 20: Inverted ranking and normalised rank and real values for Illinois and its peer (New York)

DMUs	Economic Performance	Economic Growth	Social Media	Online Performance	Rating
Inverted Ranking					
Illinois	45	8	31	14	50
New York	48	23	50	47	40
Normalised rank values					
Illinois	0.938	0.348	0.62	0.298	1.25
New York	1	1	1	1	1
Normalised real values					
Illinois	0.58	0.99	0.04	0.79	1.38
New York	1	1	1	1	1

The comparison between Illinois and its peer New York regarding their rank and real values for each variable is illustrated in Figure 8.

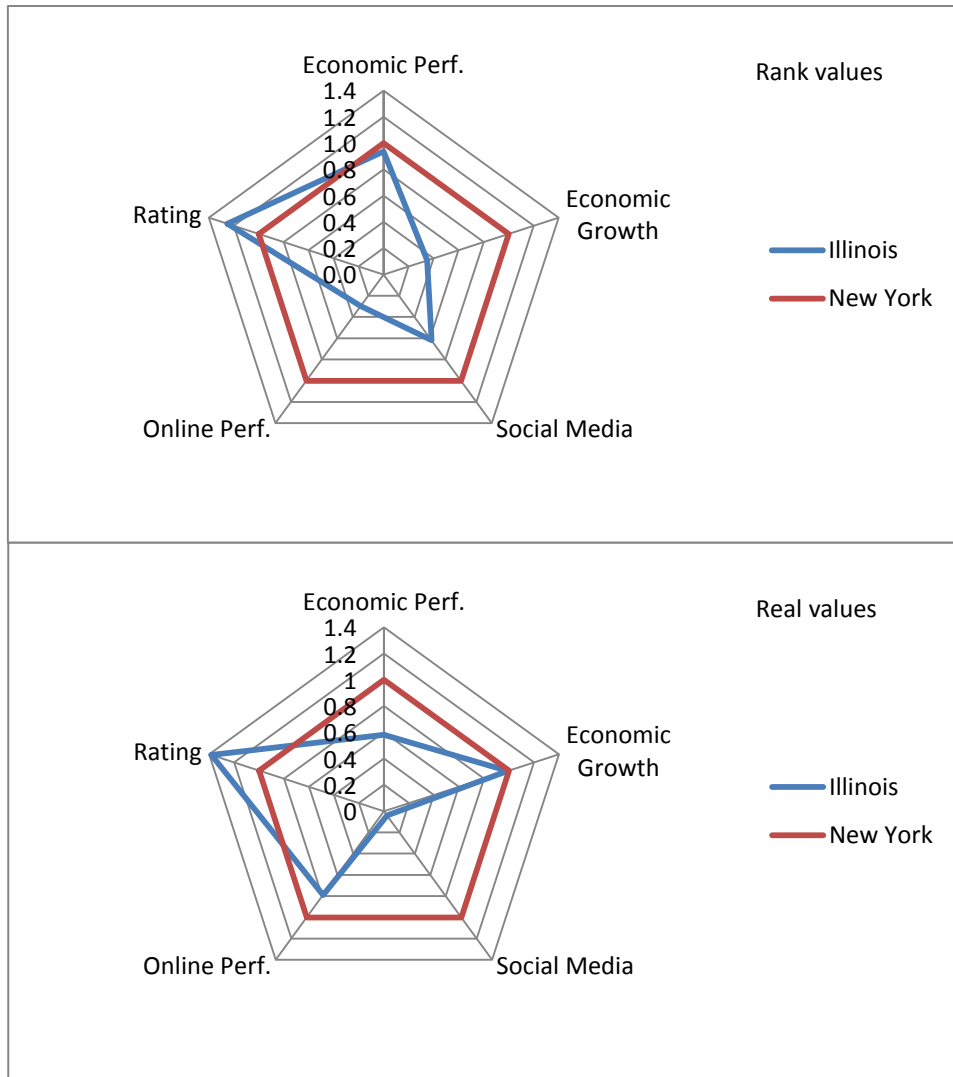


Figure 8: Graphical comparison of rank and real values between Illinois and its peer (New York)

Regarding economic growth and applying the rank values, Illinois has a considerably poorer performance than New York. On the other hand, in the real data scenario, they appear to have the same values. Additionally, there is a significant difference between the two states in terms of online performance according to Bloom Consulting rank numbers. However, using real data Figure 8 shows Illinois and New York with similar performances. Furthermore, in terms of social media and economic performance, the real values point out a larger difference between Illinois and its peer than the rank numbers, especially in the

first one. The rating is pretty much the same in the two scenarios, even though with the real data there is a slightly larger difference. Therefore, the main differences between the rankings are associated once again to economic growth and online performance. In these variables, the rank values show a considerable difference between Illinois and New York, but with real numbers this does not happen. Additionally, another difference relies on social media and economic performance where, once again, the rank numbers are not able to produce the actual difference shown by the real data.

Thus, as it happens for New Jersey, the DEA model penalises Illinois (12th position) since it is far away from the values of its peer in two variables (social media and economic performance), as represented in the bottom of Figure 8. Bloom Consulting ranking (4th position) does not penalise Illinois since it scores very well on the most weighted indicators (1st position in rating and 6th position in economic performance). As illustrated, the economic performance of Illinois is 60% of that of its peer, but even so Bloom Consulting considers it as a good indicator since Illinois is in the 6th position on this indicator. Thereby, DEA is looking for absolute differences between states, whereas Bloom Consulting is looking for relative differences between states.

Thus, it is possible to conclude that the rank numbers are not able to reflect the real difference between the values. As demonstrated, a very insignificant variation can represent a huge increase or decrease in the ranking. Thereby, given this criterion a ranking build with real values is more accurate.

Besides the type of values, in terms of variables weight, a ranking based on DEA with virtual weight restrictions would also be more reliable. First of all, DEA allows a selection of weights more objective and credible. All DMUs opt for weights which maximize their results and besides that, weights are not chosen based on subjective opinion, as it happens in Bloom Consulting ranking. Additionally, it is possible to add weight restrictions in order to avoid situations where DMUs ignore some of the variables included in the composite indicator. Moreover, these restrictions should give some flexibility choosing weights but at the same time they

should reflect reality. That is the reason to prefer scenario I instead of scenario II. Thereby, we assume that the DEA ranking with weight restrictions in scenario I would be the best to apply in order to build a state brand ranking of tourism.

5.4. Recommendations

This section describes a set of recommendations for the worst performing states according to our best ranking, based on DEA efficiency measures with virtual weight restrictions (WR) in scenario I.

The ranking based on DEA efficiency measures with virtual WR in scenario I shows Delaware, West Virginia and Rhode Island at the end of the list. These states deserve a further attention since they represent an opportunity for improvement. As expected, looking at the original data (Annex 2) it is possible to understand that these states present bad performances for several variables. Delaware has the worst result for economic performance and is also poor in social media, rating and online performance. Rhode Island presents the worst performance in terms of social media and has very poor results for economic performance. West Virginia has a bad performance in social media and still has room to improve its rating and economic performance. Even though, West Virginia shows the best position for online performance. In order to compare these three worst states graphically, the original data was normalised by dividing all values by the average of the best six states (New York, Florida, California, Texas, Virginia and Hawaii), as demonstrated in Table 21.

Table 21: Original and normalised data of Delaware, West Virginia and Road Island

Original data						
DMU	EP	EG	SM	OP	RT	
Delaware	1436	1.01	4529	11.95	2.92	
West Virginia	2345	1.03	1992	19.05	3.56	
Road Island	1760	1	1318	13.35	4.48	
Average best 6	48016	1.01	217478	14.80	4.28	
Normalised data						
Delaware	0.029	0.99	0.007	0.77	0.59	
West Virginia	0.048	1.01	0.003	1.23	0.73	
Road Island	0.036	0.98	0.002	0.86	0.91	
Average best 6	1	1	1	1	1	

Figure 9 reveals more clearly the points of intervention more urgent to be considered in each state.

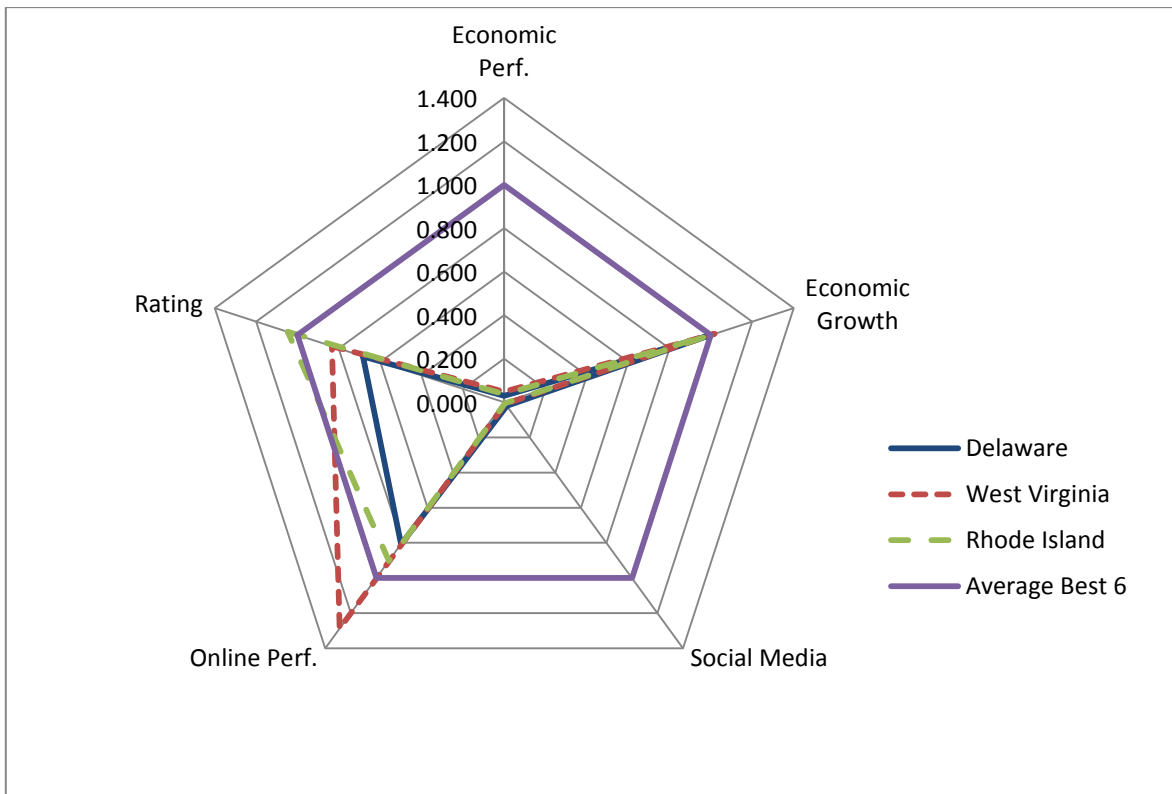


Figure 9: Comparison of the original data between the three worst states in DEA ranking with WR in Scenario I

Delaware, West Virginia and Rhode Island need to increase their tourism receipts. These states present very poor results for economic performance and this is the most relevant variable. One way to accomplish this can be reforming their tourism marketing campaigns, applying new methods of advertising, decreasing prices and expanding the offering, signing up new partnerships, among many other options. Another critical point is social media where the three worst states present very low values comparing with the best six. In fact, the huge technological progress and the increased importance of social media networks impel to the need of improving this dimension. This can be achieved by having a constant, intensive and well directed participation on Twitter and Facebook official networks. The rating is also a variable that can be improved by Delaware and West Virginia, studying what tourists are really looking for in that region and consequently promoting new messages on the TBO's website. Delaware and Rhode Island can also increase their online performance. This can be accomplished by exposing more intensively the website, perhaps using several advertising campaigns in order to increase the percentage of global page views. However the two critical variables for the three states are indeed economic performance and social media.

5.5. Efficiency of Tourism Board Organizations in the promotion of tourism

Besides the analysis of constructing a composite indicator of tourism, another interesting reflection would be evaluating the ability of states Tourism Board Organizations (TBOs) in promoting tourism given their budget, i.e. the performance of TBOs' management. The goal relies on identifying the weakest TBOs in terms of tourism management and proposing some recommendations. In order to do so, it was settled an output oriented DEA model with variable returns to scale where online performance and rating are the only outputs in the model and TBO budget is the single input considered. Economic performance, economic growth and social media were excluded since these variables are not directly related with TBO

management and are not controllable by TBOs. What TBOs can control given their budget is indeed the type of communication strategies used, the advertisement campaigns launched, the amount of promoting messages applied, the management of TBO website and the development of market studies. For the TBO budget, it was considered an average of the last five years (the data used was gathered from the US Travel Association). In order to facilitate the calculation on ISYDS, the TBO budget variable has been transformed into millions of dollars.

Computing this model of performance management without weight restrictions resulted in the variable rating being ignored several times. In order to overcome this, we established a minimum for this variable, setting up an assurance region of type I restriction where the rating weight (u_2) should be equal or superior to 0.05 of online performance weight (u_1), as represented in 7.

$$u_2 \geq 0.05 u_1 \iff u_2 - 0.05 u_1 \geq 0 \quad (7)$$

$$u_1, u_2 \geq 0$$

Therefore, applying the new DEA model seven TBOs are considered fully efficient in terms of promoting tourism given their budget. These TBOs belong to Illinois, Indiana, Maine, North Dakota, Rhode Island, Utah and West Virginia. The best one is West Virginia since is the TBO more times used as a benchmark (it is used 36 times by other TBOs as demonstrated in Annex 8.1.), followed by the Utah TBO which is a peer for 32 TBOs. On the other hand, Wyoming, Nevada and Maryland TBOs are the most inefficient. It is important to notice that this does not mean that these states are the worst in terms of tourism but that the values of rating and online performance indicators are poor given the level of budget. The average efficiency is around 86%. Wyoming, Nevada and Maryland TBOs are the ones where intervention may be more urgent. Using this methodology of understanding TBOs' efficiency it would be interesting to use Maryland as an example. In fact, Maryland TBO presents the worst efficiency score around 61%. Thus, comparing this inefficient TBO with its peers original values (Utah, West Virginia and North

Dakota TBOs) it is possible to suggest some new strategies. The data reported in Table 22 shows where the new practices can be applied.

Table 22: Comparison between Maryland TBO original data and its peers (Utah, West Virginia and North Dakota TBOs)

Variables	Peers			
	Maryland TBO	Utah TBO	West Virginia TBO	North Dakota TBO
TBO Budget	11.33	12.65	11.63	3.29
Online Performance	9.93	15.18	19.05	15.23
Rating	3.11	5.9	3.56	4.05

Maryland TBO should follow and use Utah as an example for improving its rating, since Maryland scored 3.11 and Utah 5.9 (the maximum of its peers) and consequently increase its efficiency level. Maryland policy-makers should also follow West Virginia strategy in terms of online performance, since this peer holds the maximum score of 19.05, achieved with a very similar budget. North Dakota could also be an example for both variables because it presents scores higher than Maryland, achieved with a much lower budget. However, it is not the best state to follow since there are better peers for both dimensions.

6. Conclusion

The image a nation or a region projects has a significant impact on the economy as a whole. The communication strategies used influence the way the nation is perceived by the public. Nations should manage their nation as a brand in such an incredible competitive environment in order to attract new tourists or investors. That is why nowadays it is so important to implement effective brand strategies.

In this manuscript, we have tested the Benefit of the Doubt (BOD) methodology on a practical case study in order to construct a composite indicator and, consequently, build a tourism ranking which evaluates the efficiency of states brand strategies. However, at the same time, the classic DEA model was also applied for the evaluation of Tourism Board Organizations (TBOs) in promoting tourism given the conceded budget. One of the main advantages of using DEA relies on its ability of enabling each Decision Making Unit (DMU) to obtain the best possible score. This method allows a more accurate and less subjective evaluation. DMUs are free to select the best variable weight in order to achieve their best performance. Still, it is important to establish variables weight restrictions so that all dimensions are considered.

We considered DEA with weight restrictions in scenario I as the best ranking. In fact, here the ranking is build based on efficiency measures and contains all the advantages mentioned above. Besides this, it is capable to provide a comparison with Bloom Consulting ranking because of the weight restrictions imposed in this scenario. Moreover, scenario I uses real values contributing to a more precise analysis. Unlike the rank numbers used in Bloom Consulting ranking, the real data is able to reflect the reality, meaning the true difference between the values.

Among the fifty US states we identified New York and Florida as the two DMUs with the best performances. They are considered the best performing states by all DEA models. New York holds the best performance for social media variable and it has also great results for economic performance and online performance. Florida

presents very good levels of economic performance, social media and rating. On the other hand, Rhode Island and Delaware are the weakest performing states in all conducted scenarios, where intervention is more urgent. Both states should increase their tourism receipts since the economic performance indicator is really poor. Social media is another field which Rhode Island and Delaware should improve.

Regarding the five variables used to construct the composite indicator, we verified that economic growth is not very influent. In fact, this variable is not able to discriminate states since it is a growth rate and assumes very similar values close to one.

In the evaluation of the ability of states TBOs in promoting tourism given their budget, we identified West Virginia and Utah TBOs as the most efficient. This means that they present good levels of rating and online performance according to their budget. Nevertheless, considering the previous analysis of building a ranking in order to measure the effectiveness of states brand strategies to attract tourism, West Virginia ranks 49th and Utah is 41st position in our best ranking.

Maryland TBO is the most inefficient in promoting tourism given its budget. This TBO should follow its peers' (West Virginia and Utah TBOs) strategies in terms of rating and online performance in order to achieve better results. However, in DEA scenario I ranking Maryland state is number 28.

References

Akotia, M., Spio, A., Frimpong, K. and Austin, N. (2011), Country Branding: A Developing Economy Perspective, *International Journal of Business Strategy*, Vol. 11 No. 2, pp. 123-131

Anholt, Simon (2005), Three interlinking concepts: Intellectual Property, Nation Branding and Economic Development, *WIPO International Seminar on Intellectual Property and Development*

Anholt, S. and GfK Roper Public Affairs & Media (2009), *The Anholt-GfK Roper Nation Brands IndexSM, 2009 Highlights Report*

Anholt, S. and GfK Roper Public Affairs & Media (2011), *The Anholt-GfK Roper Nation Brands IndexSM 2011 Report*

Anholt, S. and GfK Roper Public Affairs & Media (2012), *The Anholt-GfK Roper Nation Brands IndexSM 2012 Press Release*

Bloom Consulting (2011a), *Bloom Consulting Country Branding Ranking © 2011 TOURISM*

Bloom Consulting (2011b), *Bloom Consulting Country Branding Ranking © 2011 TRADE*

Bloom Consulting (2012a), *Bloom Consulting Country Brand Ranking © 2012 Tourism Edition*

Bloom Consulting (2012a), *Bloom Consulting US State Brand Ranking © 2012 Tourism Edition*

Bloom Consulting (2012b), *Bloom Consulting Country Brand Ranking © 2012 Trade Edition*

Bloom Consulting (2013), *Fashion City Brasil Stakeholder Manual: Strategy and Implementation plan for 2013 to 2016*

Charnes, A., Cooper, W. and Rhodes, E. (1979), Measuring the efficiency of decision-making units, *European Journal of Operational Research*, Vol. 3, No. 4, pp. 339-339

Cherchye, L., Moesen W. and Van Puyenbroeck T. (2004), Legitimately Diverse, Yet Comparable: on Synthesising Social Inclusion Performance in the EU, *Journal of Common Market Studies*, Vol. 42, No. 5, pp. 919-955.

Cherchye, L., Moesen, W., Rogge, N., Puyenbroeck, T., Saisana, M., Saltelli, A., Liska, R. and Tarantola, S. (2008), Creating composite indicators with DEA and robustness analysis: the case of the Technology Achievement Index, *Journal of the Operational Research Society*, No. 59, pp. 239-251

Cooper, W., Seiford, L. and Tone, K. (2000), *Data Envelopment Analysis: A Comprehensive Text with Models, Applications, References and DEA-Solver Software*, Kluwer Academic Publishers

Croy, W. (2004), *The Lord of the Rings, New Zealand, and Tourism: Image Building with Film*, Monash University Business and Economics working papers, pp. 2-21

Desai, M., Fukuda-Parr, S., Johansson, C. and Sagasti, F. (2002), Measuring the Technology Achievement of Nations and the Capacity to Participate in the Network Age, *Journal of Human Development*, Vol. 3, No. 1, pp. 95-122

Future Brand (2009), *Roper Nation Brands IndexSM (2009), 2009 Highlights Report*

Kapferer, J. (2004), *The New Strategic Brand Management: Creating and Sustaining Brand Equity Long Term*, Kogan Page Publishers

Kaufmann, D., Kraay, A. and Zoido-Lobaton, P. (2002), *Governance Matters II: Updated Indicators for 2000-01*, The World Bank Development Research Group and World Bank Institute Governance, Regulation, and Finance Division

Kotler, P. and Gertner, D. (2002), Country as brand, product, and beyond: A place marketing and brand management perspective, *Brand Management*, Vol. 9 No. 4-5, pp. 249-261

Meza, L., Neto, L., Mello, J. and Gomes, E. (2005), ISYDS - Integrated System for Decision Support: a software package for data envelopment analysis model, *Pesquisa Operacional*, Vol. 25, No. 3, pp. 493-503

Morais, P. and Camanho, A. (2010), Evaluation of performance of European cities with the aim to promote quality of life improvements, *Omega* 39 (2011), pp. 398-409

OECD (2008), *Handbook on Constructing Composite Indicators: Methodology and User Guide*, OECD publishing, pp. 3-158

Olins, W. (2002), Branding the Nation: The historical context, *The Journal of Brand Management*, Vol. 9, No. 4-5, pp. 241-248

Porter, M. (1990), *The Competitive Advantage of Nations*, *Harvard Business Review* March-April, pp. 73-91

Storrie, D. and Bjurek, H. (2000), Benchmarking European Labour Market Performance with Efficiency Frontier Techniques, *Centre for European Labour Market Studies (CELMS)*, Department of Economics, pp. 1-12

Tandon, A., Murray, C., Lauer, J. and Evans, D. (2000), Measuring overall health system performance for 191 countries. Geneva, World Health Organization, *Global Programme on Evidence for Health Policy Discussion Paper No. 30*.

Thanassoulis, E., Portela, M. and Despić, O. (2008), DEA – The Mathematical Programming Approach to Efficiency Analysis, In Fried, HO., Lovell, CAK., and Schmidt, SS., *The Measurement of Productive Efficiency and Productivity Growth*, Oxford University Press, pp. 251-420

United Nations (2001), Annex 2.1: The technology achievement index: A new measure of countries' ability to participate in the network age. Human Development Report, Oxford University Press: United Kingdom, <http://www.undp.org>.

Wong, Y. and Beasley, J. (1990), Restricting Weight Flexibility in Data Envelopment Analysis, Journal of the Operational Research Society, Vol. 41, pp. 829-835

Annexes

Annex 1: Example of Alabama clustering process for tourism

State	Message	Cluster Level 1	Cluster Level 2	Cluster Level 3
Alabama	Civil War Sites	Civil War Heritage / Memorial	Civil War Heritage / Memorial	Cultural tourism
Alabama	Historic Homes	Manor Houses	Landmarks	Cultural tourism
Alabama	Museums	National History Museums	Museums (Niche)	Cultural tourism
Alabama	Dining	Good Food/Cuisine	Local / Regional Gastronomy	Cultural tourism
Alabama	Civil War Sites	Civil War Heritage / Memorial	Civil War Heritage / Memorial	Cultural tourism
Alabama	Gardens	Gardens	Destination Tourism	Cultural tourism
Alabama	Fine Dining	Dining out	Local / Regional Gastronomy	Cultural tourism
Alabama	U.S. Space and Rocket Center	Educational Activities	Educational tourism	Cultural tourism
Alabama	Science and Discovery Museums	Niche Museum / Region specific Museums	Museums (Niche)	Cultural tourism
Alabama	Historic Sites	Historical Heritage	Landmarks	Cultural tourism
Alabama	Civil Rights	National History Museums	Museums (Niche)	Cultural tourism
Alabama	Museums and galleries	Art Museums	Cultural Archives	Cultural tourism
Alabama	Visual Arts	Art	US State Culture and Traditions	Cultural tourism
Alabama	Theatre	Theatre	Performing Arts	Cultural tourism
Alabama	Music	Music	US State Culture and Traditions	Cultural tourism
Alabama	Seafood	Local Cuisine	Local / Regional Gastronomy	Cultural tourism
Alabama	Biking	Cycling	Leisure Sports	Sport
Alabama	Soccer	Football/Soccer	Leisure Sports	Sport
Alabama	Tennis	Tennis/Squash/Table Tennis	Leisure Sports	Sport
Alabama	Motorsports	Motor racing	Leisure Sports	Sport
Alabama	Baseball	Baseball	Leisure Sports	Sport

Alabama	Senior Bowl	Local Sport events	Hosting Local Sport events	Sport
Alabama	Football	American Football	Leisure Sports	Sport
Alabama	Paddling and Rafting	Rafting	Adventure Sports and Activities	Sport
Alabama	Wakeboarding	Waterskiing	Sea and Beach Sports and Activities	Sport
Alabama	Water-Skiing	Wakeboarding	Sea and Beach Sports and Activities	Sport
Alabama	Boating	Boating	Sailing and Yachting	Sport
Alabama	Rock Climbing	Climbing	Extreme Sports	Sport
Alabama	Hiking	Hiking and Trekking	Adventure Sports and Activities	Sport
Alabama	Fishing	Fishing	Fishing	Sport
Alabama	Golf	Golf	Golf	Sport
Alabama	Outlet malls	Shopping Malls	Shopping Tourism	Holiday, Leisure, Recreation Tourism
Alabama	Road Trip	Car trips	Road trips	Holiday, Leisure, Recreation Tourism
Alabama	Specialty Shops	Boutiques	Shopping Tourism	Holiday, Leisure, Recreation Tourism
Alabama	Markets and Second-Hand Stores	Shopping Area	Shopping Tourism	Holiday, Leisure, Recreation Tourism
Alabama	Retail Destinations	Shopping Area	Shopping Tourism	Holiday, Leisure, Recreation Tourism
Alabama	Zoos & Aquariums	Zoos & Aquariums	Zoos & Aquariums	Holiday, Leisure, Recreation Tourism
Alabama	Beaches	Beaches	Beaches	Holiday, Leisure, Recreation Tourism
Alabama	Birding	Bird watching	Bird Watching	Nature
Alabama	Dolphin Sightseeing	Sea Animals	Animal Activities	Nature
Alabama	Camping	Camping	Camping	Nature
Alabama	Hunting	Hunting	Hunting	Nature

Annex 2: Rank and real values databases including Economic Performance (EP), Economic Growth (EG), Social Media (SM), Online Performance (OP) and Rating (RT) values

	Rank values					Real values				
	EP	EG	SM	OP	RT	EP (millions)	EG	SM	OP	RT
Alabama	30	30	44	23	27	7194	1.02	4681	13.88	3.87
Alaska	46	19	37	12	32	1919	1.03	10591	15.04	3.45
Arizona	16	41	16	17	6	13997	1.01	33595	14.6	5.56
Arkansas	37	20	31	26	9	5274	1.02	28527	13.48	5.1
California	1	37	17	34	10	92031	1.01	31886	12.88	4.98
Colorado	18	13	3	7	13	13096	1.03	211610	15.36	4.88
Connecticut	25	21	32	24	33	8681	1.02	60676	13.78	3.4
Delaware	50	39	45	41	43	1436	1.01	4529	11.95	2.92
Florida	2	47	2	14	8	66826	1	282651	15.02	5.51
Georgia	8	29	10	39	40	19510	1.02	67922	12.22	3.14
Hawaii	12	49	9	6	28	15633	0.98	201566	15.43	3.8
Idaho	41	35	34	13	42	3165	1.02	16689	15.03	2.99
Illinois	6	43	20	37	1	28428	1.01	25040	12.28	6.78
Indiana	26	25	21	50	4	8568	1.02	13914	8.07	5.81
Iowa	32	11	36	40	12	6139	1.03	8171	12.2	4.91
Kansas	38	8	46	16	50	5164	1.03	5151	14.68	0.06
Kentucky	31	15	35	47	15	7170	1.03	8451	11.15	4.77
Louisiana	27	31	15	18	18	8515	1.02	33378	14.6	4.62
Maine	43	7	13	43	2	2631	1.03	34626	11.8	5.98
Maryland	19	9	29	49	41	11738	1.03	10308	9.93	3.11
Massachusetts	15	24	6	2	23	14449	1.02	77351	15.73	4.38
Michigan	14	40	4	42	5	14973	1.01	233040	11.82	5.59
Minnesota	22	26	27	32	19	10161	1.02	31322	13	4.53
Mississippi	33	46	39	15	22	5972	1	7877	14.75	4.46
Missouri	20	14	43	10	24	11411	1.03	12347	15.15	4.06
Montana	42	6	18	21	48	2844	1.04	76802	14.3	1.66
Nebraska	39	12	48	35	49	3669	1.03	3585	12.48	1.37
Nevada	5	50	24	45	45	31670	0.95	31607	11.53	2.29
New Hampshire	40	48	22	48	47	3312	0.99	51066	10.85	2.04
New Jersey	10	44	42	33	7	18411	1	12654	12.93	5.53
New Mexico	36	16	30	28	44	5485	1.03	25901	13.43	2.73
New York	3	28	1	4	11	48987	1.02	623848	15.55	4.91
North Carolina	11	23	14	46	31	16277	1.02	34195	11.25	3.45
North Dakota	49	1	28	8	25	1727	1.07	10465	15.23	4.05
Ohio	13	42	25	11	35	15349	1.01	12815	15.05	3.36
Oklahoma	34	2	41	38	14	5696	1.04	8134	12.23	4.87
Oregon	29	10	11	29	26	7520	1.03	71193	13.35	4.05

Pennsylvania	7	38	12	36	21	19802	1.01	41174	12.35	4.46
Rhode Island	48	45	50	30	20	1760	1	1318	13.35	4.48
South Carolina	23	36	33	3	36	9873	1.01	74743	15.71	3.29
South Dakota	45	3	38	31	38	2090	1.04	12792	13.1	3.24
Tennessee	17	34	23	22	46	13533	1.02	37693	14.08	2.24
Texas	4	4	19	5	37	46204	1.04	37839	15.55	3.25
Utah	35	27	47	9	3	5586	1.02	3889	15.18	5.9
Vermont	47	22	26	19	30	1778	1.02	16690	14.58	3.48
Virginia	9	33	7	20	39	18416	1.02	127077	14.36	3.21
Washington	28	17	5	25	16	11341	1.04	6740	13.73	3.36
West Virginia	21	5	40	1	34	2345	1.03	1992	19.05	3.56
Wisconsin	44	18	49	27	29	8962	1.02	65102	13.43	4.73
Wyoming	24	32	8	44	17	2452	1.03	12255	11.58	1.94

Annex 3: DEA model based on rank values without weight restrictions

3.1. Efficiency scores and peers

DMUs	Efficiency score	Peers
Alabama (AL)	50.25%	CO(0.8) NY(0.16) TX(0.04)
Alaska (AK)	53.90%	CO(0.73) ND(0.15) WV(0.11)
Arizona (AZ)	96.52%	FL(0.6) IL(0.09) ME(0.05) UT(0.25)
Arkansas (AR)	76.70%	CO(0.33) ME(0.36) NY(0.12) UT(0.19)
California (CA)	100%	1
Colorado (CO)	100%	30
Connecticut (CT)	55.85%	CO(0.72) NY(0.05) TX(0.23)
Delaware (DE)	33.32%	CO(0.9) NY(0.03) TX(0.06)
Florida (FL)	100%	1
Georgia (GA)	65.51%	CO(0.13) NY(0.58) TX(0.29)
Hawaii (HI)	56.25%	MA(0.2) NY(0.72) WV(0.08)
Idaho (ID)	40.27%	CO(0.62) NY(0.18) WV(0.20)
Illinois (IL)	100%	3
Indiana (IN)	89.62%	IL(0.31) ME(0.48) NW(0.21)
Iowa (IA)	85.79%	CO(0.56) ME(0.26) OK(0.18)
Kansas (KS)	55.76%	CO(0.16) ND(0.28) OK(0.08) TX(0.48)
Kentucky (KY)	74.98%	CO(0.77) FL(0.17) OK(0.07)
Louisiana (LA)	58.84%	CO(0.47) ME(0.13) NY(0.38) UT(0.02)
Maine (ME)	100%	16
Maryland (MD)	66.06%	CO(0.25) OK(0.17) TX(0.58)
Massachusetts (MA)	100%	2
Michigan (MI)	100%	0
Minnesota (MN)	65.01%	CO(0.72) ME(0.01) NY(0.26)
Mississippi (MS)	46.47%	CO(0.40) ME(0.02) NY(0.41) UT(0.17)
Missouri (MO)	76.51%	CO(0.75) OK(0.03) TX(0.22)
Montana (MT)	90.24%	CO(0.04) 19 (0.37) TX(0.60)
Nebraska (NE)	46.91%	CO(0.26) 34 (0.02) 36 (0.33) TX(0.39)
Nevada (NV)	50.00%	CA(0.38) NY(0.35) TX(0.27)
New Hampshire (NH)	32.33%	CO(0.65) NY(0.23) TX(0.11)
New Jersey (NJ)	76.61%	IL(0.49) ME(0.08) NY(0.43)
New Mexico (NM)	48.00%	CO(0.4) ME(0.11) ND(0.01) OK(0.11) TX(0.38)
New York (NY)	100%	22
North Carolina (NC)	67.08%	CO(0.27) NY(0.38) TX(0.36)
North Dakota (ND)	100%	7
Ohio (OH)	47.80%	CO(0.2) NY(0.59) TX(0.2)
Oklahoma (OK)	100%	10
Oregon (OR)	89.77%	CO(0.41) ME(0.42) TX(0.17)

Pennsylvania (PA)	64.33%	CO(0.09) NY(0.82) TX(0.09)
Rhode Island (RI)	42.93%	CO(0.31) ME(0.18) NY(0.33) UT(0.18)
South Carolina (SC)	65.85%	MA(0.98) WV(0.02)
South Dakota (SD)	71.32%	NY(0.002) ND(0.52) OK(0.16) TX(0.32)
Tennessee (TN)	44.97%	CO(0.29) NY(0.36) TX(0.35)
Texas (TX)	100%	21
Utah (UT)	100%	5
Vermont (VT)	48.75%	CO(0.8) ND(0.12) OK(0.07) TX(0.003)
Virginia (VA)	64.23%	CO(0.17) NY(0.65) TX(0.17)
Washington (WA)	75.41%	CO(0.9) ME(0.08) NY(0.02)
West Virginia (WV)	100%	4
Wisconsin (WI)	51.96%	CO(0.67) ND(0.06) OK(0.23) TX(0.05)
Wyoming (WY)	60.64%	CO(0.36) ME(0.16) NY(0.49)

3.2. Virtual weights

(EP - Economic Performance; EG - Economic Growth; SM - Social Media; OP - Online Performance; RT - Rating)

DMUs	Virtual weights				
	EP	EG	SM	OP	RT
Alabama (AL)	32.87%	37.29%	0.00%	0.00%	29.84%
Alaska (AK)	0.00%	28.50%	0.00%	30.20%	41.30%
Arizona (AZ)	0.00%	10.03%	18.13%	25.56%	46.28%
Arkansas (AR)	27.23%	26.03%	0.00%	17.85%	28.89%
California (CA)	8.44%	75.87%	0.00%	0.00%	15.68%
Colorado (CO)	39.25%	32.16%	0.00%	0.00%	28.59%
Connecticut (CT)	30.45%	29.01%	0.00%	0.00%	40.54%
Delaware (DE)	36.33%	32.15%	0.00%	0.00%	31.52%
Florida (FL)	0.00%	14.80%	2.32%	21.97%	60.90%
Georgia (GA)	13.66%	59.79%	26.54%	0.00%	0.00%
Hawaii (HI)	25.00%	0.00%	0.00%	75.00%	0.00%
Idaho (ID)	0.00%	23.23%	0.00%	34.40%	42.37%
Illinois (IL)	11.03%	85.44%	0.00%	0.00%	3.53%
Indiana (IN)	42.82%	44.52%	0.00%	0.00%	12.66%
Iowa (IA)	48.25%	26.25%	0.00%	0.00%	25.50%
Kansas (KS)	15.92%	18.16%	0.00%	8.84%	57.08%
Kentucky (KY)	40.85%	31.29%	0.00%	0.00%	27.86%
Louisiana (LA)	15.24%	30.95%	0.00%	9.48%	44.33%
Maine (ME)	69.14%	23.60%	3.19%	0.00%	4.08%
Maryland (MD)	23.47%	17.35%	0.00%	0.00%	59.18%
Massachusetts (MA)	0.00%	61.16%	8.67%	15.50%	14.66%
Michigan (MI)	0.00%	47.73%	24.82%	0.00%	27.45%
Minnesota (MN)	26.14%	37.52%	0.00%	0.00%	36.34%
Mississippi (MS)	14.71%	36.26%	0.00%	6.24%	42.78%
Missouri (MO)	28.61%	31.26%	0.00%	0.00%	40.13%
Montana (MT)	0.00%	36.68%	62.03%	1.29%	0.00%
Nebraska (NE)	13.75%	22.92%	0.00%	16.27%	47.07%
Nevada (NV)	43.57%	41.49%	14.94%	0.00%	0.00%
New Hampshire (NH)	28.20%	38.38%	0.00%	0.00%	33.42%
New Jersey (NJ)	14.08%	66.98%	0.00%	0.00%	18.94%
New Mexico (NM)	11.76%	33.69%	4.70%	10.00%	39.84%
New York (NY)	6.54%	69.26%	0.00%	0.00%	24.20%
North Carolina (NC)	16.09%	38.17%	0.00%	0.00%	45.74%
North Dakota (ND)	0.00%	3.57%	27.18%	41.19%	28.05%
Ohio (OH)	13.55%	49.66%	0.00%	0.00%	36.79%
Oklahoma (OK)	59.76%	5.56%	0.00%	0.00%	34.68%
Oregon (OR)	1.94%	60.18%	37.88%	0.00%	0.00%

Pennsylvania (PA)	9.82%	60.47%	0.00%	0.00%	29.71%
Rhode Island (RI)	19.77%	32.77%	0.00%	11.53%	35.93%
South Carolina (SC)	56.10%	0.00%	0.00%	43.90%	0.00%
South Dakota (SD)	20.16%	17.13%	30.34%	0.00%	32.37%
Tennessee (TN)	16.67%	37.83%	0.00%	0.00%	45.50%
Texas (TX)	8.72%	9.89%	0.00%	0.00%	81.38%
Utah (UT)	0.00%	41.13%	0.00%	49.19%	9.68%
Vermont (VT)	17.22%	43.66%	0.00%	9.18%	29.95%
Virginia (VA)	15.07%	66.71%	18.22%	0.00%	0.00%
Washington (WA)	0.00%	18.75%	23.25%	0.00%	58.00%
West Virginia (WV)	23.74%	10.85%	0.00%	3.99%	61.41%
Wisconsin (WI)	17.18%	38.07%	0.00%	13.90%	30.85%
Wyoming (WY)	26.59%	43.07%	0.00%	0.00%	30.33%

Annex 4: DEA model based on real values without weight restrictions

4.1. Efficiency scores and peers

DMUs	Efficiency score	Peers
Alabama (AL)	95.67%	CA(0.06) ND(0.94)
Alaska (AK)	96.60%	NY(0.002) ND(0.91) TX(0.003) WV(0.09)
Arizona (AZ)	98.51%	FL (0.11) IL(0.12) ND(0.17) UT(0.59)
Arkansas (AR)	97.69%	IL(0.32) ME(0.14) NY(0.02) ND(0.52)
California (CA)	100.00%	9
Colorado (CO)	99.42%	NY(0.33) ND(0.31) UT(0.32) WV(0.03)
Connecticut (CT)	95.90%	NY(0.08) ND(0.84) TX(0.08)
Delaware (DE)	94.39%	ND(1.00)
Florida (FL)	100.00%	4
Georgia (GA)	96.59%	NY(0.08) ND(0.59) TX(0.33)
Hawaii (HI)	94.05%	NY(0.34) ND(0.38) WV(0.28)
Idaho (ID)	95.85%	NY(0.01) ND(0.85) TX(0.02) UT(0.12)
Illinois (IL)	100.00%	14
Indiana (IN)	98.90%	IL(0.24) ME(0.61) ND(0.15)
Iowa (IA)	98.12%	IL(0.16) ME(0.27) ND(0.57)
Kansas (KS)	96.48%	CA(0.01) ND(0.93) TX(0.05)
Kentucky (KY)	97.89%	IL(0.21) ME(0.14) ND(0.66)
Louisiana (LA)	97.17%	FL (0.06) IL(0.06) NY(0.01) ND(0.63) UT(0.24)
Maine (ME)	100.00%	8
Maryland (MD)	96.89%	CA(0.12) ND(0.88)
Massachusetts (MA)	98.00%	FL (0.16) NY(0.05) ND(0.43) UT(0.14) WV(0.22)
Michigan (MI)	98.53%	IL(0.08) ME(0.58) NY(0.34)
Minnesota (MN)	96.73%	CA(0.02) IL(0.22) NY(0.03) ND(0.74)
Mississippi (MS)	95.42%	FL(0.05) ND (0.57) UT(0.32) WV(0.07)
Missouri (MO)	97.43%	NY(0.19) ND(0.72) TX(0.02) WV(0.07)
Montana (MT)	97.70%	NY(0.11) ND(0.89)
Nebraska (NE)	96.39%	CA(0.02) ND(0.98)
Nevada (NV)	90.69%	NY(0.01) ND(0.25) TX(0.74)
New Hampshire (NH)	92.84%	NY(0.07) ND(0.93)
New Jersey (NJ)	96.81%	CA(0.01) IL(0.6) ND(0.38)
New Mexico (NM)	96.54%	NY(0.02) ND(0.91) TX(0.06)
New York (NY)	100.00%	26
North Carolina (NC)	96.29%	NY(0.03) ND(0.66) TX(0.31)
North Dakota (ND)	100.00%	40
Ohio (OH)	95.63%	ND(0.57) TX(0.32) WV(0.11)
Oklahoma (OK)	98.91%	IL(0.14) ME(0.25) ND(0.61)
Oregon (OR)	96.85%	CA(0.01) IL(0.01) NY(0.1) ND(0.88)

Pennsylvania (PA)	96.18%	CA(0.14) IL(0.15) NY(0.04) ND(0.66)
Rhode Island (RI)	94.72%	IL(0.04) ME(0.3) ND (0.66)
South Carolina (SC)	96.08%	NY(0.11) ND(0.54) TX(0.07) WV(0.28)
South Dakota (SD)	97.23%	NY(0.004) ND(0.99) TX(0.005)
Tennessee (TN)	96.13%	NY(0.04) ND(0.72) TX(0.24)
Texas (TX)	100.00%	15
Utah (UT)	100.00%	5
Vermont (VT)	95.42%	NY(0.01) ND(0.98) WV(0.01)
Virginia (VA)	96.69%	NY(0.19) ND(0.62) TX0.19)
Washington (WA)	97.80%	CA(0.11) ND(0.89)
West Virginia (WV)	100.00%	10
Wisconsin (WI)	97.15%	IL(0.13) ME(0.2) NY(0.08) ND(0.58)
Wyoming (WY)	96.32%	NY(0.003) ND(0.98) TX(0.02)

4.2. Virtual weights

(EP - Economic Performance; EG - Economic Growth; SM - Social Media; OP - Online Performance; RT - Rating)

DMUs	Virtual weights				
	EP	EG	SM	OP	RT
Alabama (AL)	0.47%	99.53%	0.00%	0.00%	0.00%
Alaska (AK)	0.09%	86.66%	0.03%	13.22%	0.00%
Arizona (AZ)	0.56%	78.43%	0.00%	9.70%	11.30%
Arkansas (AR)	0.00%	86.78%	0.11%	2.61%	10.50%
California (CA)	100.00%	0.00%	0.00%	0.00%	0.00%
Colorado (CO)	0.00%	74.20%	0.63%	15.58%	9.68%
Connecticut (CT)	0.56%	99.26%	0.18%	0.00%	0.00%
Delaware (DE)	0.00%	100.00%	0.00%	0.00%	0.00%
Florida (FL)	36.62%	0.00%	6.50%	56.91%	0.00%
Georgia (GA)	1.23%	98.56%	0.20%	0.00%	0.00%
Hawaii (HI)	0.00%	84.52%	1.41%	14.16%	0.00%
Idaho (ID)	0.16%	86.49%	0.05%	13.31%	0.00%
Illinois (IL)	0.31%	0.00%	0.30%	36.65%	62.73%
Indiana (IN)	0.10%	89.38%	0.00%	0.00%	10.52%
Iowa (IA)	0.07%	90.97%	0.00%	0.00%	8.96%
Kansas (KS)	0.34%	99.24%	0.00%	0.43%	0.00%
Kentucky (KY)	0.09%	91.19%	0.00%	0.00%	8.73%
Louisiana (LA)	0.34%	80.31%	0.00%	9.81%	9.53%
Maine (ME)	0.00%	85.61%	0.14%	2.23%	12.02%
Maryland (MD)	0.75%	99.25%	0.00%	0.00%	0.00%
Massachusetts (MA)	0.59%	75.08%	0.00%	15.90%	8.46%
Michigan (MI)	0.00%	86.41%	1.17%	0.00%	12.32%
Minnesota (MN)	0.45%	92.46%	0.06%	0.00%	7.04%
Mississippi (MS)	0.24%	75.56%	0.00%	15.33%	8.86%
Missouri (MO)	0.71%	81.74%	0.00%	14.09%	3.46%
Montana (MT)	0.00%	99.40%	0.61%	0.00%	0.00%
Nebraska (NE)	0.23%	99.76%	0.00%	0.00%	0.00%
Nevada (NV)	2.12%	97.76%	0.09%	0.00%	0.00%
New Hampshire (NH)	0.00%	99.58%	0.41%	0.00%	0.00%
New Jersey (NJ)	0.81%	90.57%	0.00%	0.00%	8.62%
New Mexico (NM)	0.35%	99.57%	0.08%	0.00%	0.00%
New York (NY)	0.00%	0.00%	99.82%	0.00%	0.00%
North Carolina (NC)	1.04%	98.86%	0.10%	0.00%	0.00%
North Dakota (ND)	0.11%	99.86%	0.03%	0.00%	0.00%
Ohio (OH)	0.78%	85.93%	0.00%	13.28%	0.00%
Oklahoma (OK)	0.07%	91.12%	0.00%	0.00%	8.82%
Oregon (OR)	0.33%	93.25%	0.14%	0.00%	6.29%

Pennsylvania (PA)	0.87%	92.08%	0.08%	0.00%	6.97%
Rhode Island (RI)	0.00%	88.40%	0.00%	2.12%	9.47%
South Carolina (SC)	0.48%	85.43%	0.22%	13.88%	0.00%
South Dakota (SD)	0.13%	99.83%	0.04%	0.00%	0.00%
Tennessee (TN)	0.87%	99.03%	0.11%	0.00%	0.00%
Texas (TX)	2.82%	97.07%	0.08%	0.00%	0.00%
Utah (UT)	0.13%	0.00%	0.03%	60.91%	38.94%
Vermont (VT)	0.00%	86.71%	0.10%	13.19%	0.00%
Virginia (VA)	1.16%	98.45%	0.38%	0.00%	0.00%
Washington (WA)	0.71%	99.28%	0.00%	0.00%	0.00%
West Virginia (WV)	0.69%	0.00%	0.01%	99.30%	0.00%
Wisconsin (WI)	0.13%	91.12%	0.26%	0.00%	8.51%
Wyoming (WY)	0.16%	99.81%	0.04%	0.00%	0.00%

Annex 5: DEA model based on real values with weight restrictions in scenario I

5.1. Efficiency scores and peers

DMUs	Efficiency score	Peers
Alabama (AL)	10.57%	NY(1.00)
Alaska (AK)	7.66%	CA(0.43) NY(0.57)
Arizona (AZ)	38.27%	CA (0.73) NY(0.27)
Arkansas (AR)	19.43%	CA(0.44) NY(0.56)
California (CA)	60.42%	NY(1.00)
Colorado (CO)	43.37%	CA(1.00)
Connecticut (CT)	28.94%	NY(0.1)
Delaware (DE)	5.10%	CA(0.64) NY(0.36)
Florida (FL)	100.00%	0
Georgia (GA)	45.44%	CA(0.61) NY(0.39)
Hawaii (HI)	47.92%	CA(1.00)
Idaho (ID)	11.94%	CA(0.45) NY(0.55)
Illinois (IL)	41.93%	NY(1.00)
Indiana (IN)	21.07%	NY(1.00)
Iowa (IA)	14.46%	NY(1.00)
Kansas (KS)	5.17%	NY(1.00)
Kentucky (KY)	15.44%	NY(1.00)
Louisiana (LA)	27.17%	CA(0.57) NY(0.43)
Maine (ME)	10.60%	CA(1.00)
Maryland (MD)	19.18%	NY(1.00)
Massachusetts (MA)	43.19%	CA(0.44) NY(0.56)
Michigan (MI)	47.84%	CA(1.00)
Minnesota (MN)	29.90%	CA(0.65) NY(0.35)
Mississippi (MS)	14.06%	NY(1.00)
Missouri (MO)	22.07%	NY(1.00)
Montana (MT)	10.99%	CA(1.00)
Nebraska (NE)	7.05%	NY(1.00)
Nevada (NV)	41.57%	NY(1.00)
New Hampshire (NH)	12.58%	CA(1.00)
New Jersey (NJ)	25.49%	NY(1.00)
New Mexico (NM)	18.57%	CA(0.49) NY(0.51)
New York (NY)	100.00%	39
North Carolina (NC)	37.47%	NY(1.00)
North Dakota (ND)	6.99%	CA(1.00)
Ohio (OH)	23.88%	NY(1.00)
Oklahoma (OK)	14.05%	NY(1.00)
Oregon (OR)	26.59%	CA(0.91) NY(0.09)

Pennsylvania (PA)	44.78%	NY(1.00)
Rhode Island (RI)	3.06%	NY(1.00)
South Carolina (SC)	32.21%	CA(0.86) NY(0.14)
South Dakota (SD)	8.29%	CA(1.00)
Tennessee (TN)	32.93%	CA(0.68) NY(0.32)
Texas (TX)	53.98%	NY(1.00)
Utah (UT)	8.88%	NY(1.00)
Vermont (VT)	7.20%	CA(1.00)
Virginia (VA)	48.93%	CA(0.72) NY(0.28)
Washington (WA)	14.85%	NY(1.00)
West Virginia (WV)	4.41%	NY(1.00)
Wisconsin (WI)	30.71%	CA(0.94) NY(0.06)
Wyoming (WY)	9.06%	CA(0.47) NY(0.53)

5.2. Virtual weights

(EP - Economic Performance; EG - Economic Growth; SM - Social Media; OP - Online Performance; RT - Rating)

DMUs	Virtual weights				
	EP	EG	SM	OP	RT
Alabama (AL)	30.00%	15.00%	5.00%	20.00%	30.00%
Alaska (AK)	25.02%	15.00%	9.99%	20.00%	30.00%
Arizona (AZ)	29.97%	15.00%	5.04%	20.00%	30.00%
Arkansas (AR)	25.25%	15.00%	9.76%	20.00%	30.00%
California (CA)	60.00%	5.00%	5.01%	5.00%	25.00%
Colorado (CO)	25.00%	15.00%	20.10%	20.00%	20.00%
Connecticut (CT)	25.00%	15.00%	12.38%	20.00%	27.65%
Delaware (DE)	28.49%	15.00%	6.50%	20.00%	30.00%
Florida (FL)	27.13%	15.00%	7.91%	20.00%	30.00%
Georgia (GA)	28.29%	15.00%	6.72%	20.00%	30.00%
Hawaii (HI)	25.00%	15.00%	19.96%	20.00%	20.00%
Idaho (ID)	25.36%	15.00%	9.65%	20.00%	30.00%
Illinois (IL)	29.99%	15.00%	5.01%	20.00%	30.00%
Indiana (IN)	30.00%	15.00%	5.00%	20.00%	30.00%
Iowa (IA)	30.00%	15.00%	5.00%	20.00%	30.00%
Kansas (KS)	50.00%	15.00%	5.00%	20.00%	10.00%
Kentucky (KY)	30.00%	15.00%	5.00%	20.00%	30.00%
Louisiana (LA)	27.38%	15.00%	7.61%	20.00%	30.00%
Maine (ME)	25.00%	15.00%	20.01%	10.00%	30.00%
Maryland (MD)	30.00%	15.00%	5.00%	20.00%	30.00%
Massachusetts (MA)	25.49%	15.00%	9.51%	20.00%	30.00%
Michigan (MI)	25.00%	15.00%	20.04%	10.00%	30.00%
Minnesota (MN)	28.76%	15.00%	6.23%	20.00%	30.00%
Mississippi (MS)	30.00%	15.00%	5.00%	20.00%	30.00%
Missouri (MO)	30.00%	15.00%	5.00%	20.00%	30.00%
Montana (MT)	25.00%	15.00%	19.97%	20.00%	20.00%
Nebraska (NE)	30.00%	15.00%	5.00%	20.00%	30.00%
Nevada (NV)	50.01%	15.00%	4.99%	20.00%	10.00%
New Hampshire (NH)	25.00%	15.00%	20.02%	20.00%	20.00%
New Jersey (NJ)	29.99%	15.00%	5.00%	20.00%	30.00%
New Mexico (NM)	26.16%	15.00%	8.83%	20.00%	30.00%
New York (NY)	25.38%	15.00%	19.96%	20.00%	19.65%
North Carolina (NC)	30.00%	15.00%	4.99%	20.00%	30.00%
North Dakota (ND)	25.00%	15.00%	10.00%	20.00%	30.00%
Ohio (OH)	30.01%	15.00%	5.00%	20.00%	30.00%
Oklahoma (OK)	30.00%	15.00%	5.00%	20.00%	30.00%
Oregon (OR)	25.00%	15.00%	16.73%	20.00%	23.24%

Pennsylvania (PA)	30.00%	15.00%	4.98%	20.00%	30.00%
Rhode Island (RI)	30.00%	15.00%	5.00%	20.00%	30.00%
South Carolina (SC)	25.00%	15.00%	13.38%	20.00%	26.61%
South Dakota (SD)	25.00%	15.00%	10.00%	20.00%	30.00%
Tennessee (TN)	29.26%	15.00%	5.73%	20.00%	30.00%
Texas (TX)	49.99%	15.00%	4.99%	20.00%	10.00%
Utah (UT)	30.00%	15.00%	5.00%	20.00%	30.00%
Vermont (VT)	25.00%	15.00%	10.00%	20.00%	30.00%
Virginia (VA)	25.01%	15.00%	11.82%	20.00%	28.15%
Washington (WA)	30.00%	15.00%	5.00%	20.00%	30.00%
West Virginia (WV)	30.00%	15.00%	5.00%	20.00%	30.00%
Wisconsin (WI)	25.00%	15.00%	12.83%	20.00%	27.20%
Wyoming (WY)	25.73%	15.00%	9.28%	20.00%	30.00%

Annex 6: DEA model based on real values with weight restrictions in scenario II

6.1. Efficiency scores and peers

DMUs	Efficiency score	Peers
Alabama (AL)	4.59%	NY(1.00)
Alaska (AK)	7.45%	NY(1.00)
Arizona (AZ)	25.12%	NY(1.00)
Arkansas (AR)	18.58%	NY(1.00)
California (CA)	27.39%	NY(1.00)
Colorado (CO)	58.29%	CA(0.7) NY(0.3)
Connecticut (CT)	31.44%	NY(1.00)
Delaware (DE)	3.75%	NY(1.00)
Florida (FL)	93.10%	NY(1.00)
Georgia (GA)	38.56%	NY(1.00)
Hawaii (HI)	59.21%	NY(1.00)
Idaho (ID)	11.45%	NY(1.00)
Illinois (IL)	21.55%	NY(1.00)
Indiana (IN)	11.95%	NY(1.00)
Iowa (IA)	7.47%	NY(1.00)
Kansas (KS)	3.08%	NY(1.00)
Kentucky (KY)	7.78%	NY(1.00)
Louisiana (LA)	22.79%	NY(1.00)
Maine (ME)	16.19%	NY(1.00)
Maryland (MD)	9.43%	NY(1.00)
Massachusetts (MA)	41.11%	NY(1.00)
Michigan (MI)	62.06%	CA(0.66) NY(0.34)
Minnesota (MN)	22.44%	NY(1.00)
Mississippi (MS)	7.22%	NY(1.00)
Missouri (MO)	11.17%	NY(1.00)
Montana (MT)	17.23%	CA(0.94) NY(0.06)
Nebraska (NE)	3.42%	NY(1.00)
Nevada (NV)	24.04%	NY(1.00)
New Hampshire (NH)	19.18%	CA(0.95) NY(0.05)
New Jersey (NJ)	11.78%	NY(1.00)
New Mexico (NM)	17.24%	NY(1.00)
New York (NY)	100.00%	49
North Carolina (NC)	24.83%	NY(1.00)
North Dakota (ND)	7.19%	NY(1.00)
Ohio (OH)	11.68%	NY(1.00)
Oklahoma (OK)	7.39%	NY(1.00)
Oregon (OR)	32.76%	NY(1.00)

Pennsylvania (PA)	29.36%	NY(1.00)
Rhode Island (RI)	1.32%	NY(1.00)
South Carolina (SC)	36.12%	NY(1.00)
South Dakota (SD)	8.59%	NY(1.00)
Tennessee (TN)	25.48%	NY(1.00)
Texas (TX)	29.39%	NY(1.00)
Utah (UT)	3.84%	NY(1.00)
Vermont (VT)	9.51%	NY(1.00)
Virginia (VA)	51.78%	NY(1.00)
Washington (WA)	6.53%	NY(1.00)
West Virginia (WV)	1.97%	NY(1.00)
Wisconsin (WI)	33.46%	NY(1.00)
Wyoming (WY)	8.60%	NY(1.00)

6.2. Virtual weights

(EP - Economic Performance; EG - Economic Growth; SM - Social Media; OP - Online Performance; RT - Rating)

DMUs	Virtual weights				
	EP	EG	SM	OP	RT
Alabama (AL)	15.00%	35.00%	15.00%	20.00%	15.00%
Alaska (AK)	15.00%	35.00%	15.00%	20.00%	15.00%
Arizona (AZ)	15.00%	20.00%	14.98%	15.00%	35.00%
Arkansas (AR)	15.00%	20.00%	15.01%	15.00%	35.00%
California (CA)	34.97%	15.00%	14.99%	15.00%	20.00%
Colorado (CO)	14.99%	19.54%	15.45%	35.00%	15.00%
Connecticut (CT)	15.00%	35.00%	14.99%	20.00%	15.00%
Delaware (DE)	15.00%	35.00%	15.00%	20.00%	15.00%
Florida (FL)	35.02%	15.00%	14.98%	15.00%	20.00%
Georgia (GA)	15.00%	35.00%	15.01%	20.00%	15.00%
Hawaii (HI)	15.01%	20.00%	14.92%	35.00%	15.00%
Idaho (ID)	15.00%	35.00%	15.00%	20.00%	15.00%
Illinois (IL)	15.01%	20.00%	15.00%	15.00%	35.00%
Indiana (IN)	15.00%	20.00%	15.00%	15.00%	35.00%
Iowa (IA)	15.00%	35.00%	15.00%	15.00%	20.00%
Kansas (KS)	15.00%	35.00%	15.00%	20.00%	15.00%
Kentucky (KY)	15.00%	35.00%	15.00%	15.00%	20.00%
Louisiana (LA)	15.00%	35.00%	14.99%	15.00%	20.00%
Maine (ME)	15.00%	20.00%	14.99%	15.00%	35.00%
Maryland (MD)	15.00%	35.00%	15.00%	20.00%	15.00%
Massachusetts (MA)	15.00%	20.00%	15.01%	35.00%	15.00%
Michigan (MI)	15.00%	19.26%	15.85%	15.00%	35.00%
Minnesota (MN)	15.00%	35.00%	15.00%	15.00%	20.00%
Mississippi (MS)	15.00%	35.00%	15.00%	20.00%	15.00%
Missouri (MO)	15.01%	35.00%	15.00%	20.00%	15.00%
Montana (MT)	15.00%	15.00%	28.88%	26.11%	15.00%
Nebraska (NE)	15.00%	35.00%	15.00%	20.00%	15.00%
Nevada (NV)	15.01%	35.00%	15.01%	20.00%	15.00%
New Hampshire (NH)	15.00%	35.00%	16.44%	18.56%	15.00%
New Jersey (NJ)	15.00%	20.00%	14.99%	15.00%	35.00%
New Mexico (NM)	15.00%	35.00%	15.00%	20.00%	15.00%
New York (NY)	19.99%	15.00%	34.94%	15.00%	15.00%
North Carolina (NC)	15.01%	35.00%	15.01%	20.00%	15.00%
North Dakota (ND)	15.00%	35.00%	15.00%	20.00%	15.00%
Ohio (OH)	15.00%	35.00%	15.01%	20.00%	15.00%
Oklahoma (OK)	15.00%	35.00%	15.00%	15.00%	20.00%
Oregon (OR)	15.00%	35.00%	15.02%	20.00%	15.00%

Pennsylvania (PA)	14.99%	35.00%	14.99%	15.00%	20.00%
Rhode Island (RI)	15.00%	35.00%	15.00%	15.00%	20.00%
South Carolina (SC)	15.00%	20.00%	15.02%	35.00%	15.00%
South Dakota (SD)	15.00%	35.00%	15.01%	20.00%	15.00%
Tennessee (TN)	14.99%	35.00%	15.00%	20.00%	15.00%
Texas (TX)	15.02%	35.00%	14.98%	20.00%	15.00%
Utah (UT)	15.00%	20.00%	15.00%	15.00%	35.00%
Vermont (VT)	15.00%	35.00%	15.00%	20.00%	15.00%
Virginia (VA)	15.01%	35.00%	15.00%	20.00%	15.00%
Washington (WA)	15.00%	35.00%	15.00%	20.00%	15.00%
West Virginia (WV)	15.00%	20.00%	15.00%	35.00%	15.00%
Wisconsin (WI)	15.00%	35.00%	14.97%	15.00%	20.00%
Wyoming (WY)	15.00%	35.00%	15.00%	20.00%	15.00%

Annex 7: Database used to analyse the ability of local TBOs in promoting tourism including TBO Budget, Online Performance (OP) and Rating (RT) values

DMUs	TBO Budget (millions US dollars)	Online Performance	Rating
Alabama	11.80	13.88	3.87
Alaska	12.84	15.04	3.45
Arizona	16.40	14.6	5.56
Arkansas	14.27	13.48	5.1
California	30.93	12.88	4.98
Colorado	15.72	15.36	4.88
Connecticut	5.78	13.78	3.4
Delaware	1.91	11.95	2.92
Florida	33.60	15.02	5.51
Georgia	10.44	12.22	3.14
Hawaii	72.41	15.43	3.8
Idaho	3.73	15.03	2.99
Illinois	49.16	12.28	6.78
Indiana	4.30	8.07	5.81
Iowa	5.11	12.2	4.91
Kansas	4.14	14.68	0.06
Kentucky	11.01	11.15	4.77
Louisiana	17.58	14.6	4.62
Maine	7.69	11.8	5.98
Maryland	11.33	9.93	3.11
Massachusetts	9.49	15.73	4.38
Michigan	19.29	11.82	5.59
Minnesota	9.18	13	4.53
Mississippi	8.39	14.75	4.46
Missouri	16.34	15.15	4.06
Montana	9.77	14.3	1.66
Nebraska	4.98	12.48	1.37
Nevada	12.72	11.53	2.29
New Hampshire	5.41	10.85	2.04
New Jersey	13.31	12.93	5.53
New Mexico	14.68	13.43	2.73
New York	17.51	15.55	4.91
North Carolina	12.68	11.25	3.45
North Dakota	3.29	15.23	4.05
Ohio	7.04	15.05	3.36
Oklahoma	10.02	12.23	4.87
Oregon	9.94	13.35	4.05
Pennsylvania	41.34	12.35	4.46

Rhode Island	1.19	13.35	4.48
South Carolina	16.35	15.71	3.29
South Dakota	9.92	13.1	3.24
Tennessee	14.39	14.08	2.24
Texas	33.27	15.55	3.25
Utah	12.65	15.18	5.9
Vermont	3.94	14.58	3.48
Virginia	16.31	14.36	3.21
Washington	4.41	13.73	3.36
West Virginia	11.63	19.05	3.56
Wisconsin	13.99	13.43	4.73
Wyoming	9.46	11.58	1.94

Annex 8: DEA model based on the budget TBO, online Performance and rating values aiming to evaluate the ability of local TBOs in promoting tourism

8.1. Efficiency scores and peers

DMUs	Efficiency score	Peers
Alabama (AL)	81.72%	ND(0.04) UT(0.49) WV(0.47)
Alaska (AK)	83.19%	UT(0.25) WV(0.75)
Arizona (AZ)	95.42%	UT(0.97) WV(0.03)
Arkansas (AR)	87.88%	UT(0.96) WV(0.04)
California (CA)	84.68%	UT(0.99) WV(0.008)
Colorado (CO)	93.96%	UT(0.7) WV(0.3)
Connecticut (CT)	85.06%	ND(0.71) UT(0.04) WV(0.25)
Delaware (DE)	85.12%	ND(0.34) RI(0.66)
Florida (FL)	96.77%	UT(0.91) WV(0.09)
Georgia (GA)	71.39%	ND(0.18) UT(0.32) WV(0.5)
Hawaii (HI)	87.08%	UT(0.34) WV(0.66)
Idaho (ID)	97.10%	ND(0.95) WV(0.05)
Illinois (IL)	100.00%	3
Indiana (IN)	100.00%	0
Iowa (IA)	93.89%	ME(0.38) RI(0.49) UT(0.13)
Kansas (KS)	92.82%	ND(0.9) WV(0.1)
Kentucky (KY)	80.35%	IL(0.007) ME(0.38) UT(0.61)
Louisiana (LA)	89.19%	UT(0.69) WV(0.31)
Maine (ME)	100.00%	5
Maryland (MD)	61.28%	ND(0.11) UT(0.62) WV(0.26)
Massachusetts (MA)	95.61%	ND(0.3) UT(0.37) WV(0.32)
Michigan (MI)	90.93%	IL(0.24) ME(0.44) UT(0.32)
Minnesota (MN)	86.12%	ND(0.3) RI(0.05) UT(0.64)
Mississippi (MS)	93.70%	ND(0.44) UT(0.42) WV(0.14)
Missouri (MO)	87.68%	UT(0.46) WV(0.54)
Montana (MT)	78.25%	ND(0.22) WV(0.78)
Nebraska (NE)	77.45%	ND(0.8) WV(0.2)
Nevada (NV)	61.42%	UT(0.07) WV(0.93)
New Hampshire (NH)	66.79%	ND (0.75) WV(0.25)
New Jersey (NJ)	92.52%	IL(0.06) ME(0.31) UT(0.63)
New Mexico (NM)	71.96%	UT(0.1) WV(0.9)
New York (NY)	94.92%	UT(0.69) WV(0.31)
North Carolina (NC)	67.99%	UT(0.65) WV(0.35)
North Dakota (ND)	100.00%	19
Ohio (OH)	88.79%	ND(0.55) WV(0.45)
Oklahoma (OK)	85.49%	ME(0.18) RI(0.15) UT(0.67)

Oregon (OR)	83.05%	ND(0.26) UT(O.51) WV(0.23)
Pennsylvania (PA)	79.10%	UT(0.89) WV (0.11)
Rhode Island (RI)	100.00%	4
South Carolina (SC)	84.82%	UT(0.14) WV(0.86)
South Dakota (SD)	76.18%	ND(0.24) UT(0.25) WV(0.52)
Tennessee (TN)	73.81%	WV(1.00)
Texas (TX)	83.91%	UT(0.13) WV(0.87)
Utah (UT)	100.00%	32
Vermont (VT)	93.81%	ND(0.92) WV(0.08)
Virginia (VA)	78.87%	UT(0.22) WV(0.78)
Washington (WA)	87.18%	ND(0.87) WV (0.13)
West Virginia (WV)	100.00%	36
Wisconsin (WI)	85.22%	UT(0.85) WV(0.15)
Wyoming (WY)	64.02%	ND(0.26) WV(0.74)

8.2. Virtual weights

DMUs	Virtual weights		
	TBO Budget	Online Performance	Rating
Alabama (AL)	19.89%	66.49%	33.51%
Alaska (AK)	0.00%	72.50%	27.50%
Arizona (AZ)	0.00%	61.36%	38.64%
Arkansas (AR)	0.00%	61.51%	38.49%
California (CA)	0.00%	61.00%	39.00%
Colorado (CO)	0.00%	65.55%	34.45%
Connecticut (CT)	10.21%	69.16%	30.84%
Delaware (DE)	13.97%	98.79%	1.21%
Florida (FL)	0.00%	62.24%	37.76%
Georgia (GA)	20.53%	68.29%	31.71%
Hawaii (HI)	0.00%	71.06%	28.94%
Idaho (ID)	11.18%	99.02%	0.98%
Illinois (IL)	0.00%	35.47%	64.53%
Indiana (IN)	12.38%	15.78%	84.22%
Iowa (IA)	10.41%	40.01%	59.99%
Kansas (KS)	12.83%	99.98%	0.02%
Kentucky (KY)	4.09%	11.00%	89.00%
Louisiana (LA)	0.00%	65.65%	34.35%
Maine (ME)	14.02%	34.62%	65.38%
Maryland (MD)	25.64%	63.86%	36.14%
Massachusetts (MA)	14.12%	66.52%	33.48%
Michigan (MI)	6.18%	10.06%	89.94%
Minnesota (MN)	17.34%	56.18%	43.82%
Mississippi (MS)	12.94%	64.66%	35.34%
Missouri (MO)	0.00%	69.29%	30.71%
Montana (MT)	30.91%	99.42%	0.58%
Nebraska (NE)	18.06%	99.45%	0.55%
Nevada (NV)	0.00%	75.27%	24.73%
New Hampshire (NH)	22.48%	99.07%	0.93%
New Jersey (NJ)	4.26%	11.00%	89.00%
New Mexico (NM)	0.00%	74.84%	25.16%
New York (NY)	0.00%	65.69%	34.31%
North Carolina (NC)	0.00%	66.35%	33.65%
North Dakota (ND)	18.87%	98.69%	1.31%
Ohio (OH)	21.05%	98.90%	1.10%
Oklahoma (OK)	20.50%	40.26%	59.74%
Oregon (OR)	16.92%	64.59%	35.41%
Pennsylvania (PA)	0.00%	62.61%	37.39%
Rhode Island (RI)	100.00%	98.35%	1.65%

South Carolina (SC)	0.00%	74.27%	25.73%
South Dakota (SD)	18.41%	69.11%	30.89%
Tennessee (TN)	0.00%	99.21%	0.79%
Texas (TX)	0.00%	74.31%	25.69%
Utah (UT)	21.15%	40.85%	59.15%
Vermont (VT)	12.15%	98.82%	1.18%
Virginia (VA)	0.00%	73.01%	26.99%
Washington (WA)	14.44%	98.79%	1.21%
West Virginia (WV)	27.53%	99.07%	0.93%
Wisconsin (WI)	0.00%	63.19%	36.81%
Wyoming (WY)	36.87%	99.17%	0.83%