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CUSTOMER PREFERENCES TOWARDS AI FUNCTIONALITIES IN OTAs

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ABSTRACT

Online travel agencies (OTAs) are platforms that allow customers to book a range of travel-related services such as accommodation, flights, car hire, cruises and other activities online. The modern age of travel is being driven by the use of digital technology and, in particular, artificial intelligence (AI) to design and deliver products and services. The implementation of AI functionalities in online travel agencies is a rapidly evolving area where the focus is on developing attractive products that satisfy, surprise and delight the customer. The research methodology consisted of three main phases, the second and third of which are described in this paper. The first phase identified the key AI functionalities in the OTAs that impact the customer's travel experience and developed an original questionnaire based on functional and dysfunctional questions from the Kano model. Kano's two-dimensional model aims to determine the level of customer satisfaction or dissatisfaction when a particular attribute (in this research, each attribute is represented by an AI functionality) is present or absent. There are five Kano categories for each quality attribute: Must-be, Performance, Attractive, Indifferent and Reverse. In addition, some of the AI functionalities were considered as clusters of AI topics such as personalisation-based, optimisation, advanced search and AI chatbots when formulating the research questions. The second phase described in this article was conduct a survey using the Kano questionnaire and prepare the dataset for analysis. The third phase consisted of applying discrete and continuous analyses for each AI functionality, discussing the results and answering the research questions.

***Keywords**: OTA, AI, Customer Satisfaction, Kano model, Tourism*

1. INTRODUCTION

Online travel agencies (OTAs), such as Booking.com, Expedia and Trip.com serve as intermediaries in the travel industry, using web-based platforms and mobile applications to accelerate the delivery of a variety of travel-related services. (Talwar et al., 2020; Chen et al., 2022). OTAs have also simplified the entire process of exploring and comparing a wide range of hotel offers worldwide, accessible with minimal effort through a few simple clicks (Jo et al., 2022). In recent years, the development and dissemination of technologies has increased considerably.

The integration of cutting-edge technology, especially the ubiquitous artificial intelligence (AI), has made the process of selecting a customised product or service more efficient and accessible to the customer than ever before. AI is a technology that has transformed many sectors around the world, including the travel, hospitality and leisure industries (Koo et al., 2021). It also offers tourism companies the opportunity to improve customer satisfaction while optimising business protocols and processes. (Samala et al., 2022; Solakis et al., 2022). Furthermore, according to Statista (2023), the AI industry is expected to grow to USD 305.90 billion in 2024. Numerous travel companies, including well-known online travel agencies (OTAs), have recognised the importance and benefits associated with the integration of state-of-the-art technologies. They have already explored the benefits and functions of artificial intelligence and found effective ways to introduce AI into the travel industry (Urwin, 2024).

Customer preferences play a crucial role in shaping the functionalities and features of AI systems implemented in online travel agencies (Zhu et al., 2023). According to Salesforce, (2023), around 80 per cent of customers are more likely to make a purchase if they receive a personalised experience from a company.

This indicates that customers value the personalisation and tailored recommendations of AI in OTAs (Solakis et al., 2022; Samala et al., 2022; Pillai & Sivathanu, 2020; Aliyah et al., 2023). Customers expect AI systems to provide real-time communication, round-the-clock customer service and the ability to predict their interests and preferences (Bilgihan and Ricci, 2024; İştin et al., 2022; Buhalis and Moldavska, 2022). To meet these preferences, tourism companies need to invest in AI tools that enable personalised offers, optimise service delivery and perform comprehensive analyses of location data, preferences and customer characteristics (Kim, So, et al., 2024; Solakis et al., 2022; Wu, 2021; Koo et al., 2021).

By analysing the potential benefits and challenges associated with AI, the main objective of this study is to identify and categorise the impact of different AI functionalities on customers' travel experience using Kano's two-dimensional model, which categorises quality attributes into five dimensions: must-be, one-dimensional, attractive, indifferent and reverse quality attributes. Based on the given objective, the research questions can be formulated as follows:

RQ1. How do various AI personalisation-based functionalities meet customer needs?
RQ2. What role do AI-supported optimisation functionalities (price prediction, travel summary, travel items combination) play in perceived customer satisfaction?

RQ3. How do customers perceive the functionality of AI chatbots in online travel agencies?
RQ4. How do customers rate advanced search options?
RQ5. Which AI functionalities in OTAs are perceived as Must-be, Performance, Attractive and Indifferent?

In order to obtain answers to the research questions, an empirical study was conducted focussing on identifying specific AI features in OTAs that influence the travel experience and customer satisfaction/dissatisfaction. The main method of this research was therefore a survey using an originally designed questionnaire based on the Kano model (Kano et al., 1984) to assess the level of customer satisfaction in relation to the presence or absence of each AI feature in OTAs. The practical contribution of the research is to provide insights that help OTAs to develop appealing, high-quality products that meet customer preferences and improve competitiveness in the market. Following the introduction, the Related work section summarises the current research efforts related to AI in tourism and OTAs and the application of the Kano model in the evaluation and development of services/products. The Methodology section describes all three main research phases as well as the introduction and description of all important constructs (scales, measurements, coefficients…). In the Results and Discussion section, all results are presented and discussed. In the conclusion, the main findings and the answers to the research questions are given as well as the limitations of the research and the plans for future research.

2. RELATED WORK

Artificial intelligence (AI) penetrates almost every aspect of travel and tourism: robotics (Ivanov and Webster, 2020; Koo et al., 2021; Goel et al., 2022; Chi et al., 2022), chatbots and virtual agents (Pillai and Sivathanu, 2020; Samala et al., 2022; Mohammad Shawal et al., 2023; Li et al., 2023; Chen et al., 2021), image recognition (Tuo et al., 2021), 24/7 customer service (Kim, Hall, et al., 2024; Bilgihan and Ricci, 2024; Orden-Mejía et al., 2023), voice-based services (Buhalis and Moldavska, 2022), dynamic pricing (Zulaikha et al., 2020; Kim, So, et al., 2024), personalised recommendation systems (Ghobriel, 2023; Allah Ali Sayed Mohamed Gaafar, 2020), forecasting and prediction tools (García-Madurga and Grilló-Méndez, 2023), relevant reviews (Kazak et al., 2020), language translation systems (Wei and Lin, 2020) and others (Dowling, 2023; Ling et al., 2023; Samara et al., 2020; Aliyah et al., 2023; ColorWhistle, 2024).

Various AI advancements along with other technologies such as blockchain, IoT, trends towards creating smart cities and smart hotels are opening up new opportunities for the tourism and hospitality sector to meet and exceed the evolving needs and experiences of tourists, (Rather, 2024; Kashem et al., 2023; Marín Díaz et al., 2023) and enhance tourists' experiences from the booking process to the end of their trips (Benaddi et al., 2024).

The new technological development in tourism is aligned with the intention to create positive impacts for customers, such as time and money savings, timely provision of important information, increased security and personalised functionalities (Yoon and Choi, 2023).

SCOPUS database searches for the field consisting of a combination of titles abstracts and keywords: TITLE-ABS-KEY (AI AND touris*) within the last 5 years in Computer Science, Business Administration, Management and Accounting, Social Sciences, Decision Sciences and Economics, Econometrics and Finance show a steady increase in publications (from 2019-2023 respectively: 19,50,79,125,209), but this number is much lower when it comes to narrowing down the search string to „OTA or online travel agenc*", which shows only eight relevant publications in the last 5 years and none of them aim to investigate customer preferences, experiences and adoption of AI functionalities specifically in OTAs.

To investigate the methodological use of the Kano model over the last 5 years, a bibliometric search was conducted in the Scopus citation and indexing database for a string search for "Kano model" in the TITLE-ABS-KEY field. It turned out that the number of related documents increased continuously from 2019 to 2023 (123, 159,167 and 192,200 respectively). The Kano model is mainly associated in the context of (keywords) customer satisfaction, product design, service quality, quality control, customer requirements, product development, decision making and service quality. To narrow down the bibliometric research to the tourism sector, the results for the search string „Kano model and touris*" from 2019 to 2023 also showed an increasing number of documents (6,7,6,10,13). A comprehensive analysis of the Kano model in the context of hospitality and tourism is available in (Slevitch, 2024).

The motivation for this research was the arise of AI features development and the need to investigate customers' AI preferences in the OTA context. This is important because when you consider implementing a certain functionality that costs time and money into an information system, there is always a risk that a customer will not accept it or even realise it exists. By understanding which functionalities lead to customer satisfaction and dissatisfaction, you can improve the customer experience and the overall success of your productor service in the market. Based on the above reasons, the lack of research on AI functionalities in OTAs and the purpose and use of the Kano model, the authors consider the Kano model questionnaire to be a good tool for assessing AI capabilities and functionalities in online travel agencies.

3. METHODOLOGY

A three-phase methodology was used to conduct this study, as shown in Table 1. The second and third phases are entirely described in this paper. The main methods and results of the first phase (accepted to be published in (Car, 2024) as a preliminary study) are briefly summarised below.

In order to investigate which AI functionalities impact the user experience in the booking process and how, a questionnaire based on the Kano model was created with the help of expert opinions (7 experts, 3 IT experts and 4 from hospitality and tourism sector). As the Kano model requires predefined functions, this was taken into account throughout.

- The analysis of all relevant AI functions implemented or to be implemented in OTAs (collection of all relevant literature and materials (scientific articles, conference papers, white papers, documentation, websites),

- assigning a score to each functionality by experts based on their assessment of its relevance to the OTA field, and
- creating a ranking of average scores for each AI feature.

Once a consensus was reached, 12 functions were identified as relevant for inclusion in the questionnaire. The KANO questionnaire was created with the 12 satisfiers and 12 dissatisfiers questions' pairs (Table 6). Two questions were formulated for each functionality: How does the respondent feel when this function is present in OTA (functional form of the question – aims to extract satisfiers) and how does the respondent feel when this function is absent in OTA (dysfunctional form of the question – aims to identify the so-called dissatisfiers) (Car, 2024).

The reliability and validity of the questionnaire was assessed separately for 12 functional and 12 dysfunctional questions. For the 12 functional questions, the Cronbach's alpha was 0.73 (acceptable according to (Hair et al., 2006), all coefficients > 0.6 indicate acceptable internal consistency and reliability), the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.68 (satisfactory according to (Leech et al., 2005) and (Stewart, 1981), > 0.5) and the principal component analysis for 4 factors showed a cumulative variance of 72% after varimax rotation. For the 12 dysfunctional questions to 115 respondents, Cronbach's alpha was 0.68, the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.66 and the principal component analysis on 4 factors showed a cumulative variance of 73% after varimax rotation (Car, 2024).

Table 1. The Research Methodology phases

Phases	Activities	Results
Phase 1	Step 1 Comprehensive analysis of relevant literature and materials	Identification of AI functionalities in OTAs to be observed
	Creation of a questionnaire based on the Kano model	First version of the Kano questionnaire
	Step 3 Testing of the questionnaire by experts and verification of validity and reliability	Final version of the questionnaire for deployment
Phase 2	Deployment of the survey and preparation of data for analysis	Collection of responses; Obtaining only the relevant answers dataset for analysis
Phase 3	Discrete and continuous analysis results and interpretation	Identification of AI functionalities that affects satisfaction/dissatisfaction; Research questions answers
Conclusion and future research plans		

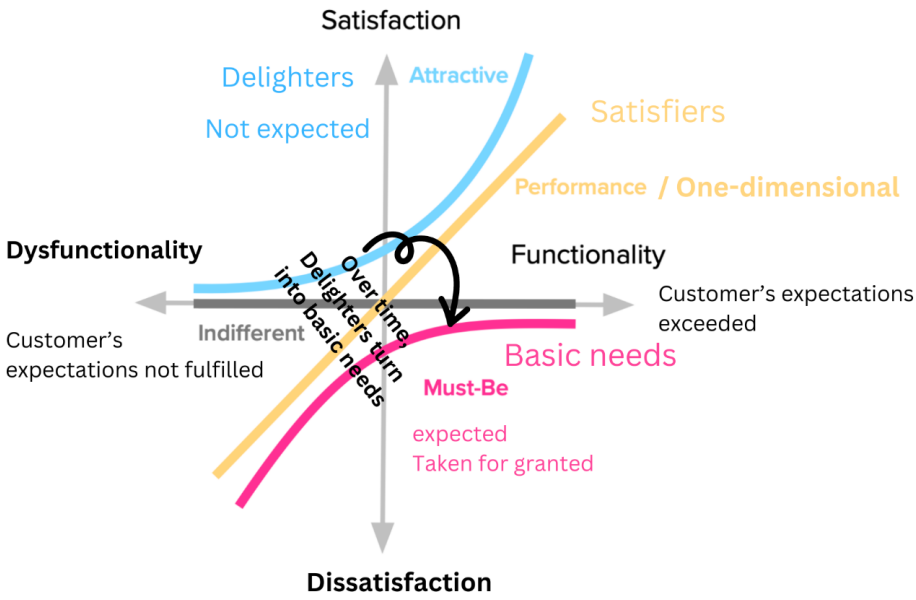
Source: Authors

3. 1 The Kano model and its constructs

The main research method was the use of an originally constructed questionnaire based on the principles of the Kano model (Kano et al., 1984) which identifies five different dimensions – levels of customer satisfaction and dissatisfaction (Table 2). It allows to understand customers' attitudes towards product features by categorising them as: Attractive, one-dimensional or Performance, Indifferent, obligatory - Must be, undesirable - Reverse. Kano links product quality and functionality to customer satisfaction (Ek and Çıkış, 2015; Avikal et al., 2014) and is used to determine which service attributes have a greater impact on customer satisfaction and therefore require immediate attention (Matzler et al., 1996). It requires a specific questionnaire survey and measures to analyse results in order to produce a numerical, tabular and graphical representation of customer satisfaction and dissatisfaction. The Kano model was and still is popular for monitoring which product features need attention in product/service development or optimisation (Pandey et al., 2022; Slevitch, 2024).

The method was slightly adapted from the research of (Chen, 2012; Berger et al., 1993; Matzler and Hinterhuber, 1998; Shahin A et al., 2013) in terms of the question generation and scoring table, as well as the processing of survey data and interpretation of results, which were adapted from the original according to (Berger et al., 1993).

Figure 1. Kano model



Source: adapted from (Kano et al., 1984), (Berger et al., 1993), (Yadav, 2016)

Table 2. Kano 5 quality dimensions

Quality Dimension	Dimension description
Attractive	When fulfilled, they cause satisfaction, but when not fulfilled, they do not cause dissatisfaction because the client does not expect them
Performance or One-dimensional	Increasing the performance of attributes results in a proportional increase in satisfaction, while decreasing the performance of attributes results in a proportional decrease in satisfaction (or increase in dissatisfaction). For example, the speed of a web page loading.
Must-be	Quality elements that result in dissatisfaction when not fulfilled (or not delivered at a satisfactory level) because the customer expects them as necessary. However, when fulfilled (delivered at a satisfactory or higher level), they do not result in satisfaction
Indifferent	Quality elements that neither result in satisfaction nor dissatisfaction, regardless of whether they are fulfilled or not
Reverse/Undesired	Quality elements that result in dissatisfaction when fulfilled and to satisfaction when not fulfilled.

For expressing their opinions, respondents will use these 5 qualitative response options.:

1. I dislike it,
2. I can live with,
3. I'm neutral,
4. I expect it/It must be,
5. I like it.

Table 3. Kano Evaluation tables (B) variant will be used in this research

A) Original Kano table

Feature/ Functionality	**Dysfunctional** (Negative questions) ***Dissatisfiers***					
		5	4	3	2	1
Functional (Positive questions) ***Satisfiers***	5	Q*	A	A	A	P
	4	R	I	I	I	M
	3	R	I	I	I	M
	2	R	I	I	I	M
	1	R	R	R	R	Q*

B) Variant of Kano evaluation table based on (Pouliot, 1993)

Feature/ Functionality	**Dysfunctional** (Negative questions) ***Dissatisfiers***					
		5	4	3	2	1
Functional (Positive questions) ***Satisfiers***	5	Q	A	A	A	P
	4	R	Q	I	I	M
	3	R	I	I	I	M
	2	R	I	I	Q	M
	1	R	R	R	R	Q

Source: Authors

*Q – indicates inconsistent/contradictory answers or possibility of wrongly formulated questions. In case of getting conflicting responses (such as "Dislike" and "Dislike") to both questions, it is a Questionable answer, category Q. For this very reason, (Pouliot, 1993) suggested that cells (2,2) and (4,4) from the standard Kano evaluation should be also of the category Q. the categories are M - Must-Be, P – Perfomance (or One-dimensional, O in some sources), A- Attractive, I-Indifferent, R-Reverse and Q-Questionable.

The discrete Kano model analysis consists of assigning the dimension label from Table 3 to each pair of respondents' answers, which results from observing the value of the functional and dysfunctional question for each functionality in the questionnaire. Then the maximum value of the sum of the frequencies of all categories for each feature is assigned as the final Kano category. For example, analysing the Functionality 7 Image-based search out of all 228 responses, the most frequent was A-Attractive.

Table 4. Example of assigning the functionality final Kano category

Functionality/ frequency	M	P	A	I	R	Q	Total	Category
7. Image based search	22	31	88	81	3	3	228	A

Source: Authors

When results from different categories are close, the following rule is applied: Must-be > Performance > Attractive > Indifferent (Lee et al., 2011) based on (Berger et al., 1993).

After applying the discrete analysis of responses to the Kano questionnaire, a continuous analysis method introduced by (DuMouchel, 1993) is also used. This uses new values, namely Dysfunctional and Functional values, both ranging from -2 to 4. Therefore, each previous response option for functional and dysfunctional questions must be converted into a number on a satisfaction potential scale as shown in Table 5.

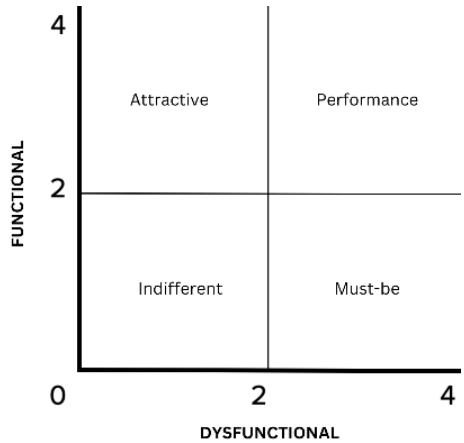
- **Dysfunctional**: -2 (Like), -1 (Must be), 0 (Neutral), 2 (Live with), 4 (Dislike)
- **Functional**: -2 (Dislike), -1 (Live with), 0 (Neutral), 2 (Must-be), and 4 (Like).

Table 5. The Kano evaluation table with additional values for functional and dysfunctional answers - continuous analysis

		Dysfunctional (X axis)				
Functional (Y axis)		**Like**	**Expect It**	**Don't Care**	**Live With**	**Dislike**
		-2	-1	0	2	4
Like	4	Q	A	A	A	P
Expect It	2	R	Q	I	I	M
Don't Care	0	R	I	I	I	M
Live With	-1	R	I	I	Q	M
Dislike	-2	R	R	R	R	Q

The average values of these new converted scores are shown in the plane with 4 quadrants – Figure 1 (intersection at point (2,2) resulting from the red coloured cell boundaries in Table 5 above):

Figure 2. Four quadrants for MPAI dimensions (the most relevant)



Source: Authors adapted from (DuMouchel, 1993)

There are also satisfaction (CS) and dissatisfaction (CD) coefficients, also referred to as Better and Worse respectively (Timko, 1993). These values show the influence on:

- customers satisfaction if the feature is present (CS value in the range of 0–1, with values closer to 1 indicating a positive relationship with satisfaction) or
- dissatisfaction if the feature is not present (values from –1 – 0, where values closer to 0 indicate a lower influence on customer dissatisfaction if the feature is not present).

After all discrete analyses have already been performed in each category for a given feature, CS and DS are calculated using these formulas:

$$CS = \frac{A+P}{A+P+M+I} \tag{1}$$

$$CD = (-1) * \frac{M+P}{A+P+M+I} \tag{2}$$

A - attractive attributes response frequency
P - performance attributes response frequency
M - must-be attributes response frequency
I - indifferent attributes response frequency.

The CS and CD coefficients are then plotted in a diagram with four quadrants that intersect at (0,5, –0,5). The diagram is divided into four quadrants corresponding to the four types of requirements: Attractive, Indifferent, Must-be and Performance, starting from the first to the fourth quadrant. By applying both discrete and continuous analysis to the results, the different perspectives will help provide a more insightful final interpretation regarding customers' attitudes towards AI functionalities in OTAs. The Kano questionnaire developed in Phase 1 is shown in Table 6, where F indicates functional and D dysfunctional questions.

Table 6. Originally Kano questionnaire developed in Phase 1

Codes	Questions
1F	OTA provides a personalized user interface based on previous searches and user preferences
1D	OTA does NOT provide a personalized user interface based on previous searches and user preferences
2F	OTA provides personalized travel suggestions based on previous searches and previous trips:
2D	OTA does NOT provide personalized travel suggestions based on previous searches and previous trips:
3F	OTA enables forecasting of accommodation prices and other travel items (flights, additional facilities...)
3D	OTA does NOT enable forecasting the prices of accommodation and other travel items (flights, additional facilities...)
4F	OTA enables search based on speech via a voice assistant (instead of text, search and filters are determined by speech)
4D	OTA does NOT enable search based on speech via the voice assistant (search and filters are determined by speech instead of text)
5F	OTA provides chatbots for complete customer support and support for booking travel items 24/7
5D	OTA does NOT provide chatbots for full customer support and 24/7 travel booking support
6F	OTA gives to the user notifications about the best price, discounts and important dates (via the application, e-mail, sms, etc.) for accommodation, flights and other items
6D	OTA does NOT give to the user notifications about the best price, discounts and important dates (via the application, e-mail, sms, etc.) for accommodation, flights and other items
7F	OTA enables image-based search
7D	OTA does NOT enable image-based search
8F	OTA enables the generation of a text description of the summary of the accommodation and accompanying attractions, helping users to better understand what to expect.
8D	OTA does NOT enable the generation of a text description of the summary of the accommodation and accompanying attractions, helping users to better understand what to expect.
9F	OTA allows the user to receive relevant reviews on items of interest to him in terms of accommodation and travel
9D	OTA does NOT allow the user to receive relevant reviews on items of interest to him in terms of accommodation and travel
10F	OTA offers personalized loyalty and reward programs
10D	OTA does NOT offer personalized loyalty and reward programs
11F	OTA offers automated and personalized travel itinerary planning by suggesting combinations of flights, accommodation and activities.
11D	OTA does NOT offer automated and personalized travel itinerary planning by suggesting combinations of flights, accommodation and activities.
12F	OTA offers additional notifications about important news, restrictions and/or emerging risks related to the upcoming trip
12D	OTA does NOT offer additional notifications about important news, restrictions and/or emerging risks related to the upcoming trip

Source: Car (2024)

3. 2 Survey deployment

The target group of the survey are customers of all ages and demographic profiles who use OTAs to book accommodation and other items when travelling (taxis, car hire, flights, excursions, city tours…). The first part of the survey (before the 12 pairs of questions of the Kano questionnaire) consisted of some demographic and general questions about travelling habits and familiarity with OTAs, which are listed in the Results and discussion section.

Due to the specificity of the Kano questionnaire and the semantics behind the scale values of the functional and dysfunctional questions, the survey was conducted online with detailed instructions. Initially, 386 responses were collected, which underwent data cleaning and filtering. The following data sets were removed:

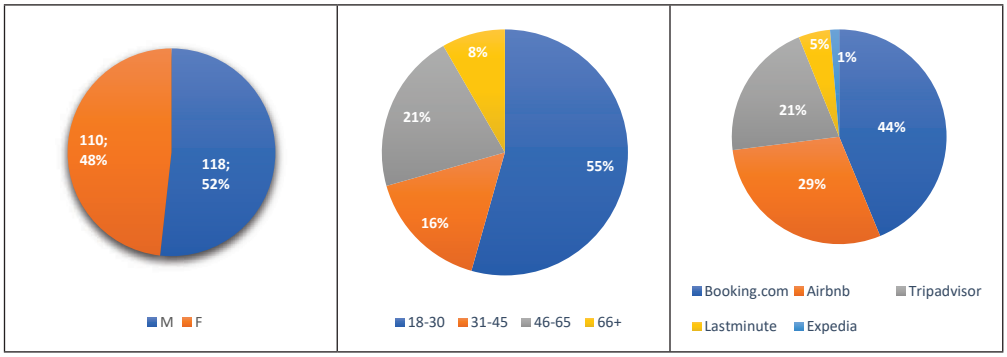
- all responses that were not completed,
- all responses from respondents who have never used an OTA,
- all responses from respondents who misunderstood the instrument – more than 2 contradictory pairs of responses (category Q).

In the final version of the dataset used for the analysis, 228 responses were valid. In the next section, all results are presented with interpretation and discussion.

4. RESULTS

From the cleaned dataset of the survey results, a total of 228 records from 228 respondents were considered for the analysis, 118 men and 110 women. The first requirement for inclusion in the final dataset for analysis was that the respondent had used at least one OTA for their travel bookings. The most popular OTA among respondents was Booking.com, followed by Airbnb and TripAdvisor (multiple choice question, top 5 most frequent results, Table 7)

Table 7. Demographic and use of OTAs results



Source: Authors

The questionnaire (Table 6) contains 12 features, which are coded as F-s (f1–f12) in some result presentations (Table 8).

Table 8. List of F-s, 12 AI OTA functionalities

F	Feature/Functionality
f1	1. Personalized interface based on previous searches and user preferences
f2	2. Personalized suggestions for traveling
f3	3. Travel items pricing prediction
f4	4. Voice based search
f5	5. 24/7 chatbot customer support
f6	6. Relevant notifications via email, app or sms
f7	7. Image based search
f8	8. Generation of summarized textual report for booked trip
f9	9. Insight in relevant and personalized reviews
f10	10. Personalized loyalty programs
f11	11. Travel items combination suggestions (flights, accommodation, activities…)
f12	12. Information regarding significant limitations, obligations, or risks associated with the destination.

Source: Authors

The discrete and continuous analysis was performed in order to gain multiple insights into customers' preferences regarding AI functionalities in OTAs and to compare both results. The first part of the discrete analysis was to obtain the Kano categories (from the Kano rating table) and then transform the response values of the functional and dysfunctional questions into the values of the respective functional and dysfunctional scores, ranging from -2 to 4 (Table 5). An example of the f7 – Image-based search can be found in Figure 3 (extract from the response table):

Figure 3. Extract from the response dataset and categories assigned

OTA enables image-based search	OTA does NOT enable image-based search	Kano Code	Functional Score	Dysfunctional Score
3	2	I	0	2
5	2	A	4	2
5	2	A	4	2
3	4	I	0	-1
4	3	I	2	0
4	3	I	2	0
5	3	A	4	0
5	2	A	4	2

Source: Authors

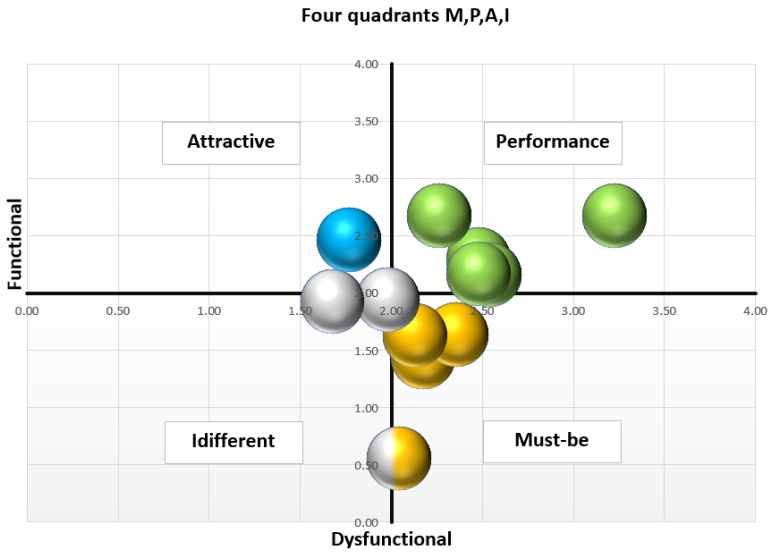
The next step was to calculate the average of the functional and dysfunctional scores for each of the 12 features, excluding the responses where the Kano code was "Q". The results are shown in Table 9 and Graph 1:

Table 9. Functional and dysfunctional scores and continuous analysis categorisation for each F

Functionality	Dysfunctional	Functional	Category for the XY Plain
f1	2.17	1.44	M
f2	2.36	1.63	M
f3	2.48	2.29	P
f4	2.04	0.56	M
f5	2.13	1.63	M
f6	2.54	2.16	P
f7	1.76	2.46	A
f8	1.98	1.94	I
f9	3.22	2.68	P
f10	2.48	2.17	P
f11	1.68	1.92	I
f12	2.26	2.68	P

Source: Authors

Graph 1. The four quadrants representation of the first continuous analysis



f1. Personalized interface based on previous searches and user preferences	M
f2. Personalized suggestions for traveling	M
f4. Voice based search	M
f5. 24/7 chatbot customer support	M
f3. Travel items pricing prediction	P
f6. Relevant notifications via email, app or sms	P
f9. Insight in relevant and personalized reviews	P
f10. Personalized loyalty programs	P
f12. Information regarding significant limitations, obligations, or risks associated with the destination	P
f7. Image based search	A
f8. Generation of summarized textual report for booked trip	I
f11. Travel items combination suggestions (flights, accommodation, activities…)	I

Source: Authors

The second continuous analysis parameter to be determined was CS and CD (formulae in Methodology section) for each AI functionality in OTA - the results are shown in Table 10 and Graph 2. The CS values range from 0 to 1, with the closer the value is to one, the greater the impact on customer satisfaction when the functionality is present.

The CD values range from 0 to minus 1, where a value close to zero means that the customer is not dissatisfied if the function is not present. If you look at the results, the red arrow points to the F-s which, if not present, could lead to high dissatisfaction. The green arrow points to the functionalities that cause higher satisfaction when present. Higher absolute values of the CDs indicate a high number of F-s that should be present so that customers are not dissatisfied – hence many Must-be (M) Kano categories. The CS and CD analysis resulted in a different categorisation of the F-s, with only one being on the borderline of the P category.

Table 10. CS and CD values and value semantics

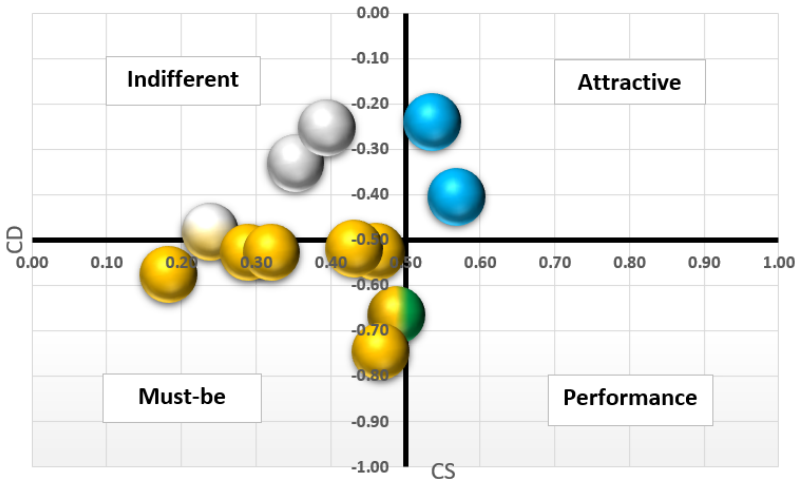
F	CS	CD	Category
f1	0.24	-0.48	I
f2	0.29	-0.53	M
f3	0.46	-0.53	M
f4	0.18	-0.58	M
f5	0.32	-0.53	M
f6	0.49	-0.67	M
f7	0.54	-0.24	A
f8	0.35	-0.33	I
f9	0.47	-0.74	M/P
f10	0.43	-0.52	M
f11	0.39	-0.25	I
f12	0.57	-0.40	A

F	CD
f9	-0.74
f6	-0.67
f4	-0.58
f5	-0.53
f2	-0.53
f3	-0.53
f10	-0.52
f1	-0.48
f12	-0.40
f8	-0.33
f11	-0.25
f7	-0.24

F	CS
f12	0.57
f7	0.54
f6	0.49
f9	0.47
f3	0.46
f10	0.43
f11	0.39
f8	0.35
f5	0.32
f2	0.29
f1	0.24
f4	0.18

Source: Authors

Graph 2. The four quadrants representation of the second continuous analysis



f2. Personalized suggestions for traveling	M
f3. Travel items pricing prediction	M
f4. Voice based search	M
f5. 24/7 chatbot customer support	M
f6. Relevant notifications via email, app or sms	M/P
f10. Personalized loyalty programs	M
f9. Insight in relevant and personalized reviews	M
f7. Image based search	A
f12. Information regarding significant limitations, obligations, or risks associated with the destination	A
f1. Personalized interface based on previous searches and user preferences	I
f8. Generation of summarized textual report for booked trip	I
f11. Travel items combination suggestions (flights, accommodation, activities…).	I

Source: Authors

From the Graphs 1 and 2 it could be observed that the features are not categorised in the same way, providing additional insight into customers' perceptions. The functional and dysfunctional scores (first continuous analysis represented on Graph 1) categorised 4 M, 5 P, 1 A and 2 I features, while the CS CD scores from the second continuous analysis (Graph 2) divided the same features into 7 M, 0 P (f6 was very close to P – bubble with orange and green on the coordinates f6(0.47, -0.67)), 2 A and 3 I. Finally, before discussing how to interpret all the results obtained, the results of the discrete analysis are given as explained in the methodology section. Before the final table, the most frequent answers are listed in 5 categories. The coloured semantics of the green-red scale serve to highlight the most important categories (M, P, A) and to show the most frequent responses to which features were most frequently

rated with the Indifferent evaluation category. The R category is also included here to show which functionalities were most frequently rated as Reverse – Presence causes dissatisfaction.

Table 11. Frequency of responses for each Kano category (except Q)

F	**M**
f9	**87**
f1	**85**
f4	**78**
f2	**76**
f5	71
f10	**65**
f6	52
f3	47
f12	41
f8	30
f7	22
f11	19

F	**P**
f6	83
f9	82
f3	68
f10	48
f12	45
f8	43
f5	39
f11	36
f2	35
f7	31
f4	29
f1	20

F	**A**
f7	88
f12	76
f11	50
f10	46
f8	35
f3	33
f1	32
f5	28
f2	26
f9	24
f6	16
f4	5

F	**I**
f8	113
f11	113
f1	81
f7	81
f2	74
f4	74
f3	71
f5	71
f10	59
f6	52
f12	51
f9	34

F	**R**
f4	31
f6	19
f5	14
f2	8
f12	8
f1	7
f11	7
f3	6
f10	4
f7	3
f8	2
f9	1

Finally, Table 12 follows, in which the values obtained from the discrete analysis are compared with the results of the continuous analysis in order to propose the final result. For example, the decision to assign the final category to Q3 as P and not M, followed by the observation of the frequencies of the discrete analysis (68 P and 47 M) and the fact that Q3 was one of the top three functionalities in absolute ranking for the P -performance category (Table 11).

Table 12. All results summarized and final category generation

	Discrete analysis								**Continuous analysis**		**Conclusion**
Functionality	**M**	**P**	**A**	**I**	**R**	**Q**	**Σ**	**Discrete analysis Category**	**Table 10**	**Table 9**	**Final category**
1. Personalized interface based on previous searches and user preferences	85	20	32	81	7	3	228	M	I	M	**M**
2. Personalized suggestions for traveling	76	35	26	74	8	9	228	M	M	M	**M**
3. Travel items pricing prediction	47	68	33	71	6	3	228	I	M	P	**P**
4. Voice based search	78	29	5	74	31	11	228	M	M	M	**M**
5. 24/7 chatbot customer support	71	39	28	71	14	5	228	M	M	M	**M**

	Discrete analysis								Continuous analysis		Conclusion
Functionality	**M**	**P**	**A**	**I**	**R**	**Q**	**Σ**	**Discrete analysis Category**	**Table 10**	**Table 9**	**Final category**
6. Relevant notifications via email, app or sms	52	83	16	52	19	6	228	P	M	P	**P**
7. Image-based search	22	31	88	81	3	3	228	A	A	A	**A**
8. Generation of summarized textual report for booked trip	30	43	35	113	2	5	228	I	I	I	**I**
9. Insight in relevant and personalized reviews	87	82	24	34	1	0	228	M/P	M/P	P	**M**
10. Personalized loyalty programs	65	48	46	59	4	6	228	M	M	P	**M**
11. Travel items combination suggestions (flights, accommodation, activities...	19	36	50	113	7	3	228	I	I	I	**I**
12. Information regarding significant limitations, obligations, or risks associated with the destination	41	45	76	51	8	7	228	A	A	P	**A**

Source: Authors

Although there are many ways to evaluate and interpret the categories of the Kano model, the combination of discrete and continuous analysis is always useful, as it provides a multifaceted view of respondents' satisfaction and dissatisfaction with the topic under investigation. Highlighted in yellow are the AI functionalities that could be assigned to the different categories through one discrete and two continuous measurements, while the green functions were assigned in the same way. For the latter, we can clearly confirm the adjacent categories, while for the former, the prioritisation principle M→P→A→I and the data from table 11 support the final categorisation. In the case of the M/P category (indicating similar values), the M category was favoured.

Summarising these research results, it can be concluded that AI features in OTAs are the following:

Table 13. F-s assigned in one of the four Kano categories

M - Must-be	P - Performance	A- Attractive	I-Indifferent
1. Personalized interface based on previous searches and user preferences 2. Personalized suggestions for traveling 4. Voice based search 5. 24/7 chatbot customer support 9. Insight in relevant and personalized reviews 10. Personalized loyalty programs	3. Travel items pricing prediction 6. Relevant notifications via email, app or sms	7. Image based search 12. Information regarding significant limitations, obligations, or risks associated with the destination	8. Generation of summarized textual report for booked trip 11. Travel items combination suggestions (flights, accommodation, activities…)

Source: Authors

5. CONCLUSION

As AI is rapidly making its way into all industries, including tourism and hospitality, the acceptance and value of the AI functions already implemented or yet to be implemented by customers must be systematically managed. The implementation of various AI features costs time and money, so it is important to evaluate their impact on user acceptance and satisfaction. The aim of this research was to explore customer preferences for AI features in the context of OTAs and to develop an understanding of which features lead to both customer satisfaction and dissatisfaction.

The methodology was conducted using the originally developed Kano questionnaire and analysing the responses using discrete and continuous measures to provide a more detailed and multifaceted perspective on the Kano categorisation of 12 AI features in the context of OTAs. Based on the results obtained, five research questions (RQ1 to RQ5) were answered (A1 to A5):

RQ1. How do various AI personalisation-based functionalities meet customer needs?

A1. There were five personalisation-based features: f1. Personalized interface based on previous searches and user preferences, f2. Personalized suggestions for traveling, f9. Insight in relevant and personalized reviews, f10. Personalized loyalty programs and f6. Relevant notifications via email, app or sms. The final results show that the first four f-s fall into the same category – Must-be, i.e., customers expect them to be present and if they are not fulfilled, this leads to growing dissatisfaction. Relevant notification (personalised) was ranked as the performance dimension which has the second highest priority when deciding which attribute should be

implemented in the product/service, as it generates the greatest customer satisfaction when it is present and the greatest dissatisfaction when it is absent.

RQ2. What role do the AI-supported optimisation functionalities (price prediction, travel summary, travel items combination) play in perceived customer satisfaction?

A2. There were three optimisation functions: f3. Travel items pricing prediction, f8. Generation of summarized textual report for booked trip and f11. Travel items combination suggestions (flights, accommodation, activities…). Function f3 was categorised as P-performance, i.e., it has a strong influence on satisfaction when it is present and on dissatisfaction when it is absent, while f8 and f11 represent the functions that cause neither satisfaction when they are fulfilled nor dissatisfaction when they are not fulfilled, as they were classified as I-indifferent in all three analyses performed.

RQ3. How do customers perceive the functionality of AI chatbots in online travel agencies?

A3. Chatbots, one of the most tangible and popular AI applications, are categorised as a Must-be feature, so customers expect it to be implemented in OTAs.

RQ4. How do customers rate advanced search options?

A4. Advanced search options such as f4. Voice based search and f7. Image-based search are divided into the categories Must be (f4) and Attractive (f7). Voice-based search is expected by customers in OTAs, while image-based search, if present, causes satisfaction, but if not present, does not cause dissatisfaction because the customer does not expect it.

RQ5. Which AI functionalities in OTAs are perceived as Must-be, Performance, Attractive and Indifferent?

A5. Some of the 12 observed AI functionalities in OTAs were not included in RQ1-RQ4. Table 12 lists the final categories for each of the 12 functionalities.

The results of this research should serve as a compass for developing features that satisfy but also delight the customer, rather than investing in those that generate indifference or dissatisfaction (Reverse category). It is expected that stakeholders of OTAs will benefit by becoming more agile in the right direction to develop engaging, high-quality products for their customers and become more competitive in the market in the age of AI. The study also aims to contribute to theory in the field of service quality and customer satisfaction in the age of AI and modern technologies (especially in tourism), both for researchers working on AI applications and for all professionals in tourism and hospitality.

The main research limitations are reflected in the inclusion of only 12 functionalities, which may vary within a short period of time due to the highly dynamic nature of the field, as well as the limited number of survey responses and some inherent limitations and criticisms regarding the Kano model and its analysis. To overcome the latter limitation, both discrete and continuous analyses were conducted. Regarding the former, it is clear that some features will gain popularity and others will lose appeal as maturity/reliability increases, so it is necessary

to regularly check the acceptance of AI features by customers using a larger sample. In the context of AI in OTAs, the proposed KANO questionnaire will be regularly updated in the future research plans by adding new questions and editing or deleting existing ones.

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PREFERENCIJE KUPACA PREMA AI FUNKCIONALNOSTIMA U ONLINE PUTNIČKIM AGENCIJAMA

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SAŽETAK

Online *putničke agencije (OTA) su platforme koje omogućuju korisnicima da rezerviraju* online *različite usluge vezane uz putovanja, poput smještaja, letova, najma automobila, krstarenja i drugih aktivnosti. U današnje vrijeme putovanja karakterizira upotreba digitalne tehnologije, posebno umjetne inteligencije (AI), koja pomaže da se oblikuju i isporuče proizvodi i usluge. Implementacija AI funkcionalnosti u online putničkim agencijama je područje koje brzo napreduje te je fokus na razvoju atraktivnih proizvoda koji će zadovoljiti, iznenaditi i oduševiti korisnike. Metodologija istraživanja sastojala se od tri glavne faze, od kojih su druga i treća opisane u ovom radu. Prva faza identificirala je ključne AI funkcionalnosti u OTA-a koje utječu na iskustvo korisnika tijekom putovanja te je kreiran originalni upitnik temeljen na funkcionalnim i disfunkcionalnim pitanjima iz Kano modela. Kano dvodimenzionalni model ima za cilj odrediti razinu zadovoljstva ili nezadovoljstva korisnika kada je određeni atribut (u ovom istraživanju, svaki atribut predstavljen je s jednom AI funkcionalnošću) prisutan ili odsutan. Po Kano modelu postoji pet kategorija/dimenzija za svaki promatrani atribut:* Must-be, Performance, Attractive, Indifferent i Reverse. *Prilikom formuliranja istraživačkih pitanja neke od AI funkcionalnosti promatrane su u tematskim skupinama AI-a poput personalizacije, optimizacije, napredne pretrage i AI* chatbotova. *Druga faza opisana u ovom članku bila je provođenje ankete pomoću Kano upitnika i priprema skupa podataka za analizu. Treća faza sastojala se od primjene diskretne i kontinuirane analize za svaku AI funkcionalnost, prezentacije rezultata s diskusijom te davanja odgovora na istraživačka pitanja.*

Ključne riječi: *OTA, AI, zadovoljstvo korisnika, Kano model, turizam*