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Research paper Cruise passengers' internal reactions to onboard environmental attributes

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ABSTRACT

This paper presents a method to analyse cruise passengers' internal responses through onboard environmental attributes. The internal responses are defined as cognitive, affective, physiological, and behavioural, while the environmental qualities are described as ambience, layout/design, social, product/service, and onboard enjoyment factors. A generic method to extract engineering attributes from written customer reviews is derived based on text mining, sentiment analysis, and metrics that characterise the success of the cruise experience in terms of customer reviews. The developed framework is demonstrated through open-source customer review data, with a sample size of 172. Even though, being a small sample, the amount of text data signifies the role of automatic data extraction. The method enables the managers and practitioners to a) improve the ship design, b) enhance the ship operations and c) to identify the issues in which both design and operations are intervened. Based on the connection between onboard environmental factors and internal responses, a key performance indicator (KPI) is derived, which is based on the absolute net score and the alignment of the sentiment.

1. Introduction

Cruise passengers are essentially tourists who choose sea travel primarily for enjoyment rather than transport. They value aspects like appealing interior decor, exterior design, quality service, and personalized attention from the crew (Levander, 2004). From a wider perspective, the domain of tourism experience research has gained significant attention in scientific research (Tung and Ritchie, 2011). Today, the industry has evolved in a way that combines the ship as the destination with the actual visited destinations to a unique experience. The design of a cruise ship significantly depends on passenger capacity and volume of the ship, number of crew members, onboard services, and their quality, as these are crucial requirements set by the ship-owners towards the shipyard (Levander, 2004).

The level of comfort and service needed typically varies, often based on the duration of the voyage and, for example, the pax/crew-ratio, characterizing the service onboard, and the volume/pax-ratio of the ship, characterising the layout. To reduce cruising cost, cruise lines aim to continuously improve their cruise ships' structural design, wastedisposal systems, fuel efficiency, back-up power systems, propulsion, and safety in general (e.g., Santos et al., 2002; Spanos and Papanikolaou, 2012; Vassalos, 2016; Wang et al., 2016, 2021; Raikunen et al., 2019; Gil et al., 2020; Vassalos and Paterson, 2021; Ruponen et al., 2022; Mauro and Vassalos, 2023; Mauro et al., 2023). In addition to the reduction of costs, innovative architectures, designs, and services have been introduced into the market to increase earnings (e.g., Musio-Sale and Zignego, 2020). The ship systems are typically designed by the shipyard with its subcontractor network based on ship-owner specification and the requirements of the flag state authorities and classification society. The once in the lifetime experience, on the other hand, is often driven by the crew of the ship operator, based on the architecture and design, as well as the ambience the ship builders have created together with the crew that operates the ship. Today, the social environment created by the crew and passengers together cannot be overlooked in the design; cruise experience is communicated through social media, thereby affecting the markets. Measuring all these dimensions that affect the cruise experience is a challenge and lacks a design criterion that could be used to improve the overall cruise experience. Thus, for the cruise ship design, the connection between naval architecture and the experience model and metrics is of great importance.

To connect the cruise ship environmental attributes to the passenger internal reactions, the authors developed a model based on text analytics and sentiment analysis to measure the success of the cruise experience as a whole. The cruise environment model developed by Akter et al. 2021a, b is used, and it contains the ambience, layout/design, social, product/service, and onboard enjoyment factors (see Fig. 1). The primary measure of operational performance for satisfaction is the combination of behavioural (desire to stay, explore, communicate), affective

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Fig. 1. Approach to describe onboard environmental factors affecting the onboard experience of cruise passengers (Akter et al., 2021).

(pleasure/displeasure), cognitive (beliefs, categorisations, and symbolic meanings), and physiological (movement, pain, comfort/discomfort) responses (Bitner, 1992; Howat and Crilley, 2007; Pizam and Tasci, 2019). Based on the connection between onboard environmental factors and internal responses, a key performance indicator (KPI) is derived, based on the absolute net score and the alignment of the sentiment, which is categorised discretely to positive, neutral, and negative. The KPI computation is automated to a routine that processes written customer reviews. This KPI can be used in decision-making for cruise ship designs and operations. The authors finally demonstrate the method with a small-set of open-source data from the cruise review website. Though the dataset is relatively small to be fully representative of the prevailing industry phenomena, it is large enough to demonstrate the need for the automatised method.

2. Literature review of cruise ship operations research

It is in the cruise operators' best interests to find new ways to meet passenger expectations, as it generally leads to higher revenues (Schmitt, 1999; Wu and Tseng, 2015). Passengers are crucial stakeholders as they purchase travel experiences and communicate their experiences/feedback via social media, affecting the markets directly. In addition, the key stakeholders involved in the cruise experience are the port, the cruise destination(s), and the cruise line coordinating the creation of the entire experience from pre-purchase to after-sales. The creation of the architecture, design, layout, and ambience is mainly created by the shipyard at ship-building stage with its subcontractors by frequent discussions with the ship-owner and the authorities. Traditionally, the cruise ship is considered as an independent system of systems in design (e.g., Evans, 1959; Levander, 2004). On the one hand, it must provide the once in the lifetime experience while also meeting



Level of Abstraction

Fig. 2. Customer experience through environmental factors internal responses.

Onboard environmental factors and dimensions affecting the onboard cruise experience, as defined by Akter et al., (2021a,b).

Factors	Dimensions/Elements	Authors of relevant literature
Ambient factors	Sounds, cleanliness, lighting, music, temperature, air quality, odour, and so on.	Baker (1987); Bitner (1992); Baker et al. (1994); Raajpoot (2002); Lucas (2003); Kwortnik (2008); Risitano et al. (2017)
Layout/design factors	Style of décor, colours, size, architectural entertainment, the comfort or the arrangement of seating	Baker (1987); Bitner (1992); Baker et al. (1994); Raajpoot (2002); Wakefield and Blodgett (1996); Lucas (2003); Kwortnik (2008); Risitano et al. (2017); comfort raised by Mason and Paggiaro (2012)
Social factors	Crowding, queues, the friendliness of the crew	Baker (1987); Baker et al. (1994); Kwortnik (2008); Risitano et al. (2017); embarkation experience raised by Li and Kwortink (2017)
Product/ service factors	Food presentation, the size of food servings, menu design, food variety; service	Raajpoot (2002); food experience raised by Li and Kwortink (2017); service experience provided by companies raised by Li and Kwortink (2017); and food quality, raised by Lee et al. (2008) and Mason and Paggiaro (2012)
Onboard enjoyment factors	Pleasure or enjoyment, excitement, aggravation	Emotional response raised by Kwortnik (2008); emotional experience raised by Mason and Paggiaro (2012); entertainment experience raised by Li and Kwortink (2017)
Overall satisfaction	Country image or brand; price	Sign, symbol and artefacts raised by Bitner (1992); cost experience raised by Li and Kwortink (2017)

lower-level human needs, such as hygiene and nutrition as well as safety; this is why the design attributes are often categorised as "musts" and "wants". As an example, in "musts", understanding the potential dangers on cruise ships and how to keep people safe at all times is critically important. Effective management of flooding risks in the maritime industry requires attention throughout a ship's lifecycle and this affects the layout of the ship as well as the crew operations. Vassalos and Paterson (2021) highlight the importance of identifying potential design flaws early and mitigating the risks, in the design phase that could lead to serious accidents under certain load and environmental conditions. When "musts" are met, only then one can move to the "wants", which are in the focus of present paper.

This work is an extension of Authors' previous work towards multistakeholder decision making tool. Akter et al. 2021a, b) define the cruise ship environment based on layout/design, ambience, product/service, onboard enjoyment, and social factors that create overall satisfaction, which is associate with "wants" (see Fig. 1). While the formers are created by the shipbuilders, towards the latter dimensions, the features are created by crew and passengers together. Customer experience and pricing have a direct relationship. However, if a customer is affected by factors such as queuing or waiting in line, this can be more important to the customer than the cost of the cruise (Berry et al., 2002; Fatma, 2014). The goods and services, or anything that customers can see, smell, taste, and hear when engaging with a service, directly affect the perceived experience (Fatma, 2014). This is why customers switch brands due to certain conflicts. Avoiding disputes, solving problems before they occur, and having general problem-solving capabilities are effective measures to prevent this from happening (Jesri et al., 2013; Salah and Abou-Shouk, 2019).

In addition, passengers seek memorable and meaningful experiences instead of satisfaction with tangible or intangible attributes (Pizam and Tasci, 2019) with the ship's personnel and other passengers. Thus, the design of a cruise servicescape should consider the needs and desires of the customers, employees, and other stakeholders, requiring a multi-stakeholder perspective (Pizam and Tasci, 2019). Then, the design and operations managers can comprehend which aspects of their service will likely impact customers' behavioural intentions or future patronage (Howat and Crilley, 2007). The design of the cruise environment is partly related to the physical environment described by architecture and layout, but also the emotional aspects. While there is undoubtedly a place for evaluating overall satisfaction, more attention should be placed on potential sources of dissatisfaction, particularly problems that are encountered by the customers (Cronin, 2003; Johnston, 2004; Howat and Crilley, 2007). Traditionally, ship designs have relied on various system engineering approaches, such as design spiral (Evans, 1959), system-based engineering (Levander, 2004), and set-based design approaches (Singer et al., 2009). Many of these approaches start with the clearly defined ship mission and then define various technical parameters through different ship design disciplines, such as the ship's main dimensions and capacities, resistance and seakeeping, and structures and powering as lie cycle cost estimates. More recently, Keiramo (2021) has highlighted the fact that cruise ship design must also account for the "Dream" and "Ambition" as the design objective is not only the cruise ship, but the entire cruise experience from pre-to post-cruise phases.

The purchase journey of the cruise passenger consists of three phases: a prospective pre-trip period phase, an active cruise experience, and a reflective post-trip phase (Yachin, 2018; Shaw and Williams, 2009). In the pre-trip period, executed today mainly in web and social media, the customer develops an interest in the cruise and creates expectations (Yachin, 2018; Kruger and Saayman, 2017). During the active phase, both the customer and the firm are present in the same physical location and time and interact to create the cruise experience together (Yachin, 2018). In the post-trip phase, value is generated via the recollection of the experience and communicating that via social networks, for example as recommendations, see Fig. 2.

The quality of the service is a global judgement or attitude that refers to the superiority of the service (Parasuraman et al., 1985), which is ideally the gap between consumer expectation and perceptions. According to Gonroos (1984) an organization must concentrate on identifying what constructs the quality of service before measuring the service quality (Musa and Thirumoorthi, 2011). The ship owner prioritizes substantial passenger capacity and efficient hotel operations, which are fundamental for profitability. Functions on a passenger ship can be broadly categorised into hotel and ship operations. According to Levander (2004) hotel functions include passenger cabins, restaurants, lounges, bars, and shops. Proper pathways, including corridors, halls, stairways, and lifts, should be well-planned to connect these spaces seamlessly. Important outdoor spaces include sun decks and promenade decks, enhancing the passenger experience. Modern passengers not only prefer cabins with windows but also desire the inclusion of a balcony. Various bars, nightclubs or discos, shops, casinos, and fitness areas are other public spaces on board. The service on the ship is also affected by the social atmosphere the crew creates together with the passengers.

Satisfaction is the combination of emotional and cognitive responses of the passenger throughout the purchase journey (Howat and Crilley, 2007), whereas service quality refers to prior overall satisfaction based on customer cognitive evaluation of a service provider (Howat and Crilley, 2007). Customer satisfaction is achieved when customers compare what they expect from a product or service to what they receive (Wu and Tseng, 2015). The experience refers to what the customer or passengers felt, thought, did, and related to (Dalla Pozza, 2014). The literature from Mehrabian and Russell (1974), Bitner (1992), Skandrani

Categorisation of the internal reactions/responses.

Internal responses	Dimensions/ Elements	Attributes
Cognitive responses	Beliefs	positive/negative cognitive response: beliefs, opinions, and categorizations
	Symbolic	symbolic meaning, brand trust,
	meaning	cognitive satisfaction
	Attention	attention, perceptions, information
		evaluations meaning transfer
	Aware of the	aware of the cruise achievements:
	cruise	positive recommendation in the website
	Brand evaluation	service brand evaluation
	Accessibility	Accessibility, confidence, centrality, clarity
Affective/	Feelings	pleasure/displeasure, feelings e.g.
Emotional responses		enjoy their stay, feel at home, value for money
	Emotion	positive emotion: peacefulness,
		romantic love, excitement,
		cheerfulness, delight, joy, pleasant,
		negative emotion: sadness
		disappointment, anger, upset, shame,
		surprise, worry, pain, anxiety,
		melancholy, regret;
		trip satisfaction: enjoy their stay, feel
		at home, value for money; satisfied
		myself
		trip dissatisfaction: visibility, weather,
		comfort etc.
	Gratitude	gratitude; guilt, anxiety, unfairness; skepticism; confusion
	Moods	moods; attitude; arousal, dominance
	Confidence	confidence, security
Physiological	Comfort/	discomfort/comfort, movement
responses	Pain	nain
	physical fit	physical fit
	Needs are well	needs are well attended
	attended	<i>(</i> 1, 1, -)
	Sense and secure	sense of belonging, secure
Behaviour	Approach	attraction, affiliation commitment
responses	rippioucii	carry out plan; satisfaction; stay/stay
-		longer; explore/exploration;
		predisposition to act; spend more \$\$\$
	Respect rules	respect rules of the XX/cruise; display
	Intention to	ramily spirit
	return/recommed	recommend
	Friendly staff	being friendly with other guests;
	-	friendly staff, going extra miles,
		helpful staff, personalized, always
		there
	Avoid	avoid (opposite to approach); avoid_
		impatience, collapse, client avoidance
		employee's avoidance

et al. (2011), and Pizam and Tasci (2019) provide significant framework on how internal reactions reflect on behaviour. According to Mehrabian and Russell's (1974) research update, Bitner proposed that in a physical environment, customers and employees can respond in three ways: cognitively, emotionally, and psychologically (Bitner, 1992). In contrast, as per the research conducted by Pizam and Tasci (2019), the internal responses encompass cognitive, emotional, physiological factors, and behaviour (Bitner, 1992; Skandrani et al., 2011). This relates to the cruise ship's environment and the services created for customers. The challenge lies in collecting this essential information and translating it into ship design and operations criteria, see Fig. 2.

3. Overview of the developed model

The model developed consist of 3 elements. The cruise ship environmental description is taken from Akter et al. 2021a, b in which the dimensions are ambience, layout/design, product/service, social and onboard enjoyment that all contribute to the overall satisfaction. On the other hand, the internal reactions of cruise passenger towards these environments are defined as physiological, cognitive, and affective, resulting in behavioural actions, such as recommendation after the journey, see Fig. 2. This framework is derived from service- and experiencescape scientific research and adopted in this paper to the cruise ship context. In order to develop a Key Performance Indicator (KPI), the environmental factors must correlated with the internal reactions. This is done in this paper based on text analytics and sentiment analysis, based on the discrete definitions of positive, neutral and negative based on Vader-algorithm.

4. Review of the environmental factors as defined by Akter et al. 2021a, b

The servicescape of a cruise company consists of physical dimensions, such as ambient conditions, spatial layout, and functionality, including signs, symbols, and art effects (Bitner, 1992). Akter et al. 2021a, b expanded this model to account also the social and onboard enjoyment factors created by the people on board the ship, see Table 1. The ambient conditions involve sensory elements, such as temperature, colour, lights, noise, music, and scent, which affect customers' perceptions of the service environment (Jeon and Jeong, 2009). These are typically developed by the ship-owner, based on installations made to the ship during ship-building stage or during conversions. Functional components, such as spatial layout, architecture, and functionality, describe how objects are arranged and related to one another, like furniture, machinery, equipment, and service areas required by exhibitors to deliver services, and these are mainly arranged by the shipyard, especially when it comes to fixed entities. Ensuring comfortable movements within these spaces is positively associated with customers' emotions. The design of the physical environment, such as the ambience, layout, and functionality, can influence whether consumers are drawn to or avoid a particular service or business. Functionality refers to how well these items support the service process and improve the customer experience; this is important for creating a comfortable and user-friendly environment (Rosenbaum and Massiah, 2011). Additionally, customers are affected by social and service/product factors that may also impact their decisions (Andersson, 2013). These elements are created by the passengers and the crew. The product/service factors have been associated with some dimensions, such as food, and service quality. In addition, today in "wants", there is a significant focus on the comfort of ships, not only as a ship-design priority but also to evaluate the quality of operations (Carchen et al., 2021). Further constraints are associated to crew actions on the human evacuation in case of accidents (Arshad et al., 2022; Fang et al., 2023). The onboard enjoyment factors refer to the emotional status, such as happiness, joy, excitement, and stimulation created by the entertainment on board.

5. Characterisation of cognitive, affective, physiological, and behavioural responses and involvement

Servicescape and experiencescape concepts have been investigated in many fields of science ranging from the retail to the maritime business areas. A well-known approach is Mehrabian and Russell's (1974) stimulus-organism-response (S–O-R) model which considers the consumers as passive and impacted by the surrounding environments (Pizam and Tasci, 2019). Therefore, Bitner (1992) proposed that the observed servicescape doesn't directly impact individuals' behaviour, but rather, individual's reactions to the servicescape influence their behaviour. Both customers and employees can respond to their physical



Fig. 3. Flowchart of the method in ATLAS.

surroundings in various ways: cognitively, emotionally, and psychologically. These responses subsequently shape their behaviours.

According to Pizam and Tasci (2019) internal reactions include cognitive, emotional, and physiological variables. In addition, atmospherics influence the consumer's emotional, physiological, and cognitive reactions (Skandrani et al., 2011). The cognitive response includes beliefs, categorizations, and symbolic meanings (Pizam and Tasci, 2019). Cognitive involvement affects people's beliefs which are seen as nonverbal communication. The main elements are the mental representations of objects such as beliefs; i.e., cognition. The emotional repleasure-displeasure, sponses include dichotomies of arousal-non-arousal, and dominance-submissiveness (Pizam and Tasci, 2019). Physiological responses refer to physical fitness, movement, pain, comfort, and physical discomfort, which leads to a set of approaches towards behaviours (Pizam and Tasci, 2019). Physiological responses also affect other elements; for example, when a guest experiences discomfort while sitting on a chair, they might respond negatively toward other people (Bitner, 1992). The resulting behavioural responses adapt from approach behaviours to avoidance ones. Behavioural responses are communicated in various manners, such as the desire to stay, explore, communicate, satisfaction (approach), or the desire to leave, the tendency to ignore, and disappointment (avoid) (Bitner, 1992; Skandrani et al., 2011). From a design standpoint, consumer reactions can be summarized as either moving towards or away from a product (Bitner, 1992; Donovan et al., 1994; Mehrabian and Russell, 1974; Vaidya and Kalita, 2021). In the pre-purchase phase, an approach

behaviour indicates the consumer's active interest in the product through exploration or physical interaction, while avoidance behaviour signifies the opposite (Vaidya and Kalita, 2021).

To summarize, both emotional responses and cognition responses seem to contribute to overall satisfaction and further to recommendations. The model used in this paper covers all elements from Cognitive, Affective and Physiological to the Behavioural leading for example to recommendations, see Table 2 for a summary.

6. New model – connecting the environmental parameters and internal responses via sentiment analysis

The impacts of onboard environmental factors on passengers' cognitive, affective, and physiological responses are described through text analytics of written customer feedback; in principle this approach could expanded with other machine learning techniques for example to handle feedback given as speech. Thus, the aim is to first create a relevant statement database to collect information from the feedback automatically, and to categorize it based on the environmental factors and internal reactions.

The main assumption is that cognitive, affective/emotional, and physiological responses affect the passenger behaviour. However, within the context of cruise-related relationships, there is a paucity of information about these reactions. The implications of these dimensions, broken down into four categories to attributes/codes, are expounded upon in this study. The first category covers beliefs, the importance of







Physiological Responses

Cognitive Responses

Behavioral Responses



Fig. 4. Frequency of cognitive, affective, physiological, and behavioural responses in relation to the environmental factors.

Table 3

Ship Facts Royal Caribbean International - Oasis of the Seas cruise ship (built 2009 by STX Finland) (Royal Caribbean, 2023; Wikipedia, 2023).

Tonnage GT	Length	Beam	Draft	Speed	Guest capacity	Decks	Crew	Cabins	GT/pax	Crew/pax	Cabins/pax
226,838	1187 ft	215 ft	30 ft	22 knots	5602 (double occupancy); 6771 (total)	16 guest 18 total 24 elevators	2109	2801	33.50	0.31	0.41

symbols, focus, knowledge of the cruise, rating the brand, and how accessible it is. The second category delves into emotions, feelings, appreciation, mood, and self-assuredness. The third focuses on comfort levels, feeling of pain, fitness, meeting needs, feeling safe, and disturbance from noise. In the fourth category, we examine behaviour like approach, respect for rules, willingness to recommend or return, interaction with staff, and avoidance tendencies. On the other hand, the study divides influential onboard environment factors such as ambience, layout/design, social, product/service, and onboard enjoyment factors affecting cruise guests into several categories. While some of these factors are intuitively mainly affected by shipbuilders (e.g., layout), the others are affected by ship-operators (product/service). In cruise ship design, where the focus is the overall cruise experience, there are also interacting elements. We posit that these elements will help categorize consumers based on their relationship types, each unique character, and relevance to cruise criteria.

The method (see Fig. 3&4) is based on finding the correlations between the environmental factor and internal reactions and relating this to the feelings defined by sentiment analysis. Tokenisation, filtering, stop word removal, stemming, etc., were performed as the following step in pre-processing the data before the data analysis began. After sorting the data into internal reactions and environmental factors, their correlations were compiled into tables containing summaries of both positive and negative feedback. For instance, regarding the ship's general (space) arrangement, an example comment highlights the success of the design (for all customer reviews check the lab report by Akter and Romanoff, 2024):

"I love the fact that there is a designated area for a running track where you can run and not have to worry about other passengers just walking around in the way and is not in the sun."

If we break down this comment, the person is happy (that's what "I love" means, and it's the affective/emotional part a positive thing). They're also glad they don't have to worry (which is another positive feeling also the affective/emotional aspect). Talking about the ship's running track (features/environmental) focusses on the design (layout), and not bumping into people walking is about how people co-exist on the ship (social). We present the results in terms of total experience (sum of positive and negative feedbacks) and the variation of feedbacks. This is to highlight both the overall score and the alignment of opinions from

Comparison between onboard environmental attributes and internal responses.

	Ship	Design		Ship Operatons			
	Layout / design factors	Ambient factors	On-board enjoyment factors	Social factors	Product / service factors	Sum	Alignmen +/-
Cognitive	+2 2/0	0	+2 2/0	+5 5/0	0 4/4	+9	14/5
Affective	+15 18/3	+9 9/0	+41 50/9	+2 4/2	+10 23/13	+77	104/27
Physiologi cal	+2 5/3	-2 4/6	+8 8/0	0 0/0	-1 1/2	+7	18/11
Behavioral	0 1/1	+4 4/0	+3 3/0	+5 5/0	+10	+22	29/7
Sum	+19	+11	+54	+12	+19	+115	21.5
Alignment +/-	26/7	18/7	63/9	14/2	44/25		165/50

different reviews. In addition, we present the analysis of the reviews in statements, giving details to the ship or cruise experience designers on what to improve.

At last, a critical metric in this context is overall business profitability, which evaluates all efforts and interactions. This metric is based on counting the arithmetic sum of discrete sentiment per combined internal reactions and environmental factors to reveal overall satisfaction as well as alignments of sentiments (number of positive and negative sentiments) with focus to reveal mixed opinions. Here, Consumer internal responses are interconnected with onboard environmental factors, which can guide executives to make more informed decisions.

For the sentiment analysis, we use the lexicon-based approach (dictionary-based approach) and Vader-algorithm for the sentiment. We pre-screen the word frequency in the text, to identify the prevailing vocabulary, code the words from Tables 1 and 2, describing the internal reactions and environmental factors, and then load the dictionaries into memory and entered data from social networking services into the software at the beginning of the sentiment analysis. Based on topics found in the text, a huge amount of data is required and must be organised into numerous codes, categories, and themes (see Fig. 2). The sentiment analysis classification approached the data mining layer and, in particular, distinguished between "opinion mining" for data without emotion and "emotion mining" for text plus emotion (Yi et al., 2003, November). Typically, sentiment analysis starts with the sentiment expressed towards a specific object before separating a lexicon of positive (rounded value + 1), neutral (rounded value 0) and negative (rounded value -1) words and phrases (Kang and Park, 2014). Data were coded and entered through Natural Language Processing (NLP), an artificial intelligence, and processed in ATLAS, see Fig. 3.

7. Case study on the oasis of the seas cruise ships

The data utilised in this investigation is from the Oasis of the Seas cruise ship from January 1st 2019 to October 26th 2022, see for details Akter and Romanoff (2024). We collected customer reviews data from cruisecritic.com website (Cruisecritic, 2022), and assume that the data is uncorrupted and this way representative. We collected a total of 172 written passengers' reviews, totalling 131,610 words. Approximating around 1 week cruise, annual operations on almost every week of the year, and the number of passenger on-board the ship, this number would

result in really small sample set of the total number of passengers onboard the ship during the period. This is the case, even if Covid-19 that occurred during the time frame is considered. Thus, the data is limited to make solid conclusions about the overall performance of the ship, but large enough to justify the automatised process of the customer feedback. The data is also "natural", i.e. written in the format that comes naturally from the customers, challenging this way the analysis of feedback. Table 3 summarises the ship details. When launched, the Oasis of the Seas was revolutionary in layout and design factors. Fig. 3 shows how many times cognitive, affective, physiological and behavioural responses were counted from the feedback. Table 4 summarises the amount of positive and negative sentiments for each combination of environmental factors and internal reactions.

As Fig. 3 shows, the 248 cognitive responses received the highest response for service brand evaluation. Furthermore, the responses of the attention and beliefs received, 69 and 19 review opinions, respectively. The highest number of affective responses, 212, refer to positive or negative emotion, while the other answers on feelings were at 161. The physiological responses achieved review opinions of 139 of the answers, on needs well attended, while 43 were opinions about negative impacts of noise. In the behavioural responses, passengers' opinions were highest in the responses of friendly staff with 230 statements. This type of analysis is useful in finding the focus on the design. The data connection between the environmental parameters and internal responses in terms of sentiment are presented in Table 4, we present only positive and negative ones.

As Table 4 shows the positive correlation between on-board environmental factors and passenger internal reactions are highest at onboard enjoyment factors and especially in the affective reactions, with sentiment score being +41 of the total score of 54 from this environmental category. The opinions are also well aligned with 50 positive and 9 negative comments. In addition, design and layout factors and product and service factors are seen as equally important with the total sentiment score of +19. However, in terms of product and service factors this results from much higher spread of positive and negative feedbacks of 44/25 in comparison to that of the layout/design factors of 26/7, indicating that the customer opinions on ship operations are less aligned than those in ship design. This type of analysis shows how the ship-designer and ship-owner can affect the customer experience independently and in collaboration. Tables 5 and 6 review the examples of

Onboard

Factors Ambient factors

Environmental

Layout/design

factors

Data connecting the environmental parameters and internal responses.

Internal responses (text analytics)

The beach environment is not naturally quiet. Generally, positive remarks about music and ship sounds, though some disturbances from entertainment are there. Central Park Area Praised for its calmness. Noise from entertainment can enter the cabin but can be diminished by closing the balcony door. Aqua Theatre was Extremely loud, but manageable adjustments can be made.

Commended for its cleanliness. Highly appreciated hotel for its impeccable cleanliness and modern touch.

The feedback emphasizes the tangible

The feedback emphasizes the tangible

feeling of waves and the ship's motion

Positive mentions of natural light, especially from Central Park. However, natural light seems to have disrupted certain experiences in some situations. Mentioned, but further details or context are not provided of the music hall experience. Main Dining Area are Well-designed

with easy access. Mirrors a typical

shopping mall. Some areas, like the pool deck, be similar to a community water park. The layout was appreciated, especially the cabins with views of Central Park, which were clean and had a romantic feel. Lengthy, posing some inconvenience for quick room returns. Can comfortably fit up to 9 guests in balcony. Easily accessible 12th Floor Rooms with standout service from the

Look like a hotel room in terms of space, boasting a generous balcony. However, the staterooms were notably compact. Adequately sized with a comfortable seating capacity.

Plenty seating is available. Found to be uncomfortable mattress, leading to

The 16th-floor ocean view cabin and

The cabin with a view of Central Park

Chops Grill, offering outdoor seating, was appreciated. The ship offers to kids a variety of activities, including water slides, a large splash park, a spacious pool, and an inviting beach area, enhancing the overall experience

The ship, being expansive, provides a

range of facilities. There were

the adult swimming/hot tub area received positive feedback. The swimming area's glass cover effectively contains sound.

was noted for its cleanliness and romantic ambiance.

Provides a homey feeling, but sometimes it feels chaotic. Central

feeling of wind.

park was quiet.

room attendant.

back discomfort.

enjoyable.

Elements/

attributes

Sounds

Cleanliness

Air Quality

Atmosphere

Physiological

Style of Décor

Scale/Size

Comfort

Features

Design and

Dedicated Spaces

Aesthetics

Functional

Elements

Architectural

Aspects

Lighting

Onboard	Elements/	Internal responses (text analytics)
Environmental	attributes	
Factors		
		spacious venue due to overcrowding
Social factors	Crow Interactions	issues.
Social factors	Crew interactions	smiles from the crew members
		reflecting a positive interaction. A
		subsequent review praised the
		majority of the staff for their
		friendliness and attentiveness.
		However, there was a slight concern
		about the sports crew. The review al
		highlighted both the welcoming
		nature of people in Barcelona and th
	n 11 0.0	friendly nature of the cruise staff.
	Boarding & Space	The feedback mentions a speedy and
		organized boarding process, even wi
		The cruise's ability to manage space
		and prevent overcrowding was prais
		and the embarkation's smoothness.
	Behavioral	The concluding review observed that
	Observation	both the local people in Barcelona a
		the cruise crew were approachable
		and kind.
Product/service	Food Quality	Positive feedback highlights
factors		commendations for specific disnes an
		chicken specialty dining spots key
		lime pie, lava cake, and various me
		options throughout the vessel.
		Negative feedback indicates
		dissatisfaction with the general food
		quality, notably in the main dining
		room and the Windjammer. Certain
		desserts and the Caesar salad served
		table-side didn't meet some
	Services	Positive: Comments laud the staff's
		professionalism and friendliness,
		delightful surprises like towel anima
		and commendable bar services near
		the jacuzzi.
		Negative: Areas of concern encompa
		added charges for in-room services,
		extended wait periods for room
		counters delays in "my time dining"
		poor internet access, and unexpected
		fees in last minutes.
	Service	Positive: Overall, many passengers fe
	Experience	well-attended, particularly
		emphasizing the attentiveness of
		Negative: Points of contention inclu-
		cleanliness concerns like soiled sofa
		in cabins, undersized sinks, and issu
		tied to specialty dining venues and
		extra costs.
Onboard	Pleasure or	The aqua show, ice show, and the
enjoyment	Enjoyment	musical 'Cats' received notable
tactors		commendations, though some felt th
		vibe of the cruise recorded with a
		resort or amusement park, which
		many found enjoyable. Additionally
		the on-deck band added to the
		entertainment proportion. While
		excursions didn't always seem worth
		their price, the broad range of
		entertainment was appreciated by

observations about the need for more lounge chairs in the pool area or a system to oversee their reservation. Regarding trivia competitions, there's a suggestion to allocate a more

(continued on next page)

many. The solarium's adults-only

well to younger passengers with designated play areas and diverse

section was pointed out for lacking the

expected tranquility. The ship catered

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Table 5 (continued)

Onboard Environn Factors

Overall satisfa

	·		
nental	Elements/ attributes	Internal responses (text analytics)	Onboar Environ Factors
		activities. The boardwalk, central	
		park, and other ship features were	
		well-received by guests. Places like La	
		Spezia emerged as pleasant surprises	
		for those keen on shopping and dining.	
		Dance classes, napkin folding sessions,	
		and other ship-led activities were	
		enjoyed the range of performances	
		the 'Cats' Broadway show didn't meet	
		everyone's expectations. The sheer	
		variety of offerings on the massive ship	
		made many wish for extended stays.	
	Excitement	Exploring the ship enhances the	
	0.0.0	overall excitement.	
	Sports & Fitness	The spa experience does not come	
		from some other cruises	
	Entertainment	The onboard gym is highly	
	Experience	appreciated. Bolero's dance lessons	
		attract a good number of participants.	
		A range of shows, from aqua	
		performances and ice-skating to	
		headliner acts and comedy, are well-	
		entertainment	
	Challenges &	The necessity to book for each show is	
	Complaints	found heavy by guests, the Cats	
	I I I	Broadway show saw a significant	
		number of attendees leaving midway.	
		Instances of misplaced luggage were	
		reported. Some of the rooms were	
		criticized for lack of cleanliness, and	
		The uperpected early closing of the	
		park café was a letdown for some	
	Family	Brand perspective, this cruise is ideal	
ction	Friendliness	for families with children. In addition,	
		this particular ship offers a multitude	
		of attractions and facilities suitable for	
		all age groups. Therefore, it appears	details a
		that the cruise experience is seen	As T
		In terms of staff and cleanliness	experie
		feedback is mostly positive.	used the
		highlighting the significance of good	shipyaro
		service and a clean environment in	ship is t
		enhancing passenger experience.	Central
	Trust and	Some individuals consistently trust the	concept
	Reputation	ship owner, expecting a fulfilling	motions
		when the brand compromises its	the seak
		offerings, affecting its reputation. It's	evperier
		noted that the ship owner's reputation	togotho
		can be influenced when relationships	the
		are made with third parties that have	the ship
		differing ethical standards.	friendlii
		appear to be a mixed bag. While some	service
		strongly trust the ship owner, others	feedbac
		express reservations due to perceived	improve
		quality issues and associations with	executiv
		external entities.	as the si
	Service and	Image/Brand perspective is the ship	instead
	Experience	owner delivered a dependable	see that
		experience, though it lacked certain	that the
		amenities such as distinguished	operatio
		luxury, even for suites. Some	bachur
		passengers described their journey as	De aiwa
		memorable but also voiced concerns	Drings b

about it seeming like a "moneygrabbing" experience due to additional

costs. This ship seemed ideal from a

Table 5 (continued)

Onboard Environmental Factors	Elements/ attributes	Internal responses (text analytics)
	Price and Extra Costs	family vacation standpoint. It offers many activities suitable for all age groups, making for memorable travel experiences. Despite the positive experiences, some hesitated about paying extra for certain features but highlighted the ship's entertainment and most beautiful ship. The overarching theme suggests a divergence in passenger experiences. While some cherish the offered attractions and entertainment, others focus on the perceived lack of luxury or the presence of hidden costs. Through the price experience, some passengers would consider booking a room again despite certain negatives.
		Some passengers who avoided extra expenses felt the service they received was just average. Opinions on pricing and additional expenses display a contrast. There's a willingness among some passengers to rebook, hinting at perceived value, while others showcase their dissatisfaction with extra charges.
	Staff and Cleanliness	Through the Image/Brand perspective, there is high praise for the staff, especially those in the dining area. Fellow passengers and staff interactions are described as pleasant. The ship's cleanliness is also commended, and there's a sense of security and trust in the staff.
	Loyalty Program	There's a call for improvement in the loyalty program. Feedback suggests the brand's potential to enhance its loyalty program's benefits or features.

details and executive summary of the written feedback respectively.

Table 5 shows the detailed feedback can be used to identify the nces passengers have identified in their journey that could be e redesign the certain attractions and elements of the ship by the d, or which could be changed positive by changing the way the being operated. An example of success is the natural light in the park, which was recognised as revolutionary concept when ship was introduced, while the tangible feeling of waves and ship s could be seen as a challenge for naval architects when designing keeping performance of the ship. The aqua show involves positive nces in which both the shipyard and the ship-owner work r, the shipyard being responsible of the pool system design and p-owner of the actual show with the performers. In services the ness of the crew was seen as positive aspect but the additional fee was seen mostly as a negative feature. This type of detail level k helps the system level designers to make decisions that e the overall performance of the ship. As Table 6 summarises the ves on the other hand can pay attention to the larger entities such ize of the ship enlarging the feeling of space at the public spaces, of the simple GT/pax-ratio. In the same way, the executives can perhaps some of the cabins have been made too small, indicating KPI's related to the cabins can be off. In the same way in the ons it is clear that the subcontracting with a third-party may not ays good for the brand image, while focusing on all age groups benefits to the ship operations. Observations from the ship suggest a contrast in experiences: while aspects such as music were positively received, some participants reported challenges with noise levels. While many enjoyed specific culinary offerings, others found aspects of

The relationship between internal responses and onboard environmental attributes, colour coding **Positive** = **Green**, **Negative** = **Red**, **Mix** = **Blue**.

Inter	nal	Onboard environmental	attributes				
respo	onses	Ambient factors	Layout/design factors	Social factors	Product/service factors	Onboard enjoyment factors	Overall satisfaction
Cogn (COC	iitive G)	Sounds: Either enjoying a disruptive, vibrating sleep or waking up	Decor Style: Nice decor and layout	Crew Friendliness: Plenty of attention, super friendly and smiling Crowding: Embarkation was very easy	Service: The service was great and the staff were professional and courteous, but the negatives were double the granuity changes. Food Quality: The negatives were to pay attention to improve quality of the load, delays in "my diming time", poor internet connections; the customer service counter provided an incredibly sleggish and mustificatory experience; the fitness centre focussed excessively on additional sales	Pleasure or Enjoyment: would return to the cruits for entertainment and comfort value (The aqua show, ice show, and the musical (cats) are must-sees.)	Brand or Image: The trip is best suited for finnilies with children The negatives were the ship owner provided a solid experience despite having no such features like chining exemplary service or additional laxary, even at the suite level The brand ship owner is compromising the quality of its offerings, resulting in a low brand reputation
Affec (AFF	tive ۲)	Cleanliness: Spotlessly clean	Space: The positives were plenty of space; they did praiseworthy work managing the space and handling the crowds Style of Décor: The negatives were the ship's interior provided an experience of a local shopping mall and felt more like a hotel room than a cabin	Crowding: The ship did not feel like there were over 6,000 passengers onboard Crew friendliness: Friendly crew	Food Quality: The positives were the food choices are huge, including paid and free A mixed experience was identified in terms of food choice, temperature, and quality. However, they were particularly dissutisfied with the food and dining experience. The negative was that it seemed like significant compromises were made in terms of ingredient quality and cost-saving measures Service experience: The service for the erusis is outstanding	Pleasure or enjoyment: The positives were decent shows and activities, always something fur to do, makes families feel welcome and plenty of fun activities for kids Excitement: touring the ship just increased the excitement	Trage or brandt: A memorable experience. Other emotional responses were negative concerning the additional costs, making it feel like a money-grabbing ship, additional fees for soft drinks, alcoholic beverages, restaurants, and excursions, and so on; upset over diamond members being moved down
Phys (PHY	iological K)	Sounds: The negatives were the noise inside the balcony entertainment made it hard to sleep at night; theatre and shows were loud; need sound engineering to fix it	Style of Décor and Access: Access to the cabin was quick; the balcony was spacious enough to accommodate a group of people Comfort: The mattress caused back pain		Service Experience: The negatives were we didn't go to specially restaurants, as I don't see the need to pay esting the sink was too low. The positive was that the service experience was excellent as the stateroom attendant took care of all needs.	Pleasure or Enjoyment: We attended the headliner show with Jeff Tractika, he was a world-class entertainer The entertainment was great; we attended the comedy show and the diving show (very impressive)	Image or Brand: The negative was that the ship owner should be aware that its reputation is affected when they engage with third-party entities operating under different ethical standards and procedures
Beha (BEF	ivioural T)	Cleanliness: The room was excellent, spotlessly clean, and very modern.	Scale/Size: The <i>n</i> gatives was that we stayed in the smallest staterooms we have ever stayed in	Crew Friendliness: The crew took excellent care of our cabin and were always so friendly; amiable and knowledgeable of the area	Service Experience: The positives were the service was reported as excellent, along with the watters, room attendants, guest services, and entertainment staff all providing exceptional service	Pleasure or Enjoyment: The ship operator was a good choice for entertainment	Image or Brand: The positives were for a family adventure, this is certainly the right ship; the ship operator provides a wide range of attractions and conveniences for all ages and, in some respects, allows you to fully enjoy what the ship has to offler, providing extraordinary travel experiences and memories to last

the food and service disappointing. While entertainment and activities were often praised, certain challenges like room maintenance and reservation systems posed issues for some guests. Experiences varied widely, underlining the subjective nature of guest satisfaction on such vacations. Thus, the feedback gives a well-rounded perspective on the cruise experience, highlighting its strengths and areas in need of improvement.

8. Conclusions

The rapid growth of the cruise industry has resulted in high competition to attract passengers and motivation to stay and take advancement of onboard amenities and services. This paper developed a method to relate the onboard environmental factorson passengers' internal reactions. The on-board environmental factors were taken as proposed by authors earlier, see Akter et al. 2021a, b, and they consisted of ambience, layout/design, social, product/service and onboard enjoyment factors, all contributing to the overall satisfaction. In the paper the internal reactions were defined based on the servicescape and experiencescape research of Bitner (1992) and Pizam and Tasci (2019) and redefined, such as cognitive, affective, physiological, and behavioural responses. In addition, we accounted the fact that everyone has their own personal judgment, likes, and dislikes. The method is based on finding the correlations between the environmental factors and internal reactions and relating this to the feelings defined by sentiment analysis. This type of process leads to more detailed information about the systems behaviour at various levels ranging from sub-system designers to executives that operate on the total ship concept level. The method also helps to identify the pure ship design and operations related issues as well as the issues where ship design becomes intervened with the ship operations.

Based on the responses from the onboard environmental attributes, it appears the ships are experience platforms and offer a wide range of activities with both negative, positive, and mixed emotions. These emotions can be affected by the ship design and or the cruise experience. The case study used in the paper contains large amount of customer reviews but is also limited in its coverage. The period is from 2019 to almost the end of 2022 and only one cruise ship is chosen. The major limitation of this study is that data were collected during the COVID-19 pandemic, which makes it difficult to compare customer behaviour preand post-pandemic. It was noticed that people were extra cautious during the COVID-19 pandemic, hence, researchers excluded COVID-19related text from the data. However, the reviews clearly show the relationship between onboard environmental factors and internal reactions and how these can be linked to those decisions made by ship designers and architects (ambient, layout) and the cruise experience designers (social, onboard enjoyment and overall satisfaction). More specifically, majority of the reviews were based on ambient factors and the responses to aspects such as sounds, cleanliness, air quality, atmosphere and lighting/natural light. Layout/design factors were liked, and respondents said they had quick access to everywhere and praised different new areas developed to the ship concept. In addition, respected relationships were identified with ship employees and customer-tocustomer for social factors, such as the crew's friendliness. Furthermore, product/service factors, including food quality and related service, received mixed opinions. Onboard enjoyment factors centred around pleasure or enjoyment such as love all the activities (e.g. sports, fitness), excitement and the entertainment experience. At last, overall satisfaction raised the responses about brand/image such as trust diminishing brand trust by lowering the quality, do more with their loyalty programme; multi-generation vacation, cruise best for families with children Thus, there is a co-relation between the environmental factors and internal reactions.

It's crucial to acknowledge that customer preferences significantly vary across different demographics, including nationality and gender, among others. Consequently, this research did not explore intercultural distinctions, which could lead to a diverse impact of environmental attributes on customer preferences. This research is left for future work. Additionally, the scope of this study was constrained by focusing solely on a single cruise ship. The ship's specific route and ports of call significantly influence the findings, meaning, conclusions drawn may be particular to this case rather than universally applicable. However, the method developed could be applied to larger data sets, that are collected either from public domains of company specific customer feedback databases. This type of applied research is left for future work. Future academic research should also explore the impact of cultural differences on cruise experiences across various destinations, potentially extending the findings of this study. Investigating the role of gender in influencing responses to the physical environment on cruises could yield insightful differences. Boo (2017) suggests a closer look at customers' demographics across diverse cultural backgrounds, including ethnic groups and national versus international customers, to enhance comparative analysis (Najhan et al., 2022). For cruise managers, analysing servicescape dimensions against competitors can offer strategic insights for enhancing their organization's image and service environment. This study, grounded in qualitative survey methodology, opens the door for future research employing mixed methods to achieve more comprehensive results. This method can identify negative aspects within text, such as the need to prioritize actual sound engineering over instructing staff to increase volume, designating child-sized sinks to enhance hand hygiene for children, and focusing on improving the

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loyalty program to boost customer loyalty. The drawback of this sentiment analysis is that if the sentences have negative words, it automatically generates negative sentences, but this phenomenon only applies in certain scenarios. To enhance this method, other sentiment analysis techniques should be tested as well.

CRediT authorship contribution statement

Sabina Akter: Writing – review & editing, Writing – original draft, Methodology, Investigation, Data curation, Conceptualization. Jani Romanoff: Writing – review & editing, Supervision.

Declaration of competing interest

None.

Data availability

Data will be made available on request.

Appendices.

Table 7

Comparison between cognitive responses and on-board environmental attributes.

	Ambio	L avout/d	Social factors	Drodu at/compies	On beard	Querall satisfaction	Sum	Sum	
	Ambie nt factor	esign factors	Social factors	factors	on-board enjoyment factors	Overall satisfaction	(Pos/mix/neg)	(Pos/neg)	
Comparison between Cognitive (COG) responses and On-board environmental factors									
Beliefs, opinions, and categorizations				Food quality= 1 , Staff Services= +2	Pleasure or enjoyment about shows must see= 3	Brand= the trip is best for families with children, +1	3 \4\0	3\0	
Symbolic meaning, brand trust, cognitive satisfaction				Service experience gratuity charges= 1		Brand, compromising the quality= 1	0\2\0	0\0	
Attention, perceptions, information search, information processing, evaluations, meaning transfer	Sound s=+1, sounds = -1		Crew friendliness= +2	Service experience about website= 2; should add more info in app and Messages not cheap: 2	Pleasure or enjoyment=+2	Brand= +2, loyalty program= 1	7\5\1	7\1	
Aware of the cruise acheivemnts; positive recommendation in the website				Food quality, improving the Windjammer experience= 1			0\1\0	0\0	
Service brand evaluation		Style of décor and access= +2	Crowding: 1 Crew friendliness=+3; the sports crew: 1	Food quality= 2; room service= 1, Service experience: +2; The fitness centre's 1; Windjammer was poor, room service additional fees= -2, poor internet connections, customer service slow= -2		Image: solid experience =+1; no such features like dining, exemplary service, or additional luxury=3	8\9\4	8\4	
Sum (Pos/mix/neg)	1\0\1	2\0\0	5\2\0	4\11\4	2\3\0	4\5\0	18\21\5	18\5	
Sum (Pos/neg)	1\1	2\0	5\0	4 \4	2\0	4\0	18\5	13	

Comparison between affective responses and on-board environmental attributes.

	Ambient	Layout/design	Social	Product/service	On-board enjoyment	Overall satisfaction	Sum	Sum
	factors	factors	factors	factors	factors		(Pos/mix/neg)	(Pos/neg)
Comparison between a	ffective (AFF)	responses and on-	board environm	ental attributes				
Feelings	Sounds = 2 Cleanlines s: +1 Air quality: =3 Atmosphe re =+1, 1 Lighting= +1	Style of décor, the interior a local shopping mall= 1, Style of décor, the interior a local shopping mall= -3 Scale/size, like a hotel room than a cabin= 1 Comfort: 1	Crowding, never felt crowded= +2	Food quality: -3	Pleasure or enjoyment=1, Pleasure pleasure or enjoyment= +1, Pleasure or enjoyment= -1, the cost of the excursions = -1, the cost of the excursions = 1, Sports, fitness: -1	Brand/image: +1, felt like a money- grabbing ship= -1	7\11\10	7\10
Positive emotion: peacefulness, romantic love, excitement, cheerfulness, delight; Negative emotion: sadness, disappointment, anger, upset, shame, surprise, worry Satisfaction and dissatisfaction	Sounds, music's = +2, 2, 1 lovely central park and violinist) were wonderful = +2 Lighting, impressive = +1 Atmosphe re: +1	Style of décor: +3 Scale/size: 2 Architectural entertainment: +3 Shapes, symbols: +2 Separate design area: +6 Space: +4					24:4:0	24\0
Confidence, security; Positive emotion; negative emotion			Crowding, embarkation was very efficient and quick - very easy process= 3 Crew friendliness= +2, Crew friendliness= -2				2\3\2	2\2
Positive emotion; Negative emotion; Pleasure				Food quality= +19 Food quality= -5 Service experience= +4 Service experience= -5			23\0\10	23 \10
Positive emotion; Negative emotion					Pleasureorenjoyment= +49orPleasureorenjoyment= -6Excitement= 1	Brand/image: +2, extra was needed to pay, over diamond members being moved down = -2	51\1\8	51\8
Sum (Pos/mix/neg)	9\8\0	18\5\3	4\3\2	23\0\13	50\3\9	3\0\3	107\19\30	107/30
Sum (Pos/neg)	9 \0	18\3	4\2	23 \13	50\9	3\3	107\30	77

Comparison between physiological responses and on-board environmental attributes.

	Ambient factors	Layout/design factors	Social factors	Product/service factors	On-board enjoyment factors	Overall satisfaction	Sum (Pos/mix/ neg)	Sum (Pos/neg)		
Comparison between physiological (PHY) responses and on-board environmental attributes										
Negative noise	Sounds, noise = -5, Sounds = +4, Sounds =1			Service experience, tiny sink that was too low=-1			4\1\6	4\6		
Pain		Style of décor, running back to the room was a pain= -1			Pleasure or enjoyment, making reservations for show was a pain= 1		0\1\1	0\1		
Physical fit; pain		Style of décor: +2 Comfort, mattress caused back pain =-1					2\0\1	2\1		
Needs are well attended	Sounds, need sound engineering= -1	Style of décor: +1 Accessories- functional: +2 but pool areas need more lounge chairs= - 1; Trivia competitions= 2		Service experience= +1, Service experience=1 Service experience, didn't go to specially restaurants/MDR with paying extra= -1	Pleasure or enjoyment= +7, Pleasure or enjoyment=4 Entertainment experience: +1	Image or brand, third-party entities = -1	12\7\4	12\4		
Sum (Pos/mix/ neg)	4\1\6	5\2\3	0	1\1\2	8\5\0	0\0\1	18\9\12	18 \12		
Sum (Pos/neg)	4\6	5\3	0	1\2	8\0	0\1	18\12	6		

Table 10

Comparison between behavioural responses and on-board environmental attributes.

	Ambient	Layout/design	Social factors	Product/service	On-board enjoyment	Overall satisfaction	Sum (Pos/mix/	Sum (Pos/neg)
Comparison between	behavioural (BE	H) responses and	on-board envir	onmental attributes	metors	1	105)	(100/1106)
Stay/stay longer; explore/ exploration	Sounds= 1 Cleanliness = +1, Cleanliness=1			Offers service: = +4 Service experience= +1, Service experience= 6, Service experience= = 6			6\8\6	6\6
Being friendly with other guests; friendly staff, going extra miles, helpful staff, personalized, always there	Cleanliness and modern= +3			Food quality= 3 Offers service= +4 Service experience= +7			14\3\0	14\0
Display family spirit; commitment; intention to recommend; intention to return; stay/stay longer						Image or brand=+8 Image or brand=1, wouldn't recommend it if pay extras for it = -1 Price, did not spend the additional \$ -1 and average room service-1	14\1\3	14\3
Being friendly with other guests; friendly staff, going extra miles, helpful staff, personalized, always there; intention to recommend						Image or brand, =+4, felt safe and secure in ship=+2		
Approach_stay/stay longer		Style of décor = +1, Style of décor= 2 Scale/size, smallest state rooms = -1					1\2\1	1\1
Being friendly with other guests			Crew friendliness: excellent care of cabin = + 1 and friendly =+1 Type and behaviour = +3				5\1\0	5\0
Approach_stay/stay longer;					Pleasure or enjoyment, wish stayed longer: +1, massive ship offers: +2		3\0\0	3\0

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