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Estimate of the supply of attributes for the development of the industrial tourism activity in the Manaus Free Trade Zone

Estimativa da oferta de atributos para o desenvolvimento da atividade do turismo industrial na Zona Franca de Manaus

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ABSTRACT

Located in the middle of the Amazon rainforest, the Manaus Industrial Pole (PIM) is recognized as one of the most advanced industrial parks in Latin America, comprising more than 500 companies that integrate the Manaus Free Trade Zone model. Considering that this industrial park is the mainstay of the regional economy and that it contributes significantly to the national Gross Domestic Product (GDP), it is possible to deduce that the PIM offers favorable conditions for industrial tourism, where, however, this activity is still incipient. In this context, this paper seeks to estimate, through a qualitative and quantitative research, the attractiveness level of the PIM companies for the industrial tourism activity, in order to support actions aimed at developing a local program of guided tours to the factories. For this, an evaluation matrix was applied, which makes it possible to verify the general level of supply of specific attributes within a group of companies, as well as to analyze a company individually, or even each of the attributes in isolation. The methodology used proved to be a useful tool for the management of a visitation program to factories and may have other applications regarding the evaluation of attributes, with the proper adaptations.

Keywords: Industrial tourism; Management tool; Attributes of industrial tourism; Attribute evaluation; Industrial Pole of Manaus.

RESUMO

Localizado em meio à floresta amazônica, o Polo Industrial de Manaus (PIM) é reconhecido como um dos parques fabris mais avançados da América Latina, formado por mais de 500 empresas, que integram o modelo Zona Franca de Manaus. Considerando-se que esse parque fabril é o pilar de sustentação da economia regional e que contribui de forma expressiva para o Produto Interno Bruto (PIB) nacional, é possível deduzir que o PIM ofereça condições propícias ao turismo industrial, onde, no entanto, essa atividade ainda é incipiente no local. Nesse contexto, o presente artigo busca estimar, por meio de uma pesquisa qualitativa e quantitativa, o nível de atratividade das empresas do PIM para a atividade do turismo industrial, de modo a subsidiar ações voltadas para o desenvolvimento de um programa local de visitação guiada às fábricas. Para isso, aplicou-se uma matriz de avaliação, que possibilita verificar o nível geral de oferta dos atributos específicos no âmbito de um grupo de empresas, bem como permite a análise de uma empresa individualmente, ou ainda de cada um dos atributos de forma isolada. A metodologia utilizada

mostrou-se uma ferramenta útil para a gestão de um programa de visitação às fábricas e pode ter outras aplicações no que se refere à avaliação de atributos, com as devidas adaptações.

Palavras-chave: Turismo Industrial; Engenharia de Produção; Ferramenta de gestão; Atributos do turismo industrial; Avaliação de atributos; Polo Industrial de Manaus.

INTRODUÇÃO

Defined in the literature as a type of tourist activity inserted in the context of an industry, Industrial Tourism is divided into two modalities that must be considered by a researcher. The first refers to the visitation of old factories and industries, which become museums or cultural spaces for visitors, and is also called heritage tourism. The second modality, called active industrial tourism, refers to guided visits to factories in operation, which allows the visitor to get to know the current mode of production in a location, enabling a better understanding of the present reality, as well as to glimpse possibilities for the future in the environment where the factory is located. For the visitor, this type of industrial tourism is a technical-scientific, pedagogical, and cultural leisure option. For the company, it is an opportunity to develop the institutional image and the notoriety of its brand, besides arousing curiosity and vocational interest mainly among the young public. (ZULAICA, 2017; OTGAAR, 2010).

In active industrial tourism, the tourist has the opportunity to learn about the manufacturing process of the products and eventually test the goods produced. Despite presenting itself in a position of subordination to the main productive activity of the company, the impacts that the activity of industrial tourism can have in the social and economic sphere deserve special attention, regarding the management of local tourist attractions. (YALE, 1991; DODD and BIGOTTE, 1997; FREW, 2000; OTGARR, 2010; LEE, 2015).

Manaus, capital of the State of Amazonas, is home to an industrial park that brings together around 500 manufacturing plants benefited by the regional development model Manaus Free Trade Zone (MFTZ) and operate in the segments of electronics, computer goods, two wheels, among others. In this environment, both the manufactured products (consumer goods of globally known brands) and the innovations in the production process, with new technologies used in production, including elements of the Industry 4.0 concept, are attractive.

Considering that the Industrial Pole of Manaus (PIM) is recognized among the most advanced industrial parks in Latin America and that it contributes significantly both to the local economy and to the national Gross Domestic Product (GDP), it is possible to deduce that it offers favorable conditions for the development of Industrial Tourism. However, this activity is still incipient in the PIM environment.

It is important to highlight that - during the searches conducted by internet on the Google Academic and Capes Periodicals platforms, in the period from November 2021 to January 2022

- no publications and available data were located about the activity of visiting the factories of the Industrial Pole of Manaus (PIM). Because there is no such data available - and considering that any method of analysis and/or evaluation requires the availability of data and information about what one wants to measure, analyze or evaluate - the first step to make an analysis of the potential of the local industrial park for industrial tourism activity was, then, to gather data and information that would enable some kind of analysis, based on relevant literature on the subject.

Thus, from the identification of the specific attributes of industrial tourism, it was sought to verify their availability in the environment of the Manaus Industrial Hub, as well as the intensity of the supply of these attributes. For this, it was developed an evaluation matrix of the intensity of the existing supply of facilities and services for the industrial tourism activity.

Then, based on the literature review regarding the evaluation of the tourism potential, it was observed the need for the following complementary information: a) If all (or part) of the specific attributes for the industrial tourism activity are observed in the PIM environment; b) What is the level (or intensity) of the supply of the specific attributes/services of the industrial tourism in the PIM environment.

In this context, this article seeks to estimate, through a qualitative and quantitative research, the attractiveness level of the PIM companies for the industrial tourism activity, in order to subsidize actions towards the development of a local program of guided tours to the factories.

The structure of this paper is divided into five sessions. Session 1 - Introduction, presents the general concept of industrial tourism, as well as the context and objective of this research. In Session 2 - Theoretical framework, there are aspects related to the specific attributes of industrial tourism and methodologies used in Production Engineering for attribute evaluation. Session 3 - Methodology, describes the methods and tools applied to develop this research. In Section 4 - Results and Discussion, the results achieved and their respective analyses are presented. Session 5 - Conclusion, contains reflections and considerations about the research results.

This study is part of the research for the master's thesis "Proposal of an industrial tourism model for the Manaus industrial park", presented to the Graduate Program in Production Engineering - PPGEP, from the Federal University of Amazonas - UFAM (ALANIS, 2022).

THEORETICAL FRAMEWORK

Characteristics of industrial tourism

The industrial tourism activity presents some specific characteristics addressed by several authors who deal with this subject. For Frew (2000), what characterizes an "industrial tourist attraction" is the fact that this type of attraction has as its main activity the production of goods or services not specifically aimed at tourism, but having tourism activity as a secondary role.

According to the author, although industrial tourism is presented in a position of subordination to the main productive activity of the company, it generates relevant social and economic impacts on the locality.

Otgaar (2012) points out that industrial tourism can be interesting for various segments of the public. For visitors, the knowledge of the production processes allows them to reflect on the history and local identity For students, industrial tourism also represents an opportunity for development in the academic or professional area, as well as a chance to meet possible future employers. For professionals, suppliers, customers, competitors, investors, and other segments of the public who already do business with the company, guided tours represent the chance to strengthen relationships and deepen knowledge about the company being visited.

Xie (2006), Otgaar et al. (2010) and Lee (2015) present a new vision that extrapolates the idea that what would most attract visitors in industrial tourism would be the specific attributes of each company, such as the product and production processes. The same authors listed four determinants to identify the attractiveness of a location for industrial tourism: 1) the attractiveness of the company; 2) the offer of industrial tourism; 3) the quality of the location and facilities for visitors; 4) the promotion of industrial tourism. From the point of view of destination management, the first two determinants are considered "essential conditions" to attract industrial tourists, while the last two are "supporting conditions".

Silva P. (2018) and Otgaar et al. (2010) point out that the younger generation holds little knowledge regarding industrial work, which motivates curiosity about the subject and leads this potential clientele to visit the spaces of industries, aiming to expand their worldview, work, leisure and tourism. The same authors point out that industrial tourism can become a dynamic tool to improve the image of a city and its industries, stimulating the tourist competitiveness of a destination and facilitating a better relationship between companies and the urban society.

Determinants and attributes of industrial tourism

With specific regard to industrial tourism, previous studies on the topic highlight company-specific characteristics, such as the product and production process, as the main factors that make some factories more attractive than others. Otgaar (2010), Otgaar et al. (2010) and Lee (2015) propose a more comprehensive framework, integrating company- and region-specific factors to analyze destination characteristics with potential for industrial tourism development. According to these authors, for an industrial tourism activity to be successful, it is necessary to take into account several aspects that can influence the quality of the factory tour experience, such as: accommodation and food facilities; internal accessibility; nearby attractions; external accessibility; availability of security and emergency systems; local attractions; information services, some being considered as essential and others as support.

In his studies conducted in Asia, specifically in Taiwan, Lee (2015) points out that in the tourism literature, there has been a growing interest in the concept of destination attractiveness and points out that destination attractiveness can be effectively measured. One of the popular ways of assessing attractiveness, according to Lee (2015), is to examine the attributes associated with the destination; furthermore, he highlights that certain attributes are definitely more important than others in determining tourism attractiveness. Thus, the same author concludes that there is a need to identify the attributes that are particularly essential to induce tourists to participate in the factory visitation activity, rather than in another type of tourism activity.

In his studies, Lee (2015) presents the specific attributes of industrial tourism distributed among eight determinants: a) On-site attractions; b) Surrounding attractions; c) Accessibility in the external environment, d) Accessibility in the internal environment; e) Lodging and accommodation services; f) Catering service facilities); g) Communications and information services; h) Security and safety systems. These determinants are distributed among four dimensions of tourism activity, called the four "As" of Tourism: I. Tourist Attractions, II. Accessibility, III. Amenities, IV. Auxiliary Services.

The results presented by Lee (2015), based on the Analytic Hierarchy Process (AHP), indicate that interaction and observation of the production process are essential elements in visiting factories, while the provision of transportation services and on-site restaurants constitute a supporting role in this attractiveness. These studies were fundamental for the construction of the supply intensity matrix of the attributes of industrial tourism in the environment of the Industrial Pole of Manaus - PIM, as will be better in Session 3 - Methodology, and Session 4 - Results and discussion.

Attribute importance analysis

In a comparison between several methods of attribute importance analysis, Samartini (2006) points out that they are basically divided into two large blocks: the direct and the indirect methods of obtaining importance. According to the author, both have advantages and disadvantages, and do not present superiority of one over the other. The various types of scales used in these methods are divided, basically, between comparative and non-comparative scales. These include: a) Semantic Differential Scales; b) Comparison by parts; c) Selective ordering of attributes (only the most important attributes); and, d) Decreasing points.

The Semantic Differential Scale is a method of evaluating the importance of attributes on a rating scale, where the extreme points are associated with bipolar labels (adjectives). In this method, participants mark the blank space that best indicates how they would describe the objects being evaluated (MALHOTRA, 2001). Aaker, Kumar, and Day (2001) describe the semantic differential scale as respondents' evaluation of object-attitudes on a series of five- or seven-point

scales, bounded at each end by polar phrases or adjectives. The respondent chooses a point whose adjective most closely matches the description of that object.

As a strong point of this method, Malhotra (2001) highlights, as a positive point, the versatility of the semantic differential scale and, as a negative aspect, he notes that there is controversy about whether the data obtained should be treated as an interval scale, which would limit the use of statistics for its analysis. In this case, the extreme points of the scale are characterized by antonymous adjectives, for example, complicated/simple, easy/difficult, fast/slow, and, in the case of this study, non-existent or fully offered attribute/service. Intermediate points are provided between the extreme points, which may or may not have a description. The respondent marks, on the scale, the point that best represents the description of the analyzed object in that attribute. Another possibility is to create a division of the scale into five or seven points, characterized numerically, and the respondent marks the number that is closest to the description of the object.

Main methods and tools researched

A summary of the main studies researched in the literature review, related to management methods and tools adhering to this research are presented in Table 01, below:

Table 01: Summary of the main methods and tools researched

METHOD	TOOL	DESCRIPTION	STUDY
Multicriteria Evaluation	Matrix for evaluating the tourism potential of localities	Detailed theoretical and methodological review on different methods for evaluating tourism potential, among them: - Evaluation Matrix of the Project Poles of Ecotourism Development in Brazil; - Classification and Evaluation of Tourist Municipalities by Boullón (1995); - Tourist Attractiveness Index by Pinzan (2003); - Tourist Attractiveness Index by Gearing et al. (2003); - Analysis of Productivity Factors for the Location of Tourism Projects by Cárdenas Tabares (1994); - Tourist Attractions Evaluation Matrix by Inskeep (1991) - Regional Evaluation Approach to Tourism Development Potential by Gun (1980); - Ferrario's Tourism Potential Index (1970); - Assessment of the Potential of Tourism Development Areas of Thailand's National Tourism Development Plan (1974); - Casal's Tool for Determination of Tourism Potential (2003); - Adaptation of the OAS Tourism Resources Hierarchization Methodology for	Almeida (2006)

Analytic Hierarchy Process (AHP)	Hierarchy of determinants of attractiveness of industrial tourism	Application in the Autonomous Community of La Roja by (Cuervo and Lenno Cerro (1993); - WTO's Resource Evaluation (1978); - Measure of Tourist Attraction by Gearing et al. (1976) - Almeida's (2006) proposal of a Matrix for Evaluating the Tourist Potential of Localities. Study on the factors that determine the attractiveness of industrial tourism in general and factory visits in particular. Thirty-four determinants were listed, drawing from previous studies conducted on visits to operational and non-operational industrial sites. They were then categorized into a four-level hierarchical structure based on the "4 As" of tourism destination management practices (attractions, access, amenities, and ancillary services).	Lee (2015)
	Evaluation of the potential use of natural areas for tourism	Baseia-se no modelo de Hierarquização de Atrativos Turísticos (HAT), criado pelo Ministério do Turismo do governo brasileiro, e na avaliação turística-geomorfológica (Geomorphosite Assessment). A análise da potencialidade é descrita por meio da avaliação de critérios que resultam na condição atual do atrativo e indicam seu potencial de uso.	Barcelos (2016)
Attribute Importance Analyses	Semantic Differential Scales; Pairwise comparison; Selective ordering of attributes (only the most important attributes) Decreasing points	The different methods can be divided into two large blocks: direct and indirect methods of obtaining significance. Both methods have advantages and disadvantages, and one is not superior to the other. The various types of scales are basically divided between comparative and non-comparative.	Samartini (2006)

Source: Author's elaboration.

The selection criteria for the methods and tools selected for this research was their adequacy to the proposal of estimating the level of supply of the attributes of industrial tourism, whether within the limits of a single factory or within the scope of a manufacturing park, in order to contribute to the development of actions directed towards the activity of industrial tourism in the Manaus manufacturing park.

METHODOLOGY

This research is configured as applied, since it aims to expand knowledge, through a practical application, generating knowledge with theoretical and experimental work with the

purpose of application in a particular context (SILVA and MENEZES, 2001; JUNG, 2010). As for the type of research, as Silva and Menezes (2001) point out, it has a qualitative approach, as it aims at a deeper and more intrinsic understanding of facts that cannot be demonstrated in numbers, and also a quantitative research, to the extent that it translates opinions and information into numbers, through the use of statistical techniques.

Considering some specific characteristics of the local industrial park, we tried to use a tool that could contribute to the analysis of the attractiveness level of the industrial tourism segment in Manaus. For this, a matrix was used, whose structure is formed by the 34 specific attributes of industrial tourism, grouped into 8 factors and 4 guidelines, based on the studies of Almeida (2006), Otgaar (2010), Lee (2015) and Barcelos (2016). In this instrument, the attributes are evaluated on a semantic variation scale - Likert scale (1932), which makes it possible to verify different levels of intensity of opinion about the same subject or theme (MALHOTRA, 2001; SAMARTINI, 2006; LUCIAN and DORNELAS, 2015). The value scale adopted in this research was from 1 to 5, where number 1 represents very low attractiveness; 2 - low attractiveness; 3 - medium attractiveness; 4 - high attractiveness; and 5 - very high attractiveness. In addition, for each factor evaluated, respondents should assign different weights: weight 2 for items considered essential for visiting the plants; and weight 1 for items (services/taxes) considered supportive (OTGAAR, 2010; LEE, 2015).

Table 02 presents the structure of the Evaluation Matrix, in which the 34 specific attributes of industrial tourism were inserted, grouped into eight criteria/factors and four guidelines, as listed by Lee (2015). This matrix was used to evaluate the following variables: Dimension/Guideline (d), Criteria/Factors (c), Weights (pe), Attributes (a), Scoring Options (p) and Survey/Calibration Methods (m).

Table 02: Structure of the evaluation matrix

Dimension/ Guideline	**Criteria (c) / Factors**	**Pesos (p)**		**Attributes (a)**	**Scoring options (p)**					**Survey / Measurement Method (m)**
		1	2		1	2	3	4	5	
I. Tourist Attractions	**A) On-site attractions**			1. Do-it-yourself experience						Formulário por *WhatsApp /Google Forms*
				2. Display space (gallery, videos/photos, brands, product models)						
				3. Observation of the production process						
				4. Events and performances						

			5. Souvenir store at the factory		
	B) Attractions in the surrounding area		6. Cultural attractions (festivals, museums)		
			7. Natural attractions and ecological places (beaches etc.)		
			8. Leisure attractions (parks, recreation areas)		
			9. Other industrial tourism factories in the surroundings		
II. Accessibility	**C) Accessibility in the external environment**		10. Access for private vehicles		
			11. Access to public transportation services		
			12. Connection with surrounding attractions		
	D) Access in internal environment		13. Regular days and hours of operation		
			14. Parking area		
			15. Audience capacity		
			16. Entry price		
			17. Ease of internal transportation (golf carts, shurke etc.)		
III. Amenities	**E) Lodging and accomodation services**		18. Lodging accommodations in or around the plant		
			19. Hotels nearby (City Center or nearby neighborhoods)		
			20. Rest areas on plant premises (chairs, armchairs, etc.)		
	F) Catering facilities		21. Restaurants available to the public in the plant area		
			22. Restaurants in the surrounding area		
			23. Shopping centers and surrounding commercial area		
IV. Auxiliary Services	**G) Communication and information services**		24. Visitor reception center		
			25. Professional guides		
			26. Publications - guides, primers		

			27.Information Displays		
			28 Sign (internal and external environment)		
			29. Interactive information panels (web pages, virtual tour, etc.)		
	H) Safety and security systems		30. Tidying up and cleaning the site		
			31. Rules for reservations and restrictions (e.g. age)		
			32. Raised walkways and glass windows in production lines		
			33. Camera system (against theft and industrial espionage)		
			34. Emergency and first aid services		

Source: Author's elaboration, adapted from Lee (2015), Almeida (2006) and Barcelos (2016)

Data treatment and collection

In the treatment of the data collected, the final score was determined by the weighted average (MAGALHÃES e LIMA, 2002) of the values assigned to each question. The general average score translates the destination's current level in relation to the offer of industrial tourism attributes; the average score per specific attribute points out strengths and weaknesses/opportunities to be observed in the process of managing and planning a program of guided tours to factories, with the purpose of making the destination more attractive as far as industrial tourism is concerned.

Thus, the proposal of this research was to identify the main attributes related to the activity of industrial tourism, and verify if they are available in the environment of the industrial park of Manaus. In addition, the research aimed to estimate the intensity of each of the attributes offered, considering that this estimate is an important indicator to identify the level of attractiveness of the factories in the Manaus industrial park for the industrial tourism activity.

Subsequently, the evaluation matrix was adapted to a questionnaire (survey) on the Google Forms platform, for data collection. The survey, with the questions, was sent by WhatsApp, to the target audience, in the period from March to July 2002, covering 40 adults, representatives of the companies in the Manaus Industrial Pole participating in the project Zona Franca de Portas Abertas, coordinated by the Superintendence of the Manaus Free Trade Zone (Suframa), as well as public managers, travel agents, tour guides, academics, and liberal

professionals, who represent the group of stakeholders - principally involved in the industrial tourism activity.

After data collection, the HAP method, Analytic Hierarchy Process (RIBEIRO; ALVES, 2016), was used to analyze the results of the data collection. The attractions were ranked according to the highest evaluation at first, followed by the other items, with lower scores. Table 03 presents the scoring scale provided in the survey, as well as the evaluation criteria corresponding to each value.

Table 03 - Scoring scale and corresponding evaluation criteria

Escala de pontuação	0	1	2	3	4	5	6
Intensidade da oferta	Inexistente	Muito baixa oferta	Baixa oferta	Media Oferta	Alta oferta	Muito alta oferta	Não sei avaliar

Source: Author's elaboration.

Analysis of the results

The application of the evaluation instrument proposed in this research made it possible to estimate the intensity of the supply of industrial tourism attributes in the environment of the Manaus Industrial Pole. The overall score of this evaluation instrument was calculated from the weighted average of the results of the simple averages of the sum of the scores for each question. The numerical data were obtained in the answers of the questionnaire/survey, multiplied by the average of the weights assigned to each of the eight guidelines in which the attributes of industrial tourism are divided, ranked by Lee (2015).

Thus, the weighted average was calculated according to Equation 1 below, where M corresponds to the Weighted Average; P is related to the assigned weight (1 or 2 in this equation); the letter N corresponds to the attribute, and n is equivalent to the number of attributes evaluated on a scale of 1 to 5, totaling 23.

$$M = \frac{P_1N_1 + P_2N_2 + \ \dots \ P_nN_n}{P_1 + \ P_2 + \ \dots Pn}$$

For this research 23 specific attributes were selected from the total of 34 attributes listed by Lee (2015), specific to the industrial tourism activity. The exclusion of 11 attributes from the original list was due to the fact that they did not fit the type of response possible to be evaluated

by points, as explained previously, in item 3.1.3. An exception was the item 9 - Offer of accommodation in the factory environment, which was excluded because it did not apply to the reality of the Manaus Industrial Pole, representing a deviation item in the data treatment. It is important to point out that the companies in the local industrial park do not have lodging services on their premises, but have hotels nearby. For this reason, it was decided that it would be enough to analyze the offer of hotels and lodging in the area surrounding the PIM, for the purpose of calculating the weighted average.

The weights per attribute were grouped by determining factor, and the values were established based on the decision making by simple majority in the answers to each question, in which the respondents attributed weight 1 for the factors considered supportive, and weight 2 for the factors considered essential for the industrial tourism activity. The criterion for defining weights 1 and 2 was the absolute majority. Thus, the factors that had the highest number of choices of weight 1 by the public respondents were classified as support factor - weight 1 in the evaluation matrix; in the same way that the factors considered essential - weight 2, by most respondents, were classified as weight 2 in the matrix.

From the survey of basic information about the availability (or offer) of attributes (or services/equipment/structure) - focused on the industrial tourism activity - it was possible to make an initial analysis that should be complemented by further studies that take into consideration issues that include the perception of other actors involved (visitors, public managers and companies that work with inbound tourism), and also that consider the influence of external factors to the environment of the attraction pointed out by Ritchie and Zins (1978), Inskeep (1991), Kim (1998), and Das et al. (2007).

The collection of this information enabled the analysis of the level of supply and attractiveness of industrial tourism in the PIM environment, and factors considered essential conditions to attract industrial tourists, meeting the objectives of this research.

Results and discussion

Of the total of 40 people who received the questionnaire, 21 answered the questions sent, representing 52.5% of the total target audience of the research.

From the application and analysis of the results of the evaluation matrix of the supply of specific attributes of industrial tourism (questionnaire survey) - prepared based on the studies of Almeida (2006), Lee (2015) and Barcelos (2016) - it was possible to estimate that there is potential for the activity of industrial tourism in the industrial park of Manaus. In the evaluation, the weighted average score of the attributes was calculated, whose final result was 3.46, in a variation of the scale from 1 to 5, representing 69.2% of the total variation of the scale. It is important to

point out that, in the scoring results obtained, most of the attributes reach a level above the average, considering the scale from 1 to 5, used as a parameter in the questionnaire applied.

Thus, the overall result was above average, which means that there is a supply of specific attributes of industrial tourism in the industrial park of Manaus. In Table 04 is presented a ranking of the score obtained for the attributes evaluated, with the respective average scores and weights arranged in descending order (HAP method), as well as the result of the final weighted average. Each item is related to the letter corresponding to one of the eight criteria established in the structure of the evaluation matrix.

Table 04: Ranking of the attributes score of industrial tourism offered in the PIM

	QUESTION	AVERAGE PER ATTRIBUTE	WEIGHT	AVERAGE SCORE ACHIEVED (POINT X WEIGHT)	MAXIMUM VALUE (POINTS X WEIGHT)
1.	Arrumação e limpeza do local - Sistemas de segurança (H)	4,62	2	9,24	10
2.	Câmeras contra roubos e espionagem industrial – Sistemas de segurança (H3)	4,50	2	9,00	10
3.	Serviços de emergência e de primeiros socorros – Sistemas de Segurança – H4	4,44	2	8,89	10
4.	Regras para reservas e restrições – H1	4,35	2	8,71	10
5.	Atrativos no ambiente interno – A	4,24	2	8,48	10
6.	Área de estacionamento – Acesso no ambiente da fábrica – D	4,19	2	8,38	10
7.	Placas de sinalização – Serviços de comunicação e de informação – G3	3,95	2	7,90	10
8.	Facilidade de deslocamento interno com uso de transporte alternativo – Acesso no ambiente interno – D1	3,76	2	7,53	10
9.	Acesso para veículos particulares – Acesso no entorno da fábrica – C	3,71	2	7,43	10
10.	Capacidade de atendimento para a atividade do turismo industrial? – D2	3,71	2	7,43	10
11.	Displays de informações – Serviços de comunicação e de informação na fábrica – G4	3,60	2	7,20	10
12.	Centro de recepção ao visitante – Serviços de comunicação e de informação na fábrica – G	3,52	2	7,05	10

13.	Passarelas elevadas e janelas de vidros nas linhas de produção – Sistemas de segurança - H2	3,47	2	6,94	10
14.	Restaurantes disponíveis para o público na área da fábrica - Serviços de alimentação – F	2,94	2	5,88	10
15.	Painéis informativos interativos (páginas eletrônicas, *tour* virtual etc.) – Serviços de comunicação e de informação na fábrica G5)	2,85	2	5,70	10
16.	Serviços de transporte público – Acesso no entorno da fábrica – C1	2,75	2	5,50	10
17.	Guias profissionais – Serviços de comunicação e de informação na fábrica – G1	2,58	2	5,16	10
18.	Restaurantes na área de entorno – Serviços de alimentação – F1	2,28	2	4,56	10
19.	Publicações – guias, cartilhas – Serviços de comunicação e de informação na fábrica – G2	2,28	2	4,56	10
20.	Conexão com outros atrativos turísticos e de lazer no entorno da fábrica – C2	1,95	2	3,89	10
21.	Hospedagem e alojamento nas proximidades – E	3,47	1	3,47	05
22.	Áreas para descanso nas dependências da fábrica – E1	3,24	1	3,24	05
23.	Atrações turísticas no entorno da fábrica - B	2,75	1	2,75	05
MÉDIA GERAL		3,47		____	
MÉDIA GERAL PONDERADA		_____		3,46	

Source: Author´s elaboration.

The results, with the weight applied, show that among the attributes best evaluated with weight 2, considered essential for the industrial tourism activity, the following stand out: the security systems related to the following items: site tidiness and cleanliness (4.62), monitoring cameras (4.50), emergency and first aid services (4.44), followed by the attractions offered during the visitation (4.24). Among the attractions with the lowest score with weight 2, the following stand out: connection with other tourist and leisure attractions around the plant (1.95), publications, guides and booklets (2.28), and food services in the surrounding area (2.28). Such attributes deserve special attention for future improvements, considering they are below average.

Regarding the attributes evaluated with weight 1, which are not considered essential but rather supportive, the score was always above the average, which would be 2.5: offer of tourist attractions around the plant (2.75), rest areas on the plant premises (3.24) and lodging and

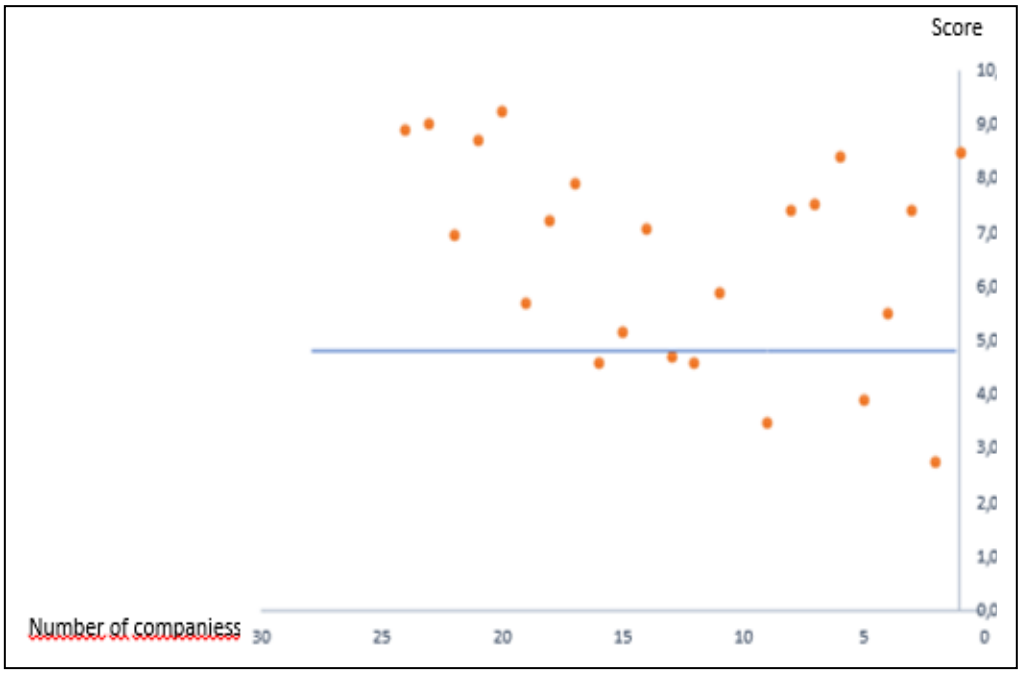
accommodation in the vicinity (3.47). Despite this above average score, these criteria also deserve attention for improvements, in the intensity of supply, so that the industrial tourism activity increases its development potential.

It is important to highlight, from the results presented, that only three attributes received weight 1, being considered supportive. They are: lodging and accommodation nearby, rest areas on the factory premises, and tourist attractions around the factory.

It was also observed that some attributes depend on improvements that can be made by the companies, such as: the types of attractions presented during the visitation, guide services and information provided by the industries in the industrial tourism activity. However, there are other specific attributes that are related to the external environment, and that require action by the government. In this question are services related to urban planning, in order to enable infrastructure for the installation of restaurants, leisure areas, and public transportation services, among others.

Graph 01, below, indicates that six attributes are below the average in the scoring scale rescaled to the value of 1 to 10 points, considering that the weights used were 1 and 2. It is also observed that the other 17 attributes evaluated are above the average point, which in the rescaling corresponds to 5, on the scale from 1 to 10. It is understood, therefore, that most of the attributes offered in the PIM environment are above the overall weighted average, which was 3.47 points, on a scale of 1 to 5.

Graph 01: Scatter of score x weight per attribute



Source: Author´s elaboration.

From the results presented in this first application of the Matrix for Evaluating the Supply Intensity of Specific Attributes of Industrial Tourism, it was possible to verify the applicability of this methodology. Developed in the process of this research, this matrix can be very useful as a management tool for decision making, both by companies and by public and private entities involved in the industrial tourism system.

It is understood, therefore, that this assessment tool aims to facilitate the identification of the general level of supply of specific attributes of industrial tourism, as well as the level of each attribute, in order to contribute to decision making about the necessary measures to increase the quality and intensity of services offered.

CONCLUSION

The application of the Matrix of Evaluation of the Intensity of Supply of the Specific Attributes of Industrial Tourism, in general, presented positive results, and also pointed to the need for some adjustments so that the activity of industrial tourism is developed in the environment of the Industrial Pole of Manaus. These results also indicate the need for further studies, for a more comprehensive analysis involving external factors that determine attractiveness, such as the quality of the location and facilities for visitors and the promotion of industrial tourism, considered "supporting conditions", according to Otgaar (2010). Other factors, such as accessibility to the destination, economic feasibility of the activity, environmental impact of the activity, sociocultural impact, national/regional importance, international importance, which can directly influence tourism attractiveness, should also be considered, being mentioned by several authors, among them Ritchie and Zins (1978), Inskeep, (1991), Kim (1998), and DAS et al. (2007).

The objective of this research was not, therefore, to measure the potential of the local industrial park for the development of industrial tourism activities, but rather to identify which are the main attributes related to the attraction, and to verify if they are available in the environment of the Manaus Industrial Pole, as well as to evaluate the intensity of each one of them. The final result was an estimate of the level of the existing supply of facilities and services for the industrial tourism activity, which serves as one of the relevant indicators to estimate the potentiality of the municipality of Manaus for the industrial tourism activity.

Therefore, in this research - more relevant than the results pointed out in the analysis of the intensity of supply of the attributes - is the proposal of the evaluation matrix itself to estimate the level of supply of the specific attributes of industrial tourism, which presents itself as a useful tool for tourism management and planning. As a management tool, this evaluation instrument has made it possible to obtain the necessary information to subsidize the elaboration of effective

indicators for, in a first moment, evaluating the potential of a locality or a company in the industrial tourism segment. In a second moment, it contributes to guide the planning of actions and decision making related to the industrial tourism activity in Manaus, with the possibility of adaptation to other locations.

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