Efficiency in the tourism sector

A conceptual analysis of international performance

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Abstract

In the twenty-first century, authors and scholars are faced with an overwhelming number of articles and dispersed information in every literature field. It is essential and for the greatest interest of mankind, that systematic reviews are undertaken with the goal of organizing and selecting the existent information. This way, providing scholars with easier access to synthesize reliable information and allowing them to continue with a sustained field progression.

An uprising field, prominent in the last three decades is tourism. Tourism has become a major global economic activity as the largest industry and employer of the world. Without possibly questioning its importance, tourism has become a vital source of wealth for many nations. Consequently, the field has caught the attention of governments, academics, and organizations all around the globe.

The present dissertation performs a systematic review, more precisely a Meta-analysis with a statistical and bibliometric analysis regarding the existent research on the efficiency of the tourism sector, fulfilling the current gap. Reviewing the current state of the tourism efficiency measurement literature serves as the main goal of this study.

By applying the PRISMA method, a sample of 130 articles is formed, with articles published from 1991 until 2021. The articles included measure the efficiency of tourism establishments or firms, more precisely hotels, airports, airline companies, and travel agencies. Ultimately, the dissertation concludes that the European and Asian countries were the most studied, more specifically Taiwan, Spain, and Portugal. The universally most used method is DEA. The most used inputs and outputs vary from sector to sector but are all number of assets or expenditures related. The publication growth during the period under analysis was 2,18%. The most relevant documents, authors, and sources in this literature field are Hwang and Chang, (2003), the Portuguese author Barros and the journal Tourism Management.

Keywords: Tourism efficiency, Frontier analysis, Systematic review, Meta-analysis, PRISMA, Bibliometric analysis

1. Introduction

As humanity evolves, it has become irrefutable that knowledge is key. Every day new papers are published, a new theme is explored and new questions emerge regarding any subject of the literature. As a consequence, twenty-first-century scholars have increasingly become swamped into mountainous virtual piles of new data and knowledge. As noted by quoted by Kim et al. (2018) and Pahlevan-Sharif et al. (2019) “for a field to progress, it must be conscious of its historical patterns to obtain insights into possible future developments and implications that contribute to the accumulation of knowledge”. It is therefore critical for the sustained progression of literature, that reviews studies are undertaken to analyze and detail what has already been done in each individual literature field. Specifically, systematic reviews are essential and have become the author’s best help, providing them with accurate and selective data and preventing them from nosediving into oceans of inadequate or valueless articles. A field of study that has seen an increase in interest in the last decades is tourism. Although its emerging significance has been firstly recognized in 1950, not until 1970 has tourism become a progressive field of study (Robinson et al., 2013). However, it is now, not only acknowledged as a major global economic activity but also has become the largest industry and largest employer in the world. Consequently, the field has caught the attention of many governments, academics, and organizations in both the public and private sectors (Lickorish and Jenkins, 1997). Without possibly questioning its importance, tourism has become a vital source of wealth for many nations. Within the tourism field of study, one particular subfield that has been prevalent in the last decade is the performance measurement field. As written by Altin et al. (2018), the significance of performance measurement and management regarding the success of businesses has been emphasized by all management perspectives and theories, and in this case, the tourism industry is no exception.

Both Sainaghi et al. (2017) and Assaf and Josiassen (2015) concur that the previous decade has seen a growth in scholarly interest in tourism performance measurement, with authors as Assaf and Josiassen (2012) and Barros (2005), commenting on it. Although, as stated by Sainaghi et al. (2017), it offers several benefits for practitioners, the concept of tourism performance

is not yet fully explored. Embedded in the performance measurement is the efficiency measurement which is one of few components that constitutes performance. This is an important technique that should be integrated into every business or industry, since, the simple use of performance or efficiency measurement, has proven to enhance the overall performance of businesses (Spekle & Verbeeten, 2014). The present work has as main goal to assess and analyze the current state and condition of the existent literature..

2. Tourism

2.1 What is Tourism?

As humanity evolved so did the tools, the means of transport, communication and technology which transformed travel into a progressively easier activity. Nowadays millions of people all around the globe take pleasure in visiting and moving from one country to another in relatively short periods of time, all these defines tourism.

Although it is often coupled with hospitality, tourism is not as focused on the business accommodations and food service operations as hospitality is, it focuses much more on the global experience of the travel, as well as all the marketing and destination management involved (Robinson et al., 2013). If there were still questions regarding the weight and impact of tourism, in 1992 those questions vanished as tourism became the largest industry and largest employer in the world. As Du et al. (2014) stated, tourism is the world's biggest industry on every economic measure, particularly concerning capital investment, gross output, employment, tax contributions, and value-added. Not only this, but is also the fastest growing industry, and, by turning into an important social and economic force, has enabled it to be affordable not only for the rich but for almost everyone all over the world.

2.2 Performance measurement

Performance measurement provides several benefits to practitioners (Sainaghi et al., 2017). As Altin et al. (2018) state, performance measurement is linked to strategy formulation and it can assist organizations when analyzing and evaluating their performance development. According to Spekle and Verbeeten (2014), the simple use of performance measurement can improve the overall performance of firms or industries, it is therefore essential for the management and strategic planning of tourism. Neely et al. (1995), defined it as "the process, metric or set of metrics used to quantify both the efficiency and effectiveness of actions."

Regarding the hospitality and tourism literature, performance measurement has long ago been an important issue (Assaf & Josiassen, 2015). When focusing only on hotels Ben and Goaied (2016) claim that hotel firms have high fixed costs, and therefore, to survive and create a profit margin they must maintain a high-performance level. Hence, for the sake of evaluating the performance of implemented strategies, hotels are required to use adequate performance measurement tools. A suitable metric to measure performance in tourism is the "efficiency" (Luo & Homburg, 2008). This method has been recently used by diverse authors to measure hotel and tourism performance. As Assaf and Tsionas (2019) mentioned, the use of efficiency metrics is well-suited for evaluating theories and experimenting putting into practice strategies associated with a competitive upper hand.

2.3 Efficiency

Hubbell (2007) made an interesting comment regarding efficiency, defining it as the barometer of the "how" of operations, since it informs and measures the performance of operations and if everything is working in the best way possible. However the most recent definitions found for tourism in the hotel sector is the following and was written by Niavis and Tsiotas (2019) "the ability of destinations to exploit the capacity of their hotels, labor, and attractions to maximize their tourism demand". Fried et al. (1993) presented two main reasons explaining the importance of efficiency measuring, firstly, because efficiency is used to measure performance and therefore it is a success indicator. Secondly, seeing that only by analyzing and studying it may one identify the sources of its efficiency, or lack of it, and therefore explore how to improve overall performance. Additionally, as Fare et al. (1985) highlighted, efficiency is a crucial feature of a producer's performance, which unfortunately is sometimes neglected by the literature.

2.4 Frontier Analysis

Efficiency is usually measured by some index associated with the perceived and desired performance. To analyze efficiency and performance, scholars, tend to use methods of frontier analysis. To do so, one must begin by calculating the production or cost frontiers. Assaf and Tsionas (2019) defined this frontier as being a representation of the maximum level of outputs that can be obtained considering a certain vector of inputs. Authors have relied on different statistical methods to evaluate the production frontiers, the various techniques used can be classified into two main categories: nonparametric and parametric frontier approaches (Cracolici et al., 2008).

There are different methods that are considered nonparametric, but the most popular and well-known is the Data Envelopment Analysis (DEA). Its popularity by scholars comes from its flexibility since it does not require any previous specification or assumption regarding its functional form and also it is possible to be applied when various inputs are used to produce several outputs (Cracolici et al., 2008). DEA implements a linear programming approach while, a parametric method, utilizes an econometric approach (Assaf & Tsionas, 2019). Taking this different approach, the most prominent method is the Stochastic Frontier Approach (SFA) which, according to Assaf and Josiassen (2015), takes a parametric

fashion to estimate the same frontier. The authors also explain that the efficiency scores are computed in comparison to the maximum feasible output given by the stochastic frontier.

There has been an extensive debate in the literature, regarding which is the best frontier approach. However, there is not a correct answer for this question, since both parametric and nonparametric methods have their advantages and disadvantages. A brief comparison between both methods is presented by Button and Weyman (1994), where the authors state that the nonparametric approach provides a measurement of the efficiency while the parametric approach measures and explains the efficiency obtained. According to Assaf and Josiassen (2015), the most flexible approach is nonparametric since there is no need for a specification of a functional form between inputs and outputs.

3. Literature Review

When analyzing the literature on the efficiency of the tourism sector two different types of articles were found, reviews articles of what has already been made on the area and also reviews of reviews.

From the reviews of research, on the tourism literature only a few studies were found, none of which were specifically efficiency focused. Although no reviews were efficiency-related, some explored it indirectly by emphasizing performance. Performance and efficiency are related as already mentioned above. Three different studies were found exploring performance, for instance, Sainaghi et al. (2017) conducted a meta-analysis by synthesizing tourism and hospitality research. A bibliometric analysis was used since it is a conventional form of meta-analysis. The study was based on quantitative content analysis, using Computer-Aided Text Analysis(CATA). This analysis carried off 978 articles covering nineteen years (from 1996 to 2014), and the sample was selected according to their keywords, journal, and year of publication. In the author's view, CATA is not a commonly used method in the literature, and therefore, future research should consider it.

The first to critically review the application of frontier studies in the tourism literature, is the study from Assaf and Josiassen (2015). A summary of what characterizes the studies in the literature was made, starting by giving a background of frontier analysis and then debating on the dissimilarity between the nonparametric and parametric frontier methods. A meta-analysis was conducted to explore the consequences of the frontier methods on the estimation of the efficiency in tourism studies. Future research is recommended to focus on the need for more variability in the geographical distribution of frontier studies and address the efficiency comparison between countries.

The most recent study found was a critical literature review by Altin et al. (2018). The review was founded on three dimensions: an advance on ontological and epistemological issues, on the purpose of performance measurement, and the emerging contexts. The lack of articles was evident since only three papers were found that explored the literature regarding the hotel performance measurement. The authors draw attention that there is a need to conduct bibliometric studies that consider quantitative methods and employ relational bibliometric analyses. Future research should review the progress on performance criteria in the hotel industry.

Regarding review of reviews type of articles, these are studies made to analyze and comment on the already existent reviews, measuring and balancing the number of studies made as well as their individual focuses. They provide a glance at how reviews have been undertaken in the area of hospitality and tourism, determine the existent trends and discuss the impacts of these studies in the literature. The first study of this type to ever been published on the matter is Kim et al. (2018), a systematic analysis of review studies. The analysis looks into the leading hospitality and tourism journals listed in the Web of Science and after applying their data collection method it comes to a final sample size of 171 studies. By analyzing and classifying these articles Kim et al. (2018) concludes that there is a wealth of qualitative reviews compared with quantitative and a noticeable lack of meta-analytical reviews. As a rule, the data collection method used is based on multiple keyword searches. The authors pointed out the number of meta-analytical reviews, which was relatively low due to their more complex review approach and analysis technique.

Assaf and Tsionas (2019) published a paper introducing a review mainly focused on frontier models. Shockingly only one study was found implementing a stochastic DEA in the tourism literature. The authors noticed that most Stochastic Frontier applications in tourism have not considered some issues as endogeneity and heterogeneity. It was recommended that tourism scholars should take a more vigorous look into the measurement of tourism performance subject to bad outputs. Pahlevan-Sharif et al. (2019) published a study that differs from the previous one by using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method, allowing a more standardized procedure and achieving a final sample size of 192 articles. From this sample, the authors perceived that the studies performed from 2012 to 2017 covered more than 75% of the articles, which reveals a humongous growth of interest in the sector. The study also exposed Google Scholar as being the most popular search engine used in more than 40% of the sample. The authors also criticized previous studies for not taking into consideration or indicating on the paper the eligibility criteria provided by the PRISMA protocol for systematic reviews. Absent in several papers was also a flow diagram describing the steps of the systematic process of review. Ultimately the authors urge that there remains an urgent need for

consistency of systematic reviews in the field of tourism and hospitality.

Based on this literature review, one can notice that there are no current reviews focused exclusively on the efficiency of the tourism sector. Some authors address the need of using the PRISMA method correctly and that there is usually an absence of a flow diagram describing the steps of the systematic process of review. Kim et al. (2018) pointed out that the number of meta-analytical reviews, was relatively low and more articles in this field should invest in this type of review. Altin et al. (2018), draw attention to the need to conduct bibliometric studies that consider quantitative methods and employ relational bibliometric analyses.

4. Methodology

4.1 Reviews

According to the Oxford English Dictionary, a review article can be defined as "a paper in a journal that summarizes recent literature on developments in a particular subject". For a field of study to advance a continuous growth of research scholarship must be developed. Researchers need to be aware of its historical patterns to acquire insights for potential future developments (Dwivedi et al., 2011). There is therefore an irrefutable need for reviews of existent research, or in other words, as said by Gough et al. (2017:5), there is a necessity for secondary research or secondary level of analysis that gathers the findings of primary level research. It is also defended by the authors that reviews should be one of the first steps before taking any kind of major decision regarding academia planning new primary research. Reviews became crucial tools for researchers that desire to be updated on new studies and findings that are piling up in their field of research.

In their book, Gough et al. (2017:5) enumerated several reasons why reviews are needed. Firstly, there is always the possibility of individual research to be fallible, all research should be treated as questionable in a certain way, therefore the need to review papers analyze and synthesize them is essential, especially since there are cases where research reports had fabricated results. Some studies may not even be trustful enough, not because of mistakes but because of its scope or context being of limited relevance.

Although there is not a unanimous consensus on how reviews are divided into types, the majority of authors agree on the existence of two types of reviews: narrative reviews and systematic reviews. A traditional narrative review is more likely to be based on bias studies while a systematic review is more trustworthy to provide unbiased conclusions from systematic research. As a consequence, systematic reviews are undertaken to answer more specific and commonly narrow questions, and they stand out by providing objective, replicable, systematic and comprehensive coverage of a particular field (Weed, 2006). Systematic reviews are less likely to commonly seen forms of bias due to their caution when using methods of research. In a systematic review, contrary to an unsystematic review, authors are expected to report the source of the information gathered and detail the process of how the data was used to reach a conclusion.

Roughly explained, briefs of research that do not contain detailed reports of systematic methods, are designated narrative reviews, while studies where the findings of primary studies are only summarized and not statistically aggregated, are characterized as qualitative systematic reviews. In this case, these reviews may even be more specified, and considering their features, can be labeled as an overview, critical review, literature review, state-of-the-art review, systematized review, etc.…On the other hand, a systematic review that implements statistical techniques to aggregate the results can be denominated as a quantitative systematic review, that can also englobe more specified methods as bibliometric analysis. The most commonly known type of quantitative systematic review is the meta-analysis, that by aggregating quantitatively the results of various studies, reach more accurate and credible conclusions.

Taking into consideration all the aspects mentioned above this article considers, for this case, the most appropriate type of review, to be a quantitative approach of systematic reviews, more specifically a meta-analysis. This analysis offer rigorous answers by combining results of various similar studies, providing a solution for busy scholars or investigators that have difficulty keeping updated on the current literature Carr (2002). When compared to qualitative systematic reviews, meta-analyses present several advantages, including an increase in power, better precision, and the capacity to find patterns among studies (Paré et al., 2015). Meta-analysis can estimate more precisely the effects of a certain phenomenon being studied, by combining statistically significant with statistically insignificant findings from the literature (Paré et al., 2015).

4.2 Data collection and extraction method

This research is conducted following the guidelines of the PRISMA method, which is known for being widely used and is considered one of the best and more precise systematic methods for data collection and extraction. While performing the data collection, a checklist of 27 parameters was taken into consideration as well

as a four-phase flow diagram. The checklist addresses the title, abstract, methods, results, discussion, and funding to guarantee a complete reporting of systematic reviews. The databases selected were the Web of Science, Scopus, and Google Scholar, and the search was executed during August and September of 2021. A keyword simulation test was carried out to obtain the highest number of results, after experimenting with different words, the search began to take place using "tourism efficiency". Reference lists from the

sample of studies gathered were also used to increase the search and the scope of the final sample Overall, the sum of the total results was 2562 studies. From this significantly vast sample, a group of 438 duplicates were removed and the remaining were examined through the inclusion and exclusion criteria.

Starting with the inclusion criteria, for an article to be included it must meet the following characteristics: written in English; published from January 1991 to August 2021; contemplate efficiency measurements; reviews; articles; tourism efficiency-focused, quantitative studies, international studies and studies of any of sectors: hotels, airports, airline companies, and travel agencies. From the exclusion criteria were excluded articles from the following types: letters; reports; books; book chapters; editorials; notes; biographical items; retracted publications; bibliographies, and conference articles. A total of 1872 articles, were excluded because they failed all inclusion criteria or included at least one exclusion criterion. The reports sought for retrieval were at this point 252, although from this number, 79 reports could not be retrieved.

To the remaining 173 articles a full-text analysis was conducted to appraise the eligibility of the documents. Articles that did not use clear data collection methods; did not present the total sample number, the source of the data, the specific countries, the years of the data collected, the inputs and output data, measured the efficiency by region or country or presented unclear results, were rejected. A total of 82 studies were rejected in this step. Additionally by analyzing some reference lists an additional 90 articles were sought for retrieval. From this number, 35 could not be accessed and were excluded. Out of the last 55 studies, 15 were excluded due to measuring hotel efficiency by region or province, and due to dubious or unclear data collection methods. This resulted in an inclusion of 40 extra studies. A final sample of 130 studies was formed.

5. Data results and analysis

For the data extraction, a laborious procedure is carried out by analyzing every one of the 130 articles and retrieving the following relevant data: author name and publication's year, country of study, year(s) studied, sample size, sector, methodologies used, input and output variables used and main results.

5.1 Statistical global overview of data

Statistical measures are applied in Table 1 regarding the data compiled from the sample.

Regarding the number of articles that compose the samples a high coefficient of variation can be spotted, due to the large dispersion of the values. The majority of studies employ only one method, however many authors apply 2/3 different methods, with the goal of obtaining more accurate results and compare the different methodologies and dissimilarities between their results. More inputs than output variables are used. It is preferred by authors to use 3/4 input variables. The majority of the articles measure the efficiency of hotels (94 articles), 24 the airport sector and the remaining on airline companies (7) and travel agencies (5).

Table 1 - Statistical measures applied to the data collected

	Number of years studied	Sample number	Number of Methods	Number of inputs	Number of outputs
Mean	4	160	1	3	3
Median	3	43	1	3	3
Mode	1	15	1	3	3
Standard deviation	4	481	0,42	1	1
Coefficient of variation(%)	92	301	36	39	46
Minimum value	1	3	1	1	1
Maximum value	22	3600	3	11	6

Concerning the countries in an overall analysis, 52 countries were studied and the most studied country was Taiwan with 37 publishments, followed by Spain (22) and Portugal (13). Asia and Europe dominate the field being present in roughly 82% of all studies. Curiously when looking into the continents with more countries being studied, Europe leads this field, with 24 different countries, representing 46% of all sample countries. The Asian continent has 16 studied countries, Africa has 5, Oceania 3, North America 2, and South America 2. The lack of nation's variety in some continents is not only related to the shortage of studies but also due to some continents are composed of few but sizable countries, such as: Australia and the USA. The scarcity of articles and countries reviewed in Africa and South America might be a consequence of being generally poor continents.

Two peculiar methods catch the eye when looking at the earlier years analyzed in the sample. The Multiple Regression Analysis method, only used by Baker and Riley (1994), and the Variable Factor Productivity Regression (VFP) model used also once in Oum et al. (2006). The Bayesian distance frontier model and the Bootstrapped Malmquist Index also almost negligibly appear on the sample. DEA is the most widely utilized method and is applied in roughly 85% of the sample. SFA is the second most common method used in 15 studies.

It would be expected that the number of published articles per year would constantly increase throughout the years, due to technological evolution and the growth of tourism and education. However, as it can be witnessed, there are some drastic declines in the number of papers published. The most shocking detail might be the shortage of articles available since 2018. In the last three years, a miserable sum of 12 articles were published. This lack of articles may be a consequence of the Covid-19 pandemic. However a different view reveals that every 10 years since 1991/1992 the number of published articles in the field has increased.

To analyze the data extracted in the best fitting way, henceforward the analysis presented will be exclusively related to each single sector at a time.

5.2 Hotel sector's statistical analysis.

Out of 95 articles, 36 different inputs were reported. Number of rooms and number of personnel are the two leading inputs, either being used in 60 studies, which statistically represent 63% of the sample (each). In third place appears the operating costs, followed by personnel expenditures and floor area of food and beverage. To quantify the F&B department (food and beverages) different variables are used, for instance: "Floor area of F&B", "Number of seats", and "F&B expenditures". Occasionally, the operating costs are divided into specified variables as: "Material-type expenditures"; "Administrative expenses"; "Marketing costs", and "Cleaning costs". Focusing on the outputs, 21 variables were found. Used in 48 of the 95 articles, the "Accommodation revenue" rules the output variables, contributing to the efficiency measurement of around 47% of all hotels. The second most used output is the "F&B" expenditures". It is interesting to notice that the four most used variables are revenue-related. As regards to, number of assets-related outputs, the two most used variables are "Number of guests" and "Number of rooms sold".

A total of 28 methods or variants of methods were found, although most authors rely only on one method per study. Once more, the DEA method is the most utilized method of the sector. It not only appears 39 times as the simple classic DEA method, but also when considering the variants, is utilized on an additional 38 articles, influencing 77 out of 95 articles, representing roughly 81% of the sample. In the second place SFA emerges being used in 8 studies. Regarding the Output-oriented DEA and the Input-oriented DEA, both are the most used methods variants. The Bootstrapped Malmquist Index and the Stochastic cost econometric frontier are the only two methods out of the top 10 most used that are not directly DEA or SFA supported.

The two most studied continents are Asia and Europe, with 13 and 11 countries studied. The least represented continent turns out to be North America, with the only addressed country being the United States The data shows that Taiwan continues to be the country mentioned in more studies, with 34 appearances, followed again by Spain and Portugal. These three most studied countries appear in more than 64% of the sample articles.

5.3 Airport sector's statistical analysis.

From 24 articles, a total of 18 different input variables were found. The five more utilized variables are used in approximately 53% of all the studies.

The number of personnel is the most used variable used in 11 studies. From the top 10 inputs, only the Operating costs, the Physical capital, and the Personnel expenditures are costs related. Out of the 7, non-costs related variables, four are relative to dimensions and three are measured as quantities. The ones related to dimensions are "Runway length", "Passenger terminal area", "Apron area", and "Airport area" The remaining three inputs are the "Number of personnel, "Number of runways", and "Number of gates". Regarding the outputs, 17 variables were found. According to the data collected the average number of outputs used is lower than the inputs, with less than three variables per study. The most used five variables are applied in more than 78% of the articles. The most used output is the number of passengers, used in 79% of all articles Two peculiar variables commonly chosen are Aircraft movement and Passenger movement. The third most used output is the Total cargo variable typically measured in tonnes.

In the airport sector sample, 12 methods or variants of methods were found. According to the media calculation, most authors rely on only one method per study. The five most used methodologies are used in more than 78% of the studies. DEA is still the most applied method by a significant lead, followed by the SFA method and two DEA variants.

Europe and Asia are again the continents with most countries studied, however, opposite to the hotel sector, in the airport sector, Europe has more countries evaluated than Asia, with respectively 19 and 10 countries. This means that more than 54% of the articles are located in Europe. Regarding the number of articles published, Europe still appears in the first place, with 11 articles, however, surprisingly, the second place goes to Oceania, with 7 articles published. The most explored country is New Zealand with six publishments, followed by the United States with five.

5.4 Airline Company's sector statistical analysis.

From the seven studies in the sample, 9 inputs and 8 outputs were used. The average number of variables show a media value of four inputs and two outputs per article

The most used input is Operating costs and is utilized in 86% of the studies. The number of personnel, number of planes, the available seat, the personnel expenditures and physical capital are also utilized in the sample. Additionally, Aircraft fuel is also used and is measured by the number of gallons of fuel consumed. The passenger revenue is the most used output variable utilized in almost 72% of the articles. The remaining variables are cost or assets related and have already been mentioned. It is still worthy to highlight that the average number of inputs used is almost double of the outputs and the variety of different input variables is still more diversified than the outputs. The minimum number of inputs used was 3 and the maximum 5, while the

minimum number of outputs used was 1 and the maximum 3.

DEA once again emerges with a percentage of 72% of the studies relying on it. The remaining methods are the Bayesian distance frontier model and the Bootstrapped Malmquist Index. Regarding the countries 77 different airline companies were studied in the sample and the locations of their headquarters are distributed through Europe, Asia, and North America.

5.5 Travel agencies' sector statistical analysis.

From the five articles in travel agencies' sector 7 inputs and 5 outputs were found. The average number of inputs used by authors is 3 per study, while the average number of outputs doesn't even come close to two variables. The two most used inputs are the number of personnel and the potential service, appearing each in three out of five articles. Total expenditures, Operational costs, Personnel expenditures, and Physical capital continue to be commonly used input variables. Regarding the outputs, the most used is the number of customers, used in three out of five articles, which composes 60% of the sample. This variable can be compared to the number of passengers and number of guests that were mentioned in the analysis of the previous sectors. The second most used variable is the average spend per customer followed by net profit, sales, and total revenue.

Out of the five articles, four of them used the classic model of DEA and the remaining used a variant of the method jointly with the inverse ~~B~~-convexity. In the travel agency's sector, only five countries were studied: Turkey; Spain; Taiwan; Morocco and Croatia.

6. Bibliometric Analysis

Bibliometric methods are divided into two categories: evaluative techniques and relational techniques (Benckendorff & Zehrer, 2013). The relational techniques search for links between published articles, by considering their keywords, citations, authors, and affiliations to conduct co-occurrence (Figueroa-Domecq et al., 2015). Some of the most used relational techniques are co-citation and bibliographic coupling, this section applies co-citation analysis to the references, authors, and sources collected.

The sample scope had to be narrowed, the reason behind this is that when performing this analysis, it was not possible to utilize citation data from more than one database. As mentioned before, to compose the 130 articles sample, studies from three distinct databases were gathered. Although many articles were simultaneously found in different databases, there were still some studies missing. Hence, after tracking down the articles, it was concluded that Web of Science had 107 articles, Scopus had 118, and Google scholar only had 94 studies. With the purpose of working with the largest possible sample, Scopus' citation files were used to perform the analysis, this way the new sample is composed of 118 articles. To conduct the analysis, Scopus data files were imported into the Bibliometrix R package software. Using Biblioshiny in the Rstudio software, it was possible to extract essential data and to develop tables and graphics. Table 2 provides the main information given by the system.

Table 2 - Main information regarding the collection

Description	Results
Documents	118
Period	1994-2021
Annual Growth Rate	2.81%
Average citations per documents	59,19
Authors	204
Author Appearances	278
Authors of single-authored documents	13
Authors of multi-authored documents	191
Documents per Author	0,58
Authors per Document	1,73
Co-Authors per Documents	2,36
Collaboration Index	1,95

Regarding the Annual Growth Rate of published articles, there is a percentage increase of 2,81%. Figure 1 displays the growth rate of the number of published articles and the mean total citations (TC) of the collection.

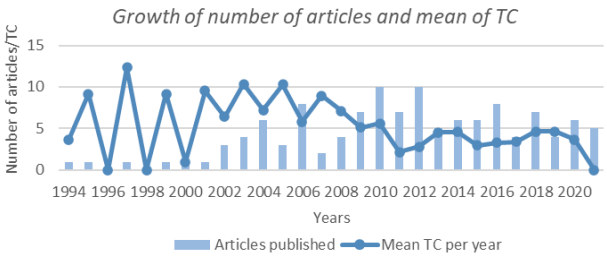

Figure 1- Growth of number of articles and Mean of TC per year

It can be observed that these two variables are not aligned with each other, in other words, when one grows, the other does not necessarily grow as well, in some cases, it might even decrease, which can be spotted for instance from 2006 to 2007.

The source of the highest number of articles is Tourism Management journal, with 12 documents, followed by the International Journal of Hospitality Management and Tourism Economics, both with 10. Regarding the sources with higher local impact, Tourism Management still appears in first place with a total of 1066 citations, followed by the International Journal of Hospitality Management with 1054. It is also interesting to display the most used keywords. The most used Author's keyword is "Efficiency", appearing in 39 articles and the most used Keyword-Plus is "Data envelopment analysis" appearing in 45 articles.

Regarding the co-citation analysis, it is a bibliometric technique that evaluates the frequency with which two articles are referenced together, suggesting their resemblance and proximity (White & Griffith, 1981). It can be used for publication, authors and sources. Two documents are considered to be co-cited if they are simultaneously cited by a third one. The association between those two documents is as strong as the number of documents citing both

documents (Ruggeri et al., 2019). The article with the highest number of citations is Hwang and Chang (2003) with 339 citations and is the most impactful and influential in the collection. It is important to note that the documents with higher total citations are mainly the ones with greater average number of citations per year.

The co-citation graphics are designated as co-citation maps or bibliometric networks. The following graphs were constructed using VOSviewer software, which is a computer program for bibliometric mapping. This software addresses the graphical representation of bibliometric maps, being particularly helpful by presenting wide bibliometric maps in a clear and comprehensible way. It was therefore chosen for its ability to provide easy visualization of the co-citation network. On these bibliometric maps, circles symbolize the items (which in this approach will be document references, authors, and sources). Circles increase in size as the number of citations or occurrences grows. In this study, the weighting attribute is measured in the number of citations. Therefore, items with a higher number of citations are shown more notably and close to each other than articles with fewer citations. According to Van Eck and Waltman (2010), the weighting of the items implies their value and significance among their clusters. The path length calculates the distance between items; the closer two items are, the stronger they are related. The lines shown connecting different items are named links. Each link was given a strength rating, which is displayed as a positive numerical value. The stronger the link, the greater the strength (Shah et al., 2019).

6.1 Article's co-citation analysis

Figure 2 presents the bibliometric network of the article's co-citation. To avoid an overlapping of the items, not all articles are displayed.

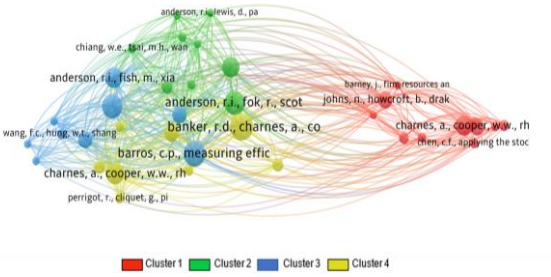

Figure 3 - Document's references co-citation analysis network

In this analysis the association strength method was applied, given that it is the most broadly used. The software allowed a minimum number of citations of a cited reference to be selected. Since there were 4142 cited references found, it was chosen a minimum of 6 citations, consequently, the analysis englobes 37 documents. Within these 37 articles, four clusters were identified. The results reveal a total of 429 links and 1230 link strength.

Cluster 1 is composed of eleven articles making it the largest sample. It is the second most cited cluster, with a total of 98 citations. However, it is also the weakest cluster, with only 450 total links strengths. The articles with the most impact are Johns et al, (1997) with 82 link strength (13 citations) and Hwang and Chang (2003) with 59 link strength (13 citations).

Cluster 2 contains nine documents and is the least cited cluster, with only 83 citations. It contains the oldest set of articles, all ranging from the 1950s until the early 2000s. The articles with more impact are Anderson et al, (2000) with 145 link strength and Baker and Riley (1994) with 82 link strength, these are also the two articles with more citations.

Cluster 3 is a collection of nine articles and is the most impactful cluster, with a total of 803 link strengths. With 106 citations, this is also the most cited collection. The most important articles are Hwang and Chang (2003) with 159 link strength (19 citations), which is the greatest value of the entire analysis, and Barros (2005a) with 144 link strength (20 citations).

Cluster 4 is composed of only 8 articles being the least numerous of the four clusters. However, it is the second with the highest impact, having a total link strength of 607. It is the second to last cluster regarding the number of citations, with only 91 citations. Banker et al, (1984) with 141 link strength and 22 citations and Barros and Mascarenhas (2005) with 13 citations and 95 link strength are the articles with the most impact.

6.2 Author's co-citation analysis

Figure 3 presents the bibliometric network of the author's co-citation analysis.

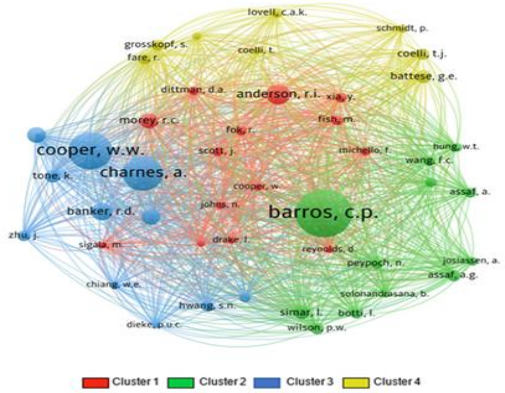

Figure 2 - Authors' co-citation analysis network

A total of 3403 authors were gathered and a restriction of 30 minimum citations of an author was implemented. A total of 45 items were found divided in four clusters. The overall results provided by the software reveal a combined total of 41787 link strength and 989 links.

Cluster 1 includes 14 authors, being the largest cluster of the analysis and also the one with the highest number of links (616), which turns out to be irrelevant since, it is the second to last regarding total links strength (21948) and the number of citations (648). The most relevant

authors are Anderson (3618 links strength, 105 citations), and Morey (2565 links strength, 78 citations).

Cluster 2 is composed of 12 authors and is ranked second concerning the number of citations (799) and link strength (25399). Barros is the author with most impact, in the cluster and on the entire analysis. With 285 citations and 8599 link strength, Barros leads the ranking, followed by Simar with 2031 link strength and 65 citations. Barros is also the author with the greater contribution to the sample, with a total of 13 published articles.

Cluster 3 has eleven authors and with 25399 link strength and 799 citations, is the most impactful cluster of the analysis. Cooper (5624 link strength, 213 citations), and Charnes (4848 link strength, 192 citations) are the most influential authors of the cluster.

Cluster 4 is composed of 8 authors, and is the most limited cluster, as well as the least relevant one with only 375 citations and 10588 link strength. The most relevant items are Battese (1820 link strength, 66 citations), and Coelli (1767 link strength, 55 citations).

6.3 Source's co-citation analysis

Figure 4 presents the bibliometric network of the sources' co-citation analysis.

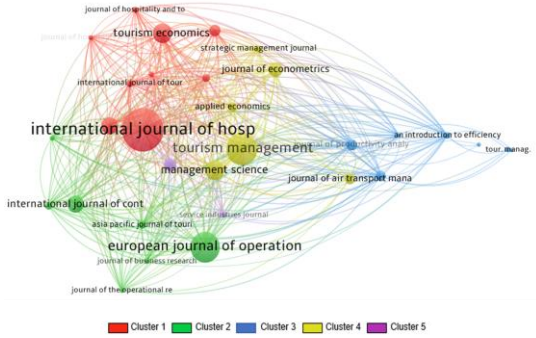

Figure 4 - Sources' co-citation analysis network

A total of 1491 sources were collected and a restriction of a minimum number of 20 citations of a source was imposed. 31 items were found, scattered into five clusters. The results display a total of 379 citations and 23129 link strength.

Cluster 1 is the widest collection, with 9 sources and is the most relevant, leading in all rankings, with the highest number of links (236), highest value of total link strength (17880), and most citations (710). Leading the ranking some renowned journals appear as the International Journal of Hospitality Management (6780 link strength, 282 citations) and the Tourism Economics (2722 link strength, 111 citations).

Cluster 2 has 7 sources and is the third regarding total link strength (10836) and number of citations (434). The most influential journals are the European Journal of Operational Research (3699 link strength, 187 citations) and the International Journal of Contemporary Hospitality Management (2846 link strength, 96 citations).

Cluster 3 is composed of 7 sources and is the second to last important cluster regarding the number of citations (232) and total link strength (3830). The journal with more citations (58) is Omega with 1216 link strength, followed by the Journal of Productivity Analysis with 54 citations and 1483 link strength.

Cluster 4 includes 6 items and is ranked as the second most influential journal, with 539 citations and 11504 link strength. In first place appears one of the most renowned and better-ranked journals related to the tourism sector, the Tourism Management with 4995 link strength and 201 citations. It is followed by the Management Science with 2324 link strength and 113 citations.

Cluster 5 with only two journals is the shorter cluster of all the analyses. Consequently, it is the least relevant cluster with only 88 citations and 2202 link strength. The two journals included are the Cornell Hotel and Restaurant Administration Quarterly (1579 link strength, 65 citations) and the Service Industries Journal (623 link strength, 23 citations). This is the least influential cluster, due to the fact it is only composed of two not journals.

7. Conclusions, limitations and future directions for research

This paper focus is to analyze what has already been done in the tourism efficiency measurement literature. In terms of the author's main conclusions in the hotel efficiency sector, a large percentage of studies have demonstrated high levels of inefficiency in the hotel industry all around the globe, in other words, the majority of hotels in the samples turned out to be not efficient. Concerning the hotel's star rating, the greater part of the articles that addressed this matter have stated that four-star hotels hold higher levels of efficiency when compared to five-star hotels. When comparing chain-managed hotels and independent-managed hotels, it was unanimously concluded that chain-affiliated hotels perform more efficiently than independent hotels. It was also discovered that international hotels or international chain-hotels have higher efficiency levels. Further statements have been claiming that resort hotels are more efficient than hotels located in urban areas.

To sum up, the following conclusions were found, starting with a global overview, from the analysis of 130 articles, the majority measures the efficiency of hotels (94 articles). In total 52 countries were studied and the country emerging in more articles was Taiwan with 37 published papers, followed by Spain (22) and Portugal (13). Asia and Europe dominate the field of tourism measurement, being present in roughly 82% of all studies. There are no doubts that the most utilized method to measure tourism efficiency is DEA, applied in roughly 85% of the 130 articles in the sample. In terms of publications per year, 2010 turns out to be the year with more publications,

holding a total of 11 papers published, curiously all in the hotel sector. A publication growth rate of 2.18%, a total of 204 different authors. Considering the number of citations and total link strength, Hwang and Chang (2003) is considered to be the most influential study in the tourism efficiency measurement literature. The most influential author both in the number of citations and total link strength is the Portuguese author Barros. Lastly, in terms of citations, Tourism Management is the most cited and renowned source.

This dissertation addresses and fulfills several aspects and suggestions made by Altin et al. (2018), Assaf and Josiassen (2015), and Pahlevan-Sharif, et al. (2019), including conducting a study that considers quantitative methods and employs relational bibliometric analysis, such as co-citation, addresses the efficiency comparison between countries, provides a clear explanation of the process of data collection, and contributes to fight the lack of systematic reviews in the field of tourism and hospitality. It also concludes that several external global effects influence, not only the performance of hotels but also the number of studies developed, for instance: Covid 19 pandemic, SARS 2003, National crisis, terrorist events, and natural catastrophes as hurricanes and earthquakes. This work has the potential to be extremely beneficial to future scholars and stakeholders. It gathers all the essential information needed to conduct a measurement of tourism efficiency as well as an extensive layout of what already exists in the literature. This not only saves tremendous time and work to authors interested in evaluating tourism establishments' efficiency but also encourages and guides stakeholders to perform those studies.

As every scientific study, this too has its limitations and constraints, these aspects are addressed in the present sub-chapter. The first liability of this study may be human error. Although methods were carefully followed and two software were used, a considerable part of the dissertation was manually handled. More specifically, the process of reviewing individually and extracting data from every single document of the sample in section 5. Secondly, a certain constraint was the accessibility restrictions of multiple articles that were not openly available through the University of Lisbon VPN. Lastly, an indisputable limitation of this study was related to the fact that the bibliometric analysis software, both the Bibliometrix RStudio package software and the VOSviewer software only allowed data files from certain databases. Although these two software were chosen because they both accept Scopus and Web of Science databases, they do not allow a merge between files from both software, in other words, the software only works with data files from a single database per bibliometric analysis.

Suggestions for future researchers involve analyzing other sectors as for instance studies measuring region, state or countries efficiency, and other sectors as national parks, cruises or restaurants. Using other databases and other softwares, for example: BibExcel, Cite Space, Sci2, Netdraw, or SITKIS. Focusing on the hotel efficiency on the most recent pandemic years and the impact of Covid 19 virus.

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