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# CRAFT BEER TOURISM IN PARAÍBA: AHP EVALUATION AND QUALITY ASSESSMENT OF BREWERIES.

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**CRAFT BEER TOURISM IN PARAÍBA: AHP  
EVALUATION AND QUALITY ASSESSMENT  
OF BREWERIES.  
TURISMO DE CERVEZA ARTESANAL EN  
PARAÍBA: EVALUACIÓN AHP Y EVALUACIÓN  
DE CALIDAD DE CERVECERÍAS.  
TURISMO DE CERVEJAS ARTESANAIS NA  
PARAÍBA: AVALIAÇÃO DO AHP E AVALIAÇÃO  
DA QUALIDADE DAS CERVEJARIAS.**

KETTRIN FARIAS BEM MARACAJÁ<sup>1</sup>

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**ABSTRACT**

This article presents a multi-criteria model based on the Analytic Hierarchy Process (AHP) method to evaluate craft breweries from a tourism perspective, incorporating criteria from the Tourqual model. The study comprises two main phases: structuring the problem and applying the AHP method. The first phase involves selecting craft breweries in a specific region, identifying decision makers, and using 13 Tourqual-based criteria. Subsequently, an evaluation matrix is constructed, and the AHP method is applied to rank craft breweries. The results obtained when evaluating seven breweries in Paraíba are consistent with experts' opinions on craft brewery tourism. The practical implications highlight the model's potential as a formal tool in assessing craft breweries and supporting decision-making processes in different tourism management structures. The originality of the study lies in the empirical application of the model. **Keywords:** Craft Breweries, Tourism destination, Multicriteria Decision Making, Tourqual.

**RESUMO.**

Este artigo apresenta um modelo multicritério baseado no método Analytic Hierarchy Process (AHP) para avaliar cervejarias artesanais sob a perspectiva do turismo, incorporando critérios do modelo Tourqual. O estudo compreende duas fases principais: a estruturação do problema e a aplicação do método AHP. A primeira fase envolve a seleção de cervejarias artesanais em uma região específica, a identificação de tomadores de decisão e a aplicação de 13 critérios baseados no Tourqual. Posteriormente, uma matriz de avaliação é construída, e o método AHP é aplicado para fornecer um ranking das cervejarias artesanais. Os resultados obtidos ao avaliar sete cervejarias na Paraíba são consistentes com as opiniões de especialistas em turismo de cervejarias artesanais. As implicações

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práticas destacam o potencial do modelo como ferramenta formal para a avaliação de cervejarias artesanais, apoiando processos decisórios em diferentes estruturas de gestão do turismo e a originalidade do estudo reside na aplicação empírica do modelo.

**Palavras-Chave:** Cervejarias Artesanais, Destino Turístico, Tomada de Decisão Multicritério, Tourqual.

## **RESUMEN.**

Este artículo presenta un modelo multicriterio basado en el método del Proceso Analítico de Jerarquía (AHP) para evaluar cervecerías artesanales desde una perspectiva turística, incorporando criterios del modelo Tourqual. El estudio comprende dos fases principales: estructuración del problema y aplicación del método AHP. La primera fase consiste en seleccionar cervecerías artesanales en una región específica, identificar a los tomadores de decisiones y aplicar 13 criterios basados en Tourqual. Posteriormente se construye una matriz de evaluación y se aplica el método AHP para brindar un ranking de cervecerías artesanales. Los resultados obtenidos al evaluar siete cervecerías de Paraíba coinciden con las opiniones de expertos en turismo cervecero artesanal. Las implicaciones prácticas resaltan el potencial del modelo como herramienta formal para evaluar cervecerías artesanales, apoyando procesos de toma de decisiones en diferentes estructuras de gestión turística y la originalidad del estudio radica en la aplicación empírica del modelo.

**Palabras Clave:** Cervecerías Artesanales, Destino turístico, toma de decisiones multicriterio, Tourqual.

## **1. INTRODUCCIÓN**

The global beverage landscape has witnessed a burgeoning fascination with craft breweries, drawing in tourist's eager to explore distinctive flavors, aromas, and unique characteristics associated with locally crafted drinks (Berry, 2019). Beverage tourism, known as Beverage Tourism (Plummer et al., 2005), provides an avenue for travelers to delve into the production processes and tastings of diverse beverages, with beer tourism (TC) emerging as one of the most promising segments in Brazil (Coelho-Costa, 2019).

TC encompasses activities centered around visiting breweries and attending beer-related festivals or shows, where the primary motivation for tourists is to delve into the beer-making process and savor the produced beers (Plummer et al., 2005). Furthermore, beer tourism provides a platform for a gastronomic and cultural experience, allowing participants to indulge in different beer varieties and local culinary delights (Gimenes-Minasse et al., 2016).

The production of craft beers in Brazil has experienced significant growth in the first two decades of the 21st century, arousing the interest of producers, consumers, and tourist destination planners (Munhoz et al., 2022). This growth has led to a notable research gap concerning the quality management of

tourist services within Paraíba's craft breweries. Recognizing the pivotal role of visitor satisfaction in attracting customers and driving sales (Murray & Kline, 2015), this study proposes the application of the Tourqual model. Renowned for its adaptability, the Tourqual model assesses various dimensions of the visitor experience, including access, interactions, safety, and technical quality (Mondo, 2014).

This model enables the evaluation of craft breweries services from multiple dimensions, each associated with one or more variables, creating a set of evaluation criteria ( $C=c_1, c_2, \dots, c_m$ ). Decision-makers assess each alternative (breweries), represented as  $a_i$  ( $i=1, \dots, n$ ), concerning a specific dimension (criterion),  $c_j$  ( $j=1, \dots, m$ ), resulting in a unidimensional evaluation,  $g_j(a_i)$ . These unidimensional evaluations derive a global performance score,  $g(a_i)$ , for each breweries, utilizing a weighted sum operator. These weights are determined by individual evaluators, reflecting their personal preferences and perceptions. This research evaluates craft breweries' services as a multicriteria decision-making problem, with Tourqual as the model.

Various methods are available for analyzing multicriteria decision-making problems, including Multi-Attribute Utility Theory (MAUT), Analytic Hierarchy Process (AHP), Analytic Network Process (ANP), TOPSIS, ELECTRE, and PROMETHEE. A comprehensive review of multicriteria models in tourism and hospitality decision-making by Maracajá et al. (2022) identifies AHP and its variations as significant, with nearly 30% of studies from 1996 to 2014 employing this method. The growing importance of AHP in tourism research is evident, with a remarkable increase in publications in recent years.

Craft breweries and beer tourism have emerged as significant phenomena in the global beverage landscape, captivating the interests of both consumers and tourists alike. The surge in popularity of craft breweries, particularly in Brazil, has led to a burgeoning trend known as Beer Tourism (TC), where travelers seek immersive experiences in the beer-making process and the enjoyment of locally produced beers (Plummer et al., 2005). Munhoz et al. (2022) underscore the remarkable growth of craft beer production in Brazil, stimulating interest from producers, consumers, and tourist planners. However, within this dynamic and burgeoning field, there exists a notable research gap, specifically in the realm of quality management of tourist services within Paraíba's craft breweries.

The significance of addressing this research gap becomes apparent when considering the pivotal role visitor satisfaction plays in attracting customers to breweries and, consequently, driving sales (Murray & Kline, 2015). To comprehensively evaluate the quality of tourism services in craft breweries, this study proposes the application of the Tourqual model, renowned

for its adaptability and ability to assess various dimensions of the visitor experience. The Tourqual model, in the context of craft breweries tourism, encompasses a holistic evaluation, including aspects such as access, interactions, safety, and technical quality (Mondo, 2014).

This paper aims to contribute to the field by introducing a multicriteria model based on the Analytic Hierarchy Process (AHP) to assess craft breweries in Paraíba, Brazil, aligning with the criteria established in the Tourqual model. The utilization of AHP, a method gaining prominence in tourism research (Maracajá et al., 2022), promises a more consistent mathematical evaluation, offering a valuable contribution to the growing importance of this methodology in the field of beer tourism. In contrast to assigning numeric values, AHP relies on pairwise comparisons using linguistic terms to determine aggregation constants, translating these comparisons into trade-off information with a robust mathematical foundation. This unique approach enables the aggregation constants to encompass relative importance and trade-off information.

With the potential for a more consistent mathematical evaluation, this paper aims to introduce a multicriteria model based on the AHP method to assess craft breweries from a tourism perspective while considering the criteria employed in the Tourqual model. The proposed model evaluates the seven most prominent craft breweries in Paraíba, Brazil.

## **2. CRAFT BREWERY TOURISM IN PARAÍBA, BRAZIL**

Tourism plays a significant role in people's lives, catering to both leisure and professional purposes (Lohmann & Netto, 2016). Since the 1960s, when tourism emerged as a global economic phenomenon, recognized by national governments as a driver of income, employment, and economic development in regions with limited potential (Song, Li & Cao, 2018), the sector has continued to expand. The Brazilian Institute of Geography and Statistics (IBGE) has identified tourism as a critical contributor to Brazil's 2.9% GDP growth in 2022 (Pereira, Amaral e Silva & Brito, 2023). Additionally, the Monthly Services Survey (PMS), also conducted by IBGE, recorded a nearly 24% increase in tourism-related activities in 2022, demonstrating the continuous development and growth of this market segment.

However, tourism should not be regarded solely as an economic activity; it is also intertwined with representations, resistances, and values (Bianchi, 2009). It represents a time dedicated to relaxation, culture, and leisure (Marat-Mendes, Silva Lopes, Cunha Borges & d'Almeida, 2022). These aspects are particularly prominent in cultural tourism, which focuses on locations that value local culture. In cultural tourism, Richards,

King & Yeung (2020) emphasizes that all tourist activities involve cultural elements, whether visiting a locality or participating in cultural events. According to Lopez-Guzman & Gonzales Santa-Cruz (2016), in addition to architectural heritage and the arts, gastronomy is also considered a part of cultural tourism in some countries.

While gastronomy is included in cultural tourism due to the critical role of food in local and regional culture (Beber & Gastal, 2020), it has its distinct category within tourism: culinary tourism or food tourism. Over the years, culinary tourism has gained prominence worldwide, supporting the idea by authors Hall & Sharples (2003) that culinary tourism defines the desire to experience a specific type of food or product from a particular region. In this regard, the cultural aspect of gastronomy recognizes that cuisine can be a memorable element of a tourist's journey (Cohen & Avieli, 2004; Hall, et al., 2003; Karim & Chi, 2010).

Culinary tourism, driven by food and beverage tourism, is also considered a branch of cultural tourism (Goeldner & Ritchie, 2006; Jolliffe & Aslam, 2009; Coelho-Costa, 2018). According to Plummer et al. (2005), beverage tourism defines people's motivation to travel to explore specific beverages, resulting in niche segments such as wine tourism, tea tourism, and beer tourism. According to Ferreira (2020), tourism is a significant variable when seeking new and differentiated experiences beyond the everyday. Considering Coelho-Costa's (2018) observations about the originality and creativity of Brazilians in beer production and marketing, beer tourism has gained prominence in Brazil. Leal & Almeida (2015) affirm that beer tourism, a well-established branch of culinary tourism in various countries, has piqued the interest of Brazilians, and Coelho-Costa (2018) notes a strong trend of growth in this segment, despite it being relatively new and unexplored in the country.

In 2015, beer tourism, also known as Beer Tourism, was considered a relatively new niche market, according to Coelho-Costa. Thus, Plummer et al. (2005) define beer tourism as activities motivated by visits to breweries, festivals, or shows that offer the opportunity to explore the beer-making process and taste the produced beers. Preliminary investigations of this subject were carried out by Bizinelli, Manosso, Gândara, Valduga (2013); Francioni (2012); Niester (2008); and Plummer, Telfer, and Hashimoto (2006), as well as Plummer, Telfer, Hashimoto, and Summer (2005). These studies explored beer tourism within the framework of culinary and beverage fundamentals, drawing upon theoretical foundations from related research (Coelho-Costa, 2015).

The oldest record of beer production in Brazil dates back to October 27, 1836 when an advertisement in the Rio de Janeiro

Journal of Commerce promoted beer (Santos, 2004). Until 1858, there were only a few breweries in the country, mainly located in major urban centers and areas inhabited by German immigrants (Santos, 2004). These artisanal products had small shipments, typically 200 to 300 thousand bottles yearly (Coelho-Costa, 2015). Currently, according to the SINDICERV (National Beer Industry Union), there are more than 1,500 registered breweries with the Ministry of Agriculture, Livestock, and Supply (MAPA) in Brazil (2023).

According to Coelho-Costa (2015), the first industrialized Brazilian breweries emerged in the 1870s and 1880s; with the introduction of refrigeration compressors, two breweries, Brahma and Antarctica, emerged as market leaders (Santos, 2004). More than a century later, in 1999, these two companies merged to form AmBev (American Beverage Company), positioning Brazil as the world's second-largest beer producer. Since then, Brazil has continued to evolve in the sector. Events such as Oktoberfest, held in Blumenau, boost beer consumption. In 2022, it reached a record of 15.4 billion liters of beer, an 8% increase from the previous year, according to a survey conducted by the market research company Euromonitor International for SINDICERV (2023). As a result, Brazil remains among the top three beer producers in the world, trailing only China and the United States.

However, Brazilians' interest in and appreciation for beer goes beyond industrialized brews. Craft beers have caught the attention of both producers and consumers due to their potential in terms of flavors, aromas, and tasting practices, as well as their attractiveness to tourism and their association with cultural and culinary segments (Munhoz et al., 2022). According to Gomes & Marcusso (2022), the production and marketing of beers, including craft beers, have gained prominence worldwide, including in Brazil, as they drive the local economy, society, and culture, influencing tourism in these areas. Most craft beers are produced in microbreweries, as defined by Morado (2009), small enterprises that aim to make distinctive beers.

Thus, brewpubs have emerged, which combine craft beer production with on-site consumption (Hernández Fierro, 2018). This form of craft brewery has gained prominence in recent years, offering consumers the opportunity to enjoy fresh and unique beers directly from the production site (Holguín Matos et al., 2020). The popularity of brewpubs has grown significantly, attracting consumers seeking distinctive beer experiences and entrepreneurs in the beer industry who see this model as a way to stand out in the market (Gimenes-Minasse et al., 2016). These establishments contribute to developing local beer culture, boosting the economy, and attracting tourists interested in learning about and enjoying craft beer production (Munhoz et al., 2022).

The first craft beers developed in Brazil needed more quality or fermentation control (Coelho-Costa, 2015). Over the years, the evaluation of quality has become a demand of new consumers in the tourism sector (Tavolara, 2006), and understanding consumer behavior has become essential to keep them satisfied, especially in the service sector, which is essentially intangible (Kotler, 2000).

In this context, Mondo (2014) developed a model called TOURQUAL specifically to assess the perception of service quality in tourism, whether in destinations or events. The author developed 59 indicators of quality perception; however, in the niche of craft breweries, 13 indicators (access, waiting for service, ease of purchase, opening hours, comfort, human element, experience, security, cost/benefit relation, infrastructure, signaling, technology, cleanliness) were validated, along with their respective evaluation methods development and improvement of services offered during visits to craft breweries. According to Juran (1992), "quality is fitness for use through the perception of customer needs," and according to Faucao & Galvão (2012), quality in the provision of tourism services is a determining factor for the success of a tourism venture. These aspects are especially relevant in places that stand out for their culture and present growth potential. Based on the model developed by Mondo (2014) - Tourqual Breweries, this study will present results addressing the objectives and the proposed problem.

### **3. METHODOLOGY – PROPOSED MODEL**

Our approach to evaluating Craft Breweries is structured into two distinct phases: (i) Problem Structuring and (ii) Analytic Hierarchy Process (AHP). These phases are essential for conducting a comprehensive evaluation of Craft Breweries. In the initial phase, we follow these key steps:

#### *Phase I: Problem Structuring*

**Defining the Region:** The process commences with a precise definition of the geographical region where the evaluation model will be applied. This region encompasses the Craft Breweries under examination.

**Craft Beer Identification:** We then proceed to identify specific craft beers within the chosen region, which offer similar services and facilities. This identification enables us to make informed comparisons from a beer tourism perspective.

**Selecting the Decision-Maker:** This phase includes the critical task of selecting the decision-maker. The chosen decision-maker's preferences and expertise will serve as the cornerstone for the evaluation model.

**Criteria Establishment:** Craft Breweries are assessed based on a predefined set of criteria, which is derived from the



Tourqual protocol. This comprehensive evaluation relies on data from various sources to ensure objectivity.

In the second phase of the methodology, we apply all the steps of the AHP method to the multicriteria problem structured in the first phase. This phase involves the following steps:

*Phase II: Analytic Hierarchy Process*

**Defining Craft Brewery Regions:** We start by defining the specific regions where the Craft Brewery evaluation study will take place. Subsequently, we identify the craft beers encompassed in these regions, ensuring that they provide comparable services and facilities for meaningful comparisons. These craft beers collectively form the set of alternatives ( $A=\{a_1, a_2, \dots, a_m\}$ ).

**Decision-Maker for Pairwise Comparisons:** A critical aspect is selecting the decision-maker who will be responsible for conducting pairwise comparisons between elements in the hierarchical structure of the AHP model. To facilitate these comparisons, AHP provides a predefined 9-point linguistic scale, known as Saaty's scale. This scale allows the decision-maker to express the relative importance of one element over another based on their perspective.

**Addressing Linguistic Expressions:** While the use of linguistic expressions enhances the user-friendliness of the evaluation process and captures subjective information derived from human judgments, it has certain limitations. In AHP, linguistic expressions are eventually converted into precise numerical values, potentially losing valuable subjective information. This can lead to inconsistencies, as the same term may have different meanings even for the same individual. To mitigate this, we recommend that the decision-maker should be a specialist in tourism and/or beer tourism, as specialists tend to have better-calibrated systems for evaluating such experiences.

In our proposed model, Craft Breweries are evaluated based on the 13 categories outlined in the Tourqual protocol. Table 1 provides a comprehensive list of criteria ( $C=\{c_1, c_2, \dots, c_{13}\}$ ) along with their respective descriptions.

This structured problem, encompassing decision-makers, criteria, and the Craft Brewery alternatives, serves as the foundational framework for the application of AHP. Further details on the application of AHP will be discussed in the subsequent section.

The foundational step in our approach involves structuring the problem, which entails the careful delineation of the decision-maker, criteria, and alternatives (in this context, Craft Breweries). This meticulous structuring sets the stage for the subsequent application of the Analytic Hierarchy Process (AHP), a process we will elaborate on in the following section.

**Table 1. Criteria**

<b>ID</b>	<b>Name of the criteria</b>	<b>Description</b>
C1	Access	Aspects related to tourist access to the attraction, geographic location, driving directions, parking, and external signage.
C2	Waiting for the service	Waiting time for tourists to consume the attraction, reservations, waiting time and initial service, waiting for tasting and tour time.
C3	Ease of purchase	Customer effort to purchase.
C4	Opening hours	Establishment opening hours on weekdays and weekends.
C5	Comfort	Environment management taking into account temperature, comfort, and silence.
C6	Human element	Human aspects of service delivery, care, trust, employee technical knowledge, and responsibility.
C7	Experience	Tourist experience in the destination taking into account learning, entertainment, escape, and aesthetics.
C8	Security	Security of attractiveness and payment methods.
C9	Cost/benefit relation	Reasonable cost to the customer, without detriment to quality.
C10	Infrastructure	Maintenance of equipment, materials, and tools.
C11	Signaling	Possibility of tourist orientation within the attractive.
C12	Technology	Aspects related to technology such as websites, social networks, apps, and Internet connection quality in the establishment.
C13	Cleanliness	Cleanliness at the place of service consumption, appearance, and appearance of employees.

#### *Analytic Hierarchy Process (AHP)*

The Analytic Hierarchy Process (AHP) stage of our model follows the comprehensive steps outlined by Saaty (1990a) and Saaty (1990b). It begins by decomposing the problem into a hierarchical structure, featuring objectives, criteria, and alternatives. For each level of this structure, the decision-maker conducts pairwise comparisons between each pair of elements, using Saaty's scale. This process aids in determining the weight of each element at the same level by calculating the Eigenvector of the matrix. The performance of each alternative is then assessed by multiplying the vector of priorities for elements in the last level with the vector of priorities for elements in the last but one level. Ultimately, the recommendation is based on the performance of the alternatives.

Our model's objective is to select the best for Craft Breweries tourism within a given region. This decision is to be based on a set of 13 criteria (Table 1), forming the intermediate level of the hierarchy, with the final level comprising the set of alternatives, denoted as A.

**Table 2. Saaty's Scale (Saaty, 1990a; Saaty, 1990b)**

Linguistic value	Numeric Value	Explanation
Equally important	1	Two activities contribute equally to the objective
Equally to moderate	2	
Moderately important	3	Experience and judgment strongly favor one activity over another
Moderately to strongly	4	
Strongly important	5	Experience and judgement strongly favor one activity over another
Strongly to very strongly	6	
Very strongly important	7	An activity is strongly favored, and its dominance demonstrated in practice
Very strongly to extremely	8	
Extremely important	9	The evidence favoring one activity over another is of tile highest possible order of affirmation

Next, the decision-maker is tasked with evaluating the relative importance of criteria concerning their contribution to the problem's objective. The process involves a pairwise comparison of each criterion in the rows with every criterion in the columns, with numeric values assigned based on Saaty's scale (Table 2).

This results in a square matrix of criteria versus criteria, measuring 13x13, where cells contain values representing the relative importance of the criterion in row over the criterion in column. Consistency checks are essential to ensure decision-maker judgments align with Saaty's guidelines and avoid transitive cycles ( $a > b > c > a$ ), which signal inconsistency.

For each criterion, the decision-maker conducts pairwise comparisons of the alternatives. At this stage, the matrix values for evaluating alternatives against criteria serve as references to establish the strength of preference for one alternative over another within a given criterion. This process leads to the creation of 13 square matrices of alternatives versus alternatives, each of size  $m \times m$ , one for each criterion.

Subsequently, we proceed with the determination of the relative importance of each element at the same level of the hierarchy. This involves calculating the Eigenvector of each matrix, where  $n$  is the number of rows (columns) in the matrix. While various methods can be employed for Eigenvector calculation, an approximate method is used in our approach. According to Kostlan (1991), this method is practical and recommended, as the difference between the actual value and the approximate value typically falls below 10%.

Lastly, the recommendations for the best winery selection are based on the overall performance of the alternatives, considering the collective evaluation of all criteria. In the following section, we will present the application of this model, as it was used to create a ranking of Craft Breweries within the Paraíba region.

#### **4. APPLICATION OF THE MODEL**

The model was applied to evaluate the Craft Breweries in the Paraíba region, in Brazil. There are approximately 18 Craft Breweries in this region and 7 are available for visiting and to ensure the homogeneity of the set of alternatives and to avoid comparing alternatives that are very different from each other. Table 3 presents a brief description of each Craft Breweries.

This study encompassed the assessment of seven distinct establishments that provide tourist visitation services, operating under the Brewpub model. Detailed information about the identified breweries can be found in Table 2.

In this evaluation process, the role of the decision-maker was shared between seven managers of these Craft Breweries establishments and seven experienced researchers specializing in the field of beer tourism. All decision-makers received comprehensive information regarding the study's objectives and were well-versed in the fundamental principles of the AHP method.

Firstly, they were tasked with comparing each pair of criteria using Saaty's Scale (Table 2) to convey a mutually agreed-upon assessment. This initial step yielded a  $13 \times 13$  quadratic matrix of criteria versus criteria. Each cell at position  $ixj$  contained a numerical value representing the relative importance of the criteria in row  $c_i$  in relation to the criteria in column  $c_j$ , as agreed upon by both academics. For instance, they reached a consensus that Access (C1) is significantly more important than Accessibility (C2); hence, the cell  $1 \times 2$  held the value 5, while the cell  $2 \times 1$  contained 0.2.

**Table 3. Craft Breweries**

ID	Description
A1	Started its activities in 2015, in Campina Grande, being the first in the city
A2	Being considered the second-best brewpub among participants in the 2021 edition of the Brazilian Beer Competition in the city of João Pessoa
A3	Appeared in 2019 in the city of Sousa being the oldest in the city
A4	Growing and highlighting the history of Paraíba through beers in the city of João Pessoa
A5	Obtained the brand registration certificate in 2023, being produced in the city of Cabedelo
A6	Started its activities in 2017, in the city of Patos and sells throughout Brazil
A7	Started its activities in 2016, in the city of Campina Grande and has the most diverse brewpub in the state

The aim of this stage was to establish the weights for the criteria, reflecting their relative importance based on the decision maker's preferences. To achieve this, the Eigenvector of the quadratic matrix for criteria versus criteria was computed using an approximate method. The Eigenvector, denoted as " $p$ ," took the form of a  $17 \times 1$  matrix, with each cell at position  $ix1$  (where  $i=1,2,\dots,17$ ) holding the weight assigned to criterion  $C_i$  ( $i=1,2,\dots,17$ ). The results are displayed in Table 4.

**Table 4. Weights of Criteria**

Criteria	Weight	Criteria	Weight
C1	0.04	C11	0.01
C2	0.04	C12	0.02
C3	0.06	C13	0.11
C4	0.01		
C5	0.01		
C6	0.16		
C7	0.08		
C8	0.08		
C9	0.11		
C10	0.04		

Likewise, they were instructed to evaluate each pair of alternatives from the standpoint of each individual criterion. As a result of this process, a collection of 13 quadratic matrices was generated, each corresponding to the comparison of alternatives against each criterion. Subsequently, the Eigenvector for each matrix was computed to gauge the relative significance of the alternatives when viewed from a one-dimensional perspective. These outcomes are detailed in Tables 5 and 6, where each column represents the relative importance of the alternatives in accordance with criteria numbered from 1 to 13 ( $n = 1,2,\dots,13$ ).

**Table 5. Alternatives versus Criteria**

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13
A1	0,12	0,07	0,02	0,09	0,11	0,21	0,10	0,02	0,10	0,03	0,03	0,21	0,04
A2	0,31	0,37	0,18	0,33	0,28	0,07	0,32	0,18	0,27	0,26	0,26	0,18	0,21
A3	0,05	0,07	0,02	0,09	0,10	0,08	0,06	0,03	0,08	0,05	0,05	0,05	0,04
A4	0,08	0,07	0,09	0,09	0,09	0,08	0,21	0,18	0,27	0,26	0,26	0,21	0,21
A5	0,01	0,03	0,01	0,02	0,05	0,06	0,02	0,18	0,10	0,02	0,02	0,04	0,03
A6	0,08	0,07	0,09	0,02	0,05	0,08	0,04	0,18	0,06	0,07	0,07	0,05	0,21
A7	0,31	0,26	0,18	0,33	0,28	0,39	0,21	0,18	0,10	0,26	0,26	0,21	0,21

The information contained in Tables 5 was consolidated into a unified matrix, denoted as P, with dimensions of 7x13.

In the last step, the relative significance of each alternative was computed, taking into account a multi-dimensional viewpoint. This involved the multiplication of matrix P and another matrix. The outcome can be understood as an indicator of the overall performance of the alternatives, enabling the creation of a ranking for Craft Breweries (as shown in Table 6). This ranking orders the wineries from the highest to the lowest in terms of their quality management of tourist services, encompassing the evaluation of 13 dimensions as proposed by the Tourqual protocol.

**Table 6. Final Result**

Ranking	Alternative	Global performance
1	A7	0.27
2	A2	0.24
3	A4	0.16
4	A1	0.11
5	A6	0.08
6	A3	0.07
7	A5	0.06

  

A1	Started its activities in 2015, in Campina Grande, being the first in the city
A2	Being considered the second-best brewpub among participants in the 2021 edition of the Brazilian Beer Competition in the city of João Pessoa
A3	Appeared in 2019 in the city of Sousa being the oldest in the city
A4	Growing and highlighting the history of Paraíba through beers in the city of João Pessoa
A5	Obtained the brand registration certificate in 2023, being produced in the city of Cabedelo
A6	Started its activities in 2017, in the city of Patos and sells throughout Brazil
A7	Started its activities in 2016, in the city of Campina Grande and has the most diverse brewpub in the state

The AHP analysis yielded a ranking with Craft Breweries A7 Reference in quality and innovation, with more than 20 exclusive recipes of different styles; Beers won awards in all competitions in Brazil, having won 10 awards and specialized services for events with craft beers. In addition to being wholly computerized for the customer to request services and place a charge through the application, the waiter leaves their products

on their table, including regional gastronomy products. In contrast, Craft Breweries A5 It is a new craft brewery that is still adjusting to the market, having few beer options, a small space, and does not offer regional products for tasting, just a few snacks. Craft Breweries A2 it stands out in providing tourist services but offers a low-skilled workforce and little variety of craft beers. The local cuisine focused on something other than regionality with local products. Craft Breweries A4 and A1 offer similar services, with the distinction that A4 incorporates craft beer production with local products such as hot and orange in the product, while A1 only produces products with barley.

The Craft Breweries A6, being a nationally known brand, does not have a pub so that tourists can taste their craft beers with local gastronomy products, making it a secondary activity because it focuses only on selling beers. The Craft Breweries A3 offers a variety of craft beer options, but its tourist infrastructure is primary, with small facilities, no signage or internet, and an unsafe environment. In light of these conclusions, it concluded that the AHP results aligned with the situation in Brazil and the state of Paraíba observed in craft breweries, highlighting those that are older and have invested in infrastructure, as well as good services and the diversity of products for tourists.

#### **4.1. Discussion and implications**

The AHP results closely align with the real-world conditions observed within the craft brewery landscape in Paraíba, emphasizing those breweries that have invested in infrastructure, services, and product diversity, highlighting the older and more established players in the industry. The use of AHP in this context proves its significance in aiding the evaluation and ranking of craft breweries, which has implications for the growth and development of the craft beer tourism sector in Brazil. This resonates with the research of Coelho-Costa (2018) and Gimenes-Minas et al. (2016), who have previously highlighted the importance of infrastructure and service quality in shaping the beer tourism experience. The practical implications of this study extend beyond academia, offering valuable insights for both practitioners and policymakers involved in the craft beer industry.

Furthermore, the study differentiates itself by emphasizing the real-world applicability of the AHP results, closely aligning with observed conditions within the craft brewery landscape in Paraíba. The focus on infrastructure, services, and product diversity brings attention to the older and more established players in the industry, contributing valuable insights for both practitioners and policymakers. The study's findings not only contribute to the academic discourse on beer tourism but also offer practical implications for the growth and

development of the craft beer tourism sector in Brazil. Drawing on the works of Gimenes-Minasse et al. (2016) and Munhoz et al. (2022), the emphasis on the established players aligns with their observations of the significant role played by experienced breweries in shaping the craft beer landscape.

This discussion underscores the increasing importance of tourism, not just as an economic force but as a multifaceted experience intertwining culture, gastronomy, and regional uniqueness. It highlights the role of culinary tourism, specifically beer tourism, which has gained prominence in Brazil as the craft beer industry continues to flourish. The craft beer landscape in Paraíba has evolved significantly, with over 1,500 registered breweries contributing to the country's position as a significant global beer producer. The works of Coelho-Costa (2018) and Munhoz et al. (2022) resonate with this, as they have previously emphasized the cultural and economic significance of beer tourism in Brazil and the evolving landscape of craft beer production.

The significance of the beer industry in Brazil is undeniable, with events like Oktoberfest driving substantial beer consumption and the country consistently ranking among the world's top beer producers. However, the unique appeal of craft beers has added a new dimension to the beer tourism landscape. Craft breweries have become destinations in their own right, allowing visitors to witness the beer-making process and savor distinctive flavors. This aligns with the observations of Gimenes-Minasse et al. (2016) and Munhoz et al. (2022), who have emphasized the transformative role of craft breweries in shaping the beer tourism experience and attracting visitors.

The study highlights the emergence of brewpubs as a critical component of craft beer tourism, providing a platform for direct interaction between consumers and brewers, fostering local beer culture, and attracting tourists interested in the craft beer experience. These establishments are pivotal in stimulating local economies and offering visitors an authentic craft beer experience. Building on the works of Gimenes-Minasse et al. (2016) and Munhoz et al. (2022), the emphasis on brewpubs aligns with their observations of the growing role of these establishments in shaping the beer tourism landscape and contributing to local economies.

The development of quality standards and the focus on customer perception in the craft brewery sector have become essential. The TOURQUAL model, tailored explicitly for assessing service quality in tourism, provides a valuable framework for evaluating craft breweries. In a highly competitive and service-oriented sector, quality is a defining factor for success and relevant in destinations known for their culture and growth potential. This aligns with the perspectives of Juran (1992) and Faucao & Galvão (2012), who have



emphasized the critical role of quality in the success of tourism ventures and the service sector.

The discussion also advances existing work by highlighting the multifaceted nature of beer tourism, intertwining economic forces with cultural, gastronomic, and regional uniqueness. The emphasis on brewpubs as critical components of craft beer tourism distinguishes this study, shedding light on their role in fostering local beer culture, stimulating local economies, and providing visitors with an authentic craft beer experience. Overall, the research presented here advances the understanding of beer tourism by acknowledging its evolving landscape, underscoring the unique appeal of craft beers, and emphasizing the importance of quality standards and customer perception in this thriving industry.

In summary, using AHP and the TOURQUAL model to assess craft breweries in Brazil underscores the growing importance of beer tourism. It not only reflects the economic impact of tourism but also highlights the rich cultural and gastronomic experiences that draw tourists to craft breweries. It underscores the evolving craft beer landscape, emphasizing the role of brewpubs as key attractions and the significance of quality and customer perception in this thriving industry.

## **5. CONCLUSIONS**

This study successfully achieved its research objective of introducing a multicriteria model based on the Analytic Hierarchy Process (AHP) to assess craft breweries from a tourism perspective, incorporating the criteria employed in the TOURQUAL model. The AHP analysis provided valuable insights into the craft brewery landscape in Paraíba, emphasizing the significance of infrastructure, services, and product diversity in shaping the success of these establishments in the tourism sector. In comparing the results with the elements of the theoretical foundation section, the alignment of AHP outcomes with real-world conditions not only validates the theoretical underpinnings of the study but also underscores the practical applicability of these methodologies in the context of beer tourism research.

From an academic standpoint, this research contributes substantively to the growing body of knowledge on beer tourism. By leveraging AHP and the TOURQUAL model, the study advances the theoretical foundation, demonstrating their relevance and effectiveness in evaluating craft breweries. The comprehensive evaluation offered by AHP aligns with the nuanced criteria specified in the TOURQUAL model, providing a robust framework for assessing service quality and enhancing our understanding of the dynamics within the craft beer industry. This comparison reinforces the theoretical soundness of the

research, highlighting its contribution to the academic discourse on tourism, quality management, and the craft beer industry.

On a practical level, the findings bear important implications for the growth and development of craft beer tourism in Brazil. The emphasis on established breweries investing in infrastructure and services offers actionable insights for craft brewery owners, serving as a practical guide to attract tourists and contribute meaningfully to the local economy. Furthermore, the identification of brewpubs as crucial components in providing authentic experiences aligns with the theoretical foundation, showcasing the real-world application of the study's insights.

Nevertheless, it is crucial to acknowledge certain limitations in this research. The focus on the craft brewery landscape in Paraíba may limit the generalizability of findings to the broader Brazilian context. Additionally, future research could explore the incorporation of additional factors beyond the TOURQUAL model criteria to provide a more comprehensive assessment of craft brewery tourism. By reflecting on these limitations in relation to the theoretical foundation, future studies can refine and expand upon the current research, contributing to a more holistic understanding of beer tourism in Brazil.

For future research endeavors, it is recommended to conduct similar studies in diverse regions of Brazil, capturing the nuances and variations in craft brewery tourism. Exploring the impact of external factors, such as economic conditions and cultural trends, on beer tourism could further enrich our understanding of this dynamic industry. Additionally, continuous refinement of the evaluation model, incorporating feedback from both tourists and brewery owners, is essential for the ongoing improvement of craft beer tourism experiences. In essence, this research not only lays the foundation for a nuanced understanding of the craft brewery tourism landscape in Brazil but also serves as a catalyst for future investigations and practical applications that can contribute to the sustainable growth and success of the craft beer industry in the country.

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