

A systematic review of cognitive biases in tourist decisions

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ABSTRACT

This study examines articles related to tourist decision making, especially with respect to cognitive biases, published in the *Journal of Travel Research*, *Annals of Tourism Research*, and *Tourism Management* over the past 10 years (from January 2008 to September 2018). Tourists do not always make rational choices due to the influence of behavioral factors, such as dispositions and emotions. According to the study of judgment and decision making, cognitive biases are the main underlying causes of suboptimal decisions. Through a systematic analysis, this study reveals the prevalence and influence of common biases at different stages of travel, such as pre-trip, on-site, and post-trip. This study also summarizes implications for tourism management and proposes areas of potential research contributions.

1. Introduction

Tourist decision making has been a popular research topic in the past decade (Decrop & Kozak, 2009; Sirakaya & Woodside, 2005; Smallman & Moore, 2010). People make various choices in their journeys, from trip preparation to their return. Accordingly, previous research has attempted to explain, predict, and understand the tourist decision-making process.

Most relevant studies are based on the traditional economic discipline (i.e., utility theory), which assumes that tourists maximize their satisfaction in making travel decisions by selecting the best alternative. Under this view, people often base their decisions on rationality, logic, and complex reasoning (Gretzel, 2011; McCabe, Li, & Chen, 2016; Pearce & Packer, 2013). Other studies explain tourist decisions through psychological theories, such as the theory of planned behavior, which hypothesizes that a person acts through reasoning (Fishbein & Ajzen, 1975; as cited in McCabe et al., 2016), and rational choice theory, which postulates that choices are hierarchically selected until the final decision is derived (Hauser & Wernerfelt, 1990; Howard & Sheth, 1969; Roberts & Lattin, 1991; as cited in Vermeulen & Seegers, 2009). Tourist decisions are presumed to rely on cognitive processing, and comprehensive decision-making process occurs before the final purchase (McCabe et al., 2016).

These perceptions have been dominating tourist decision-making research for many years (Gretzel, 2011; McCabe et al., 2016). Tourist approaches provide insights into the process through the input-output or causal mechanism (where decision outcomes or purchase intentions

are the results of various input attributes). New claims have also been emerging in recent years, positing that traditional theories neglect affective or emotional factors, intuitive reasoning, adaptive characters, and spontaneous acts (Decrop, 1999). These issues influence actual decisions and should not be omitted from the analysis of tourist decision-making process.

Tourists, as humans, can be irrational decision-makers. Various travel products and services require travelers to commit to advance purchases for future consumption, which can further affect the optimality of tourist decisions. Time delays influence how tourists construe decisions (Trope & Liberman, 2010) and perceive decision attributes. Human cognitive limitations also make tourists emotional and subjective (Bazerman & Moore, 2009; Gladwell, 2005). Thus, systematic decision-making deviations from rationality may arise (Albar & Jetter, 2009), leading to poor consumer choices. These findings illustrate that tourist decisions are more complex than original thoughts.

Recent literature reports that tourists have a limited memory that may impede their decision-making process. During searches, they are exposed to massive information that can cause cognitive overload (Park & Nicolau, 2015). These limitations can drive tourists to rely more on trust and intuitive perceptions than on logical reasoning (Correia, Kozak, & Tao, 2014).

Research on cognitive biases in tourist decisions is arguably still in its infancy. Despite various studies on decision making in the tourism context, incidents and prognoses of cognitive biases with regard to their types and stages where they arise are still abstruse. To ameliorate this situation, a systematic investigation is necessary. The present study

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focuses on the most frequent bias types and the stages in which cognitive biases occur. The authors review relevant articles in three forefront tourism journals published within 10 years from January 2008 to September 2018. The *Journal of Travel Research (JTR)*, *Annals of Tourism Research (ATR)*, and *Tourism Management (TM)* are the top three leading tourism journals according to the Web of Science's Journal Impact Factor (JTR: 4.564, ATR: 3.194, and TM: 4.707), posing influential roles in tourism knowledge.

This study aims to answer the following questions.

- 1) Based on the current stage of literature on cognitive biases in key tourism literature, what are the general characteristics of the existing articles?
- 2) What are the most frequent bias types found in the tourist decision-making context?
- 3) How can cognitive biases occur in different tourism stages, starting from destination choice to post-visit experience?

This paper is organized in the following manner. Section 2 discusses the background literature regarding decision making and cognitive biases. Section 3 provides the methodology of the review process. Section 4 presents the findings and discussions regarding the types and stages that cognitive biases manifest in tourism literature. Section 5 concludes with a summary of implications on tourism management and potential future research areas.

2. Background literature

2.1. Normative, descriptive, and prescriptive decision making

Decision science is an academic field that can be classified into the study of normative, descriptive, and prescriptive decisions (Steele and Stefánsson, 2015). Normative decision-making studies indicate how people should decide to maximize their objectives. This is close to that of game theory in economics, which focuses on the interactions between agents and the best action that each one takes (Myerson, 1991). By contrast, descriptive decision making is concerned with how people make decisions, which may deviate from norms of optimality or rationality (MacCrimmon, 1968; Slovic, Fischhoff, & Lichtenstein, 1977). As a consequence of the discrepancy of normative and descriptive decisions, prescriptive decision making relates to practical applications of “nudging” people to make good decisions. The interactions among normative, descriptive, and prescriptive decision making, especially through experimental findings, have led to a good understanding of human decision-making processes (Anand, 1993; Keren & Wagenaar, 1985). Most tourism studies examine issues related to descriptive or behavioral decision making, i.e. how tourists decide from available or given choices.

Among normative, descriptive, and prescriptive areas of decision science, the most extensively researched category is decision under uncertainty, which is founded on mathematical and statistical concepts of probability. In this paradigm, people must commit to an action before an outcome is realized. For example, people must decide how many shares of a particular stock to buy, which may eventually result in either a profit or a loss. In decision under uncertainty, calculating the expected value to evaluate such a prospect is traditionally accepted in the field of economics and finance (Schoemaker, 1982). Many theoretical studies focus on this area, especially from a normative perspective. For example, Von Neumann and Morgenstern (1953) axiomatized the influential model of expected utility. However, descriptive-oriented studies have indicated that people do not always behave rationally. The most prominent works are by Maurice Allais (1953) and Daniel Ellsberg (1961) who proposed the paradoxes or decisions which violate normative assumptions. In addition, prospect theory (Kahneman & Tversky, 1979) is widely accepted as a plausible model of descriptive choice.

Another widely investigated category is that of intertemporal choices or decisions that involve the element of time (Frederick, Loewenstein, O'donoghue (2002)). A typical situation is when people decide between two alternative prospects with varying time delays, such as to spend a particular amount of earnings today or to save and consume it (with interest) in the future. Decision uncertainty and intertemporal choice are applicable to tourism because many products and services require payment before the actual consumption, such as airplane flights. In addition, tourists often report varying experiences for the same products and services, such as hotel stays.

2.2. Bounded rationality, heuristics, and tourist decision making

Literature on decision making, including that related to tourism, has traditionally developed with a strong linkage to economics, thus these studies are often based on the rational choice paradigm. In this setting, classical (expected) utility theory (von Neumann and Morgenstern, 1953; as cited in Thaler, 2015) is used to explain tourist decision making (Albar & Jetter, 2009; Decrop, 1999; Gretzel, 2011; Pearce and Packer, 2013). Existing tourism studies on this topic assume that tourists make rational decisions following a logic of reasons and order (Sirakaya & Woodside, 2005). Goldstein (2011, as cited in Pearce & Packer, 2013) found that the nature of decision making and its process is considerably affected by the presentation of problems. Tourists are not always rational and can make biased decisions. Irrational decisions occur when tourists violate the principles of rationality and select options that do not reflect their true preferences (Bown, 2007). Keys and Schwartz (2007) revealed the three principles of rationality: i) dominance (the option that never results in an outcome worse than others should be the preferred option), ii) variance (information should be understood and must weigh the same regardless of its presentation), and iii) sunk cost (irreversible consequences should be ignored when making considerations for the future).

Simon (1972) introduced the “bounded rationality” concept, which states that although an individual makes a rational choice, (s)he may lack important information that can help define a problem or determine a relevant criterion. Time and cost constraints likewise limit the quantity and quality of available information. These factors explain why an individual cannot always assume a fully rational model because his/her rationality is bounded by cognitive limitation (Bazerman and Moore, 2009; Thaler, 2015).

In addition, individuals must deal with a tremendous amount of available information. Heuristics or mental shortcuts may be employed to save time but can cause cognitive biases (Tversky & Kahneman, 1974). Payne, Bettman, and Johnson (1993) discovered that decision makers must normally find rules, which are adaptively based on a given situation (e.g., time pressure or the number of available options). However, heuristics do not always lead to undesirable results. Certain types such as elimination by aspects (Tversky, 1972), allow individuals to make choices on the basis of systematic reduction. In this case, people base their decisions on the most desirable attributes to reduce the complexity in decision making. Such heuristics can become functional, especially when they yield consistent choices. Effective heuristics can be established by determining the degree to which achieving a predetermined objective is allowed (Merlo, Lukas, & Whitwell, 2008).

To conclude, irrational decisions are a result of the limited ability of humans to arrive at the optimal solution, which may be caused by time and cost constraints, limited cognitive capacity, and incomplete or overloaded information. People cannot often maximize the utility of all possible choices (Cahyanto et al., 2016). Instead, individuals make good decisions that are good enough, rather than optimal (Simon, 1972; as cited in Smallman & Moore, 2010; Bazerman and Moore, 2015). Such situations are common in tourism, especially regarding tourist decisions. For example, in choosing places to visit, most tourists cannot afford the time and effort to evaluate the details of all possible alternatives without resorting to certain heuristics.

3. Methodology

This study systematically reviewed all articles on tourist decision making that were published in JTR, ATR, and TM between January 2008 and September 2018. Two main processes were performed before the systematic review, namely, article collection and article screening.

3.1. Article collection

In the initial step, different sets of keywords were used to identify articles on cognitive biases in tourist decisions. After several attempts, the two authors agreed upon the set of {tourist, traveler, “decision making,” cognitive, bias}.

The three journals yielded 269 articles (148, 27, and 94 articles in JTR, ATR, and TM, respectively). The articles were then collected and recorded in a spreadsheet to facilitate categorization and prepare for data screening. Information regarding article titles, authors, year, affiliations, countries, and abstracts was also noted.

3.2. Article screening

All of the 269 articles were screened through two parallel actions: 1) examining the abstract of each article and 2) inspecting the context surrounding each of the specified keywords in the body of each article. This process confirmed whether the article is related to cognitive biases in tourist decisions. During the screening process, the two researchers agreed upon the evaluative judgment by assigning each article to one of the following categories.

- Category 1: articles in which at least one cognitive bias type(s) is explicitly stated within the body.
- Category 2: articles that can be inferred as related to cognitive biases but specify no bias type.
- Category 3: articles that are not related to cognitive biases in tourist decisions.

In this study, only Category 1 was selected for the main analysis. The 269 articles were reviewed and coded, and the results were jointly cross-checked to confirm the categorization. The inter-coding reliability between the two researchers was 85%. Articles that received different codes, particularly 1 versus 2 and 1 versus 3, were further discussed and investigated before confirming their categorization. The last step was a reference search, and a total of 37 articles were selected for the review.

4. Preliminary analysis

The past 10 years, from January 2008 to September 2018, has seen an increase in the number of studies on cognitive biases in tourist decisions, especially between 2016 and 2018. For each journal, the number of articles rose from zero to three papers each year between 2008 and 2015 to five to nine papers between 2016 and 2018. Among the 37 articles, 14, 6, and 17 papers were published in JTR, ATR, and TR, respectively (See Table 1). In addition, cognitive biases assumed a central role in 23 papers and a supporting role in the remaining 14 papers. (A central role means that a cognitive bias type is one of the key topics in the study, whereas a supporting role means that a bias is used for explanatory purpose.). See Table 2.

The 37 selected studies applied three types of research methods. Thirty-four papers adopted a quantitative analysis, two were conceptual reviews, and one performed a qualitative analysis. For articles in which cognitive bias posed a central role, only the quantitative method was used. Among the 34 quantitative studies, the experimental design was the most frequently used method (13 articles, 56.5%), followed by surveys using questionnaires (6 articles, 26.1%). The prevalence of experimental design is in line with the nature of cognitive bias studies in the field of judgment and decision making. Furthermore,

Table 1

Article distribution in JTR, ATR, and TR from 2008 to 2018.

Year	JTR	ATR	TM	Total	Accumulated Total
2008				0	0
2009		1	1	2	2
2010	1		1	2	4
2011			1	1	5
2012	3			3	8
2013	1		1	2	10
2014		0	1	1	11
2015	1	1	1	3	14
2016	2	2	5	9	23
2017	0	1	4	5	28
2018	6	1	2	9	37
Total	14	6	17	37	

Table 2

Roles of cognitive bias in the selected studies.

Roles of cognitive biases	JTR	ATR	TM	Sum
Cognitive biases as a <i>central role</i> of the study	11	3	9	23
Cognitive biases as a <i>supporting role</i> of the study	3	3	8	14
Total	14	6	17	37

the quantitative studies performed common statistical analyses, including structural equation modeling, regression analysis, *t*-test, and ANOVA (see Table 3).

The 37 selected articles classified by regions and countries reveal that research related to cognitive biases in tourist decisions has been conducted across the globe. Most studies were from North America (39%), followed by Asia (21%) and Europe (19%). North American and Asian papers have predominantly used quantitative research methods (mainly experimental design and questionnaire survey). By contrast, studies in the European continent, mainly from Spain and the United Kingdom, have employed mathematical modeling (See Table 4).

Moreover, from the selected 37 articles, 24 cognitive biases were observed with different frequencies. The highest frequency was *heuristics*, which appeared in six articles (12.24%), followed by *social bias and stereotype* in five articles (10.2%). *Framing effect and cognitive dissonance* each appeared in four articles (8.16%). In addition, *anchoring* and *negativity bias* were each referred to in three articles (6.12%). Six of the bias types were mentioned in two articles (4.08%), and 12 of the bias types appeared in one article (2.04%). See Table 5. The detail explanation of each bias type can be found in Table 6.

4.1. Keywords frequently related to the most common cognitive biases

Frequent keywords related to the most common types of cognitive biases were examined. Specifically, the qualitative analysis tool of the NVivo 11 software was employed to identify the word influence via word cloud, a visual tool to indicate dominant keywords. Figs. 2 and 3 illustrate the four most commonly found biases, namely, [A] heuristic, [B] social bias and stereotype, [C] framing effect, and [D] cognitive dissonance. The biases are likewise explained in relation to the related keywords in the figure.

Heuristics, or mental shortcuts, are simple principles that enable individuals to decide and assess values efficiently under uncertain and intricate conditions (Tversky & Kahneman, 1974). Heuristics can cause cognitive bias when the application of automatic mental processing leads to inconsistent choices (Bown, 2007). Derived from keywords found in the literature, possible heuristic cues can help tourists make decisions but also distort rational decisions. The predominant keywords related to heuristics are “destination image” (see Article 22 from Appendix 1) and “online reviews” [11, 16, 35, and 37]. Online reviews are valuable information sources that affect customer pre-purchase

Table 3
Research methods employed in the selected studies.

Methods	All articles	Cognitive bias as a central role	Percentage (only articles with central role)
Quantitative analysis			
The analysis of the quantitative survey (not the experiment)	9	6	26.1%
Mathematical equation	4	3	13%
Experimental design	17	13	56.5%
Quantitative analysis on textual data	4	1	4.3%
Qualitative analysis			
Discourse analysis	1		
Review article			
Conceptual review	2		
	37	23	100%

evaluations and decisions (Book, Tanford, & Chen, 2016). However, the reviews pose as heuristics because their valences (positive or negative) enable tourists to decide quickly. Negative reviews are expected to activate heuristic processing as voicing unfavorable attitudes can attract attention (Kanouse & Hanson, 1987). “Destination image” is another heuristic cue for destination choice. When faced with several destinations, tourists can reduce the number of considerations or available choices due to the limitation of their cognitive ability (Miller, 1956; as cited in Decrop, 1999). The perception toward a destination image helps tourists reduce destination choices in the available set.

Social bias and stereotype is a common bias in tourism that occurs from prejudicial attitudes toward certain groups or races. The keywords related to these cognitive bias types surround the ideas of “destination image” [5, 12, 22], “gender in tourism” [29], “advertising” [10, 29], and “country or national conflicts” [10]. A message derived from advertising can form a stereotype toward a destination image. Moreover, country or national conflicts may lead to an unfavorable image of a country in conflict. Stereotype also applies to the role of gender (male versus female), such as perceptions on solo female travelers.

Framing effect refers to the situation when choices being made are influenced by their manner of presentation (Tversky & Kahneman, 1981). The keywords related to the framing effect in tourism studies are “price anchoring” [13], “online review” [23], “media” [28], and “destination image” [36].

Tanford, Choi, and Joe (2018) [13] argued that framing principles can explain the influence of tourist budget on price evaluations. Perceived high or low budget framing may influence how people view hotel pricing strategies and may affect purchase decisions (Wu & Cheng, 2011). Review framing (what is read first: positive or negative review) can influence consumer choice. Sparks and Browning (2011) [23] found that positively framed reviews result in a more favorable booking intention than negatively framed reviews. Moreover, news media can frame audience perception on destination risk [28] and how destination image is perceived [38]. The “gain-framed condition” (97% of the visitors are satisfied when visiting a destination) receives a higher image perception than the “loss-framed condition” (only 3% of the visitors are dissatisfied when visiting a destination). This factor provides an important implication on how the advertising message about a

Table 4
Studies by regions and countries.

Total studies by region	North America	Europe	The Middle East	Africa	Asia	Oceania
n = 57 (100%)	n = 22 (39%)	n = 11 (19%)	n = 1 (2%)	n = 3 (5%)	n = 12 (21%)	n = 8 (14%)
Countries	The United States (21) Canada (1)	The United Kingdom (4) Norway (2) Spain (2) Greece (1) Switzerland (1) Russia (1)	Israel (1)	South Africa (3)	People Republic of China (5) Republic of China (3) Hong Kong SAR (2) Republic of Korea (2)	Australia (5) New Zealand (3)

Table 5
Distribution of bias in the selected articles.

No.	Bias types	Number	Percentage
1	Heuristics	6	12.24
2	Social bias and stereotype	5	10.20
3	Framing effect	4	8.16
4	Cognitive dissonance	4	8.16
5	Anchoring	3	6.12
6	Negativity bias	3	6.12
7	Loss aversion	2	4.08
8	Positivity bias	2	4.08
9	Primacy effect	2	4.08
10	Bias on memory (Recall bias)	2	4.08
11	Time perspective bias	2	4.08
12	Confirmation bias	2	4.08
13	Halo effect	1	2.04
14	Cognitive miser	1	2.04
15	Decoy effect	1	2.04
16	Priming effect	1	2.04
17	Impact bias	1	2.04
18	Subconscious bias	1	2.04
19	Cognitive bias (no specific)	1	2.04
20	Sunk cost effect	1	2.04
21	Present bias	1	2.04
22	Availability bias	1	2.04
23	Conjunction fallacy	1	2.04
24	Scope insensitivity	1	2.04
Total biases		49	100.00

destination can be framed to attract the interest and trust of tourists.

Cognitive dissonance refers to the situation when people’s attitudes, beliefs, or behaviors are not aligned and create conflicts in a way that such people react irrationally to maintain consonance. When people encounter cognitive dissonance, they react in one of the following three ways: 1) change beliefs; 2) change actions; and 3) change perceptions of action (rationalize the action). The last option can lead to irrational decision making when people reconcile their conflicting beliefs (Investopedia, 2018).

The keywords that are most related to cognitive dissonance revolve in the concepts of “social influence” [6], “perceived regret” [24], “seller rating” [32], and “sunk-cost effect” [25]. In the tourism context,

Table 6

Detail explanation of each bias type.

Sources [excluding the selected articles]: Bazerman and Moore, 2009; Haselton et al. (2005); Heshmat (2015); Huber et al. (1982); Oxford Reference (2019); O'Donoghue & Rabin (1999); Tversky and Kahneman (1974); Tversky and Kahneman (1981); Social bias (n.d.); Wilson and Gilbert (2005); World Heritage Encyclopedia (2019); Zimbardo & Boyd (1999).

Bias types	Bias explanations	Selected article
Heuristics	... or rules of thumb, are the cognitive tools we use to simplify the decision making process	Tanford and Kim (2018); Tanford et al. (2018); Park and Nicolau (2015); Castelltort and Mäder, 2010; Xiang et al. (2017); Tan, Lv, Lui, & Gusoy (2018)
Social bias	... prejudicial attitudes toward particular groups, races, sexes, or religions, including the conscious or unconscious expression of these attitudes in writing, speaking, etc.	Stepchenkova, Su, & Shichkova (2019); Gritzalls, & Stavrou (2018)
Stereotype	.. when a person has certain characteristics about another person, thing or place without having actual information...	Chen et al. (2013); Castelltort and Mäder, 2010; Berdychevsky et al. (2016)
Framing effect	... the situation when choices being made are influenced by the way they are framed. Framing effect occurs when changing perspective influences evaluation of outcomes	Tanford et al. (2018); Sparks and Browning (2011); Kapuściński and Richards, 2016; Zhang et al. (2018)
Cognitive dissonance	... the situations when attitudes, beliefs or behaviours of a person are not aligned and could create conflict and he or she can react in the irrational way in order to maintain the consonance (McLeod, 2018).	Tanford and Montgomery (2015); Park and Jang (2013); Park and Jang (2014); Tseng (2017)
Anchoring	... the tendency to anchor a decision at an initial value and fail to adjust sufficiently to reach the true value	Book et al. (2016); Tanford et al. (2018); Higham, Ellis, & Maclaurin (2019);
Negativity bias	... things of a more negative nature have a greater effect on one's psychological state and processes than neutral or positive things	Tanford and Kim (2018); Park and Nicolau (2015); Zhang et al. (2016)
Loss aversion	... changes from reference points may be valued differently depending on whether they are gains or losses and people tend to avoid potential loss and leading them to make irrational decision	Nicolau (2012); Nguyen (2016)
Positivity bias	... a pervasive tendency for people, especially those with high self-esteem, to rate positive traits as being more true	Ouyang et al. (2017); Xiang et al. (2017)
Primacy effect	... recalling or seeing primary (last) information presented better than information presented later on (before)	Ert and Fleischer (2016); Sparks and Browning (2011)
Bias on memory (Recall bias)	... bias which occurred when people remember past events that easily spring out into their memories but don't usually have a complete or accurate picture of what happened	Lee and Kyle (2012); Smith et al. (2015)
Time perspective bias	... refers to the relative focus and valence a person assigns to past, present, and future time frames.	Kah et al. (2016); Lu et al., 2016a, b
Confirmation bias	... the tendency to interpret new evidence as confirmation of one's existing beliefs or theories.	Chi et al. (2018); Higham et al. (2019)
Halo effect	... when a person making an initial evaluation of another person, place, or thing based on the assumption of ambiguous information	Kneesel et al. (2010)
Cognitive miser	... a social psychology theory that suggests that humans, valuing their mental processing resources, find different ways to save time and effort when negotiating the social world	Tanford et al. (2012)
Decoy effect	... (or attraction effect) is the phenomenon that consumers will tend to have a specific change in preference between two options when they are presented with a third option that is asymmetrically dominated	Kim et al. (2018)
Priming effect	... how ideas prompt other ideas later on without an individual's conscious awareness	Thai and Yuksel (2017)
Impact bias	... tendency that people overestimate the intensity and duration of their emotional reactions to future events	Larsen, Brun, & Ogaard (2009)
Subconscious bias	... while individuals are likely to respond better to human cues, they are unlikely to be aware of what has occurred, or why they feel more favorable towards the message they have just seen	Letheren et al. (2017)
Cognitive bias	... a systematic pattern of deviation from norm or rationality in judgment	Tan, Lv, Lui, & Gusoy (2018)
Sunk cost effect	... when a person is more likely to continue with a project if he or she has already invested a lot of money, time, or effort in it, even when continuing is not the best thing to do	Park and Jang (2014)
Present bias	... tendency of people to give stronger weight to payoffs that are close to present time when considering trade-offs between two future moments.	Nguyen (2016)
Availability bias	... the estimation of frequency or probability by the ease with which instances or associations could be brought to mind.	Higham et al. (2019)
Probabilistic reasoning and conjunction fallacy	... individuals exhibit a bias toward overestimating the probability of conjunctive events and underestimating the probability of disjunctive events	Higham et al. (2019)
Scope insensitivity	... the amount that a person is willing to pay for purchasing moral satisfaction (e.g. donation) is relatively insensitive to the actual nature and extent of harm to be ameliorated	Higham et al. (2019)

cognitive dissonance occurs when individuals' purchase decision is affected by factors that lead to distortion or regret in their decision choice. These factors include the social influence on the selected choice or from several available choices. Regret can arise when customers consider the favorable qualities of the options they did not choose, causing dissonance (Festinger, 1957; as cited in Landman, 1987). For example, article [32] investigated how seller ratings can reduce post-

purchase regret.

As previously discussed, the context surrounding the four most common cognitive bias types varies. The next section further scrutinizes all of the bias types with respect to their manifestations in different tourism stages.

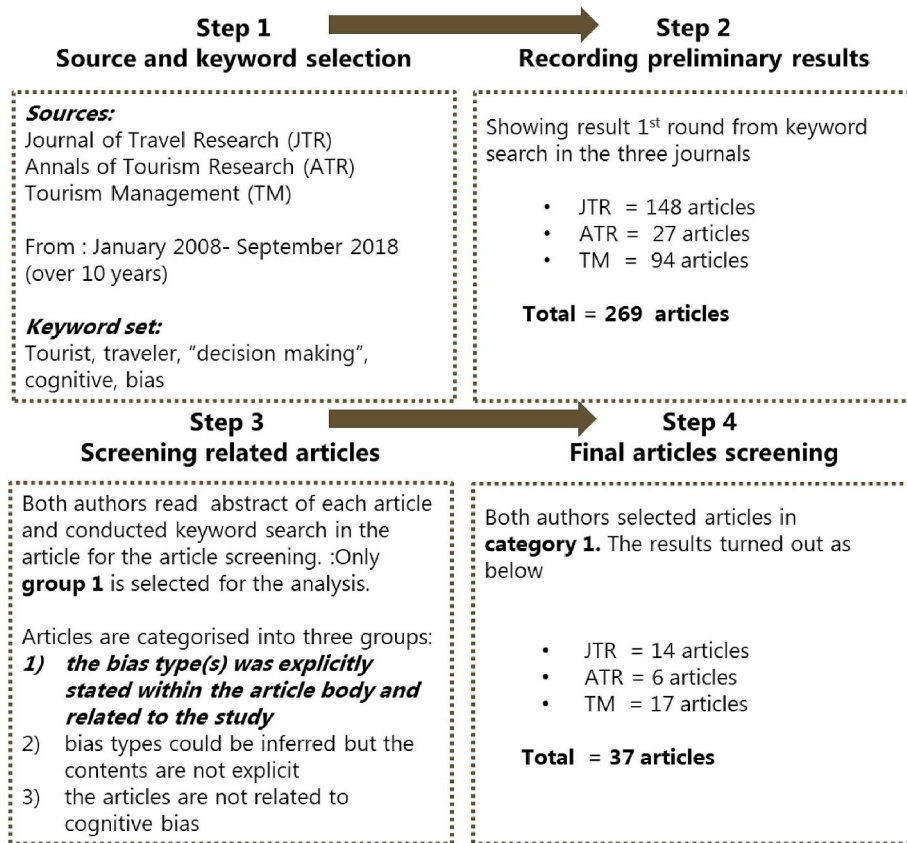


Fig. 1. Article selection and screening.

4.2. Cognitive biases with respect to different tourism stages

Within the selected 37 articles, different types of cognitive biases occur in distinct tourism stages, namely, [1] pre-trip, [2] on-site, and [3] post-trip. In this study, [1] is classified into three sub-stages: [1.1] evaluating destination choice, [1.2] evaluating tourism product rating, and [1.3] evaluating tourism product choice.

Six types of cognitive biases occur during [1.1] and appear in nine articles (18.4%). Five cognitive bias types occur during [1.2], appearing in nine articles (18.4%). The largest number of bias types, nine, is recorded in [1.3] and appear in 14 articles (32.7%). Two bias types are found in [2], appearing in two articles and accounting for 4.1%. Only one bias type exists in the two articles for [3], accounting for 4.1%. The

last categories [4], which refer to the tourism articles in which the travel stage cannot be identified, comprise 10 types of bias in six articles, accounting for 22.5%.

Each stage is elaborated in the next section. The details of the key bias types observed in the three tourism stages and three sub-stages are illustrated in Figs. 4 and 5.

4.3. Pre-trip experience

4.3.1. Destination choice

Tourist decision making on a destination choice relies on choice set theory, which is borrowed from marketing and consumer behavior disciplines (Hastak & Mitra, 1996; Howard, 1977). At this stage, tourists

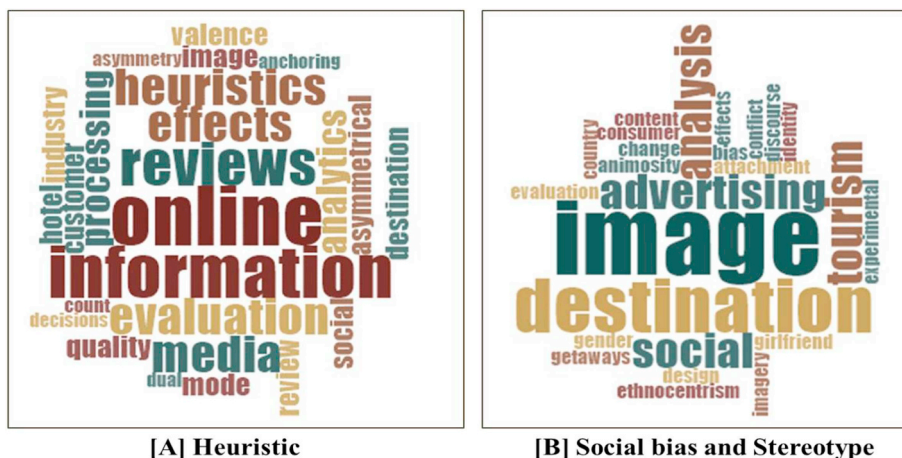


Fig. 2. Word clouds of keywords on [A] heuristic and [B] social bias and stereotype.

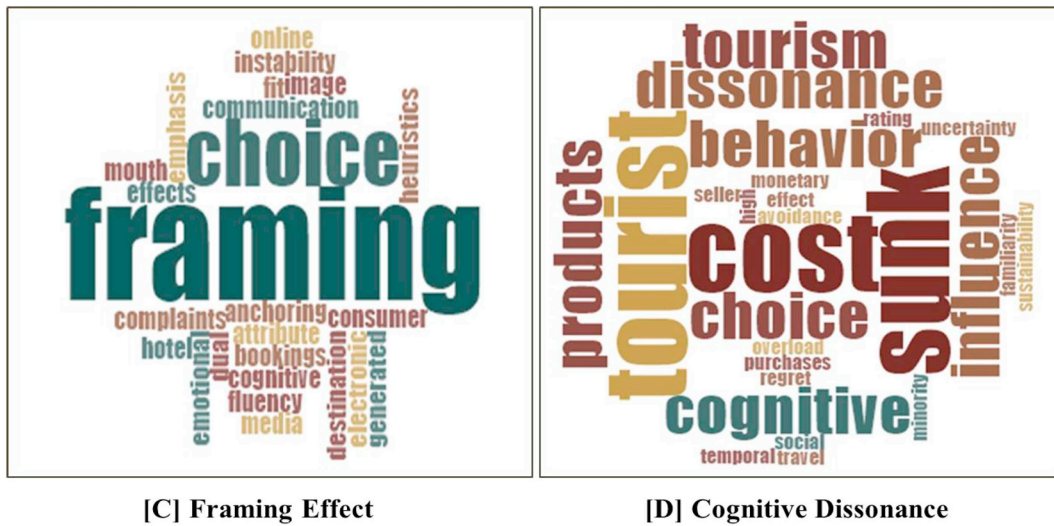


Fig. 3. Word clouds of keywords [C] framing effect and [D] cognitive dissonance.

apply a mental process and consider possible places to travel. Certain rules can be applied so that tourists can make certain comparisons and work out their preference order among alternatives (Li, McCabe, & Song, 2017). Choice set theory proposes that several destinations are included in the consideration (or evoked) set before the final choice is made (Decrop, 1999).

At the stage of destination selection, six types of cognitive biases are observed to affect the destination choice. The key bias types are *heuristics*, *halo effect*, *framing effect*, *stereotype*, *social bias*, and *subconscious bias*.

In this stage, destination image is the key variable that is often addressed as a *heuristic cue* (mental shortcut) before tourists make a final decision. Destination image can be influenced by many factors, from news media to marketing promotional campaigns. The perception of destination image through news media or advertising likewise links

to *framing effect*. This bias can arise from watching news and seeing promotional materials. The framing of media context (e.g., positively, negatively, or neutral) can affect how tourists perceive a destination (Kapuściński and Richards, 2016; Zhang, Zhang, Gursoy, & Fu, 2018). *Halo effect* refers to character judgments of an object that can be influenced by its overall impression. Such an effect is another bias type that is likewise found at this stage. Tourists pose a positive judgment toward a destination because they have a positive view, resulting from the positively framed marketing. Thus, such marketing affects the final judgment of how tourists perceive a destination choice (Kneesel, Baloglu, & Millar, 2010).

International tourist perception toward a destination is likewise influenced by *social bias* and *stereotype*, referring to the positive and negative tourist perceptions about the destination. Chen et al. (2013) explained that tourists can have a negative stereotype if their home

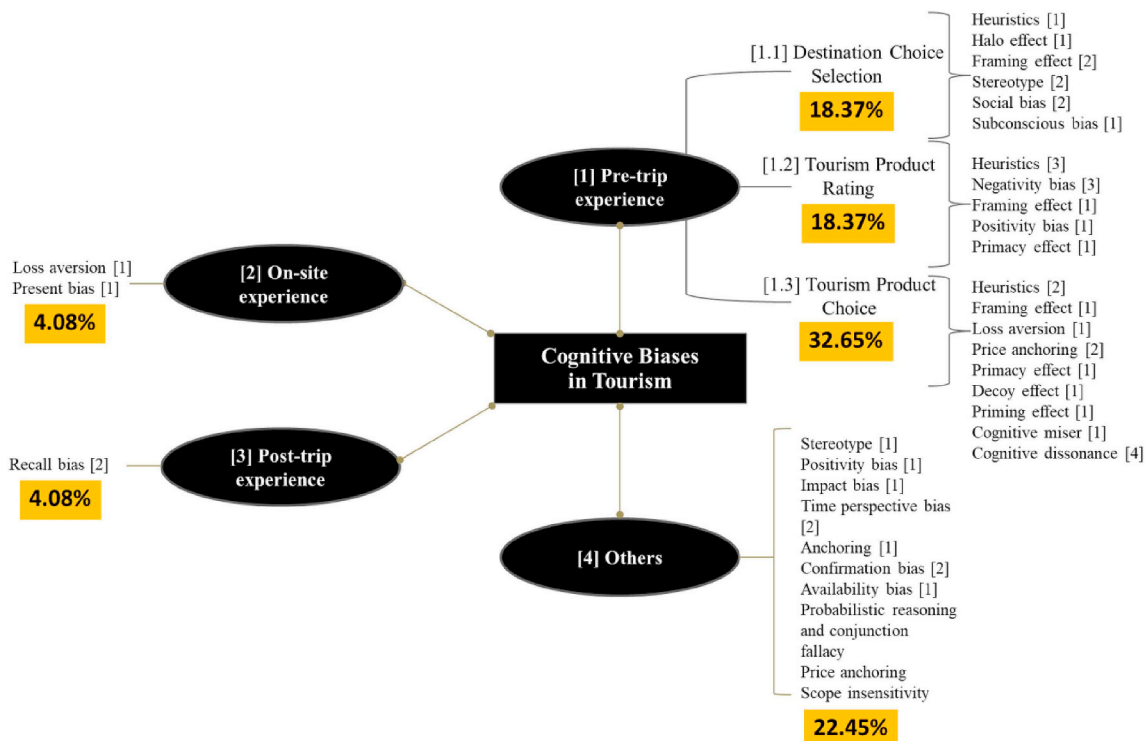


Fig. 4. Types of cognitive bias found in each stage of the selected articles (the number in brackets [] indicates the number of articles).

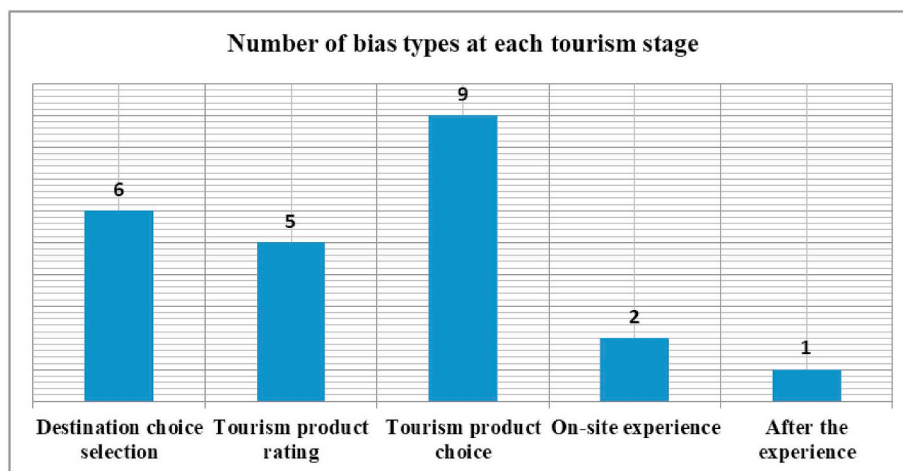


Fig. 5. Cognitive biases in each tourism stage.

country has a record of conflict with other countries, resulting in the formation of a negatively biased country and destination image. This negative stereotype is similarly witnessed when the destination country is viewed as the out-group on the basis of the constant political, economic, diplomatic, or military conflicts (Stepchenkova & Shichkova, 2019).

Moreover, *subconscious bias* occurs when people respond to the marketing communication message of a destination or to human cues without knowing the reasons. Letheren, Martin, and Jin (2017) reported that people with high anthropomorphic tendency (tendency to humanize non-human agents/objects) can develop a positive destination attitude when exposed to a personified advertisement, rather than a concrete or plain text.

These biases can result in the distorted image perception of a destination. Destination image acts as a heuristic clue and plays a crucial role in destination choice (Fu, Yeh, and Xiang, 2016). Therefore, such biases affect tourist perceptions toward a destination. With its likely inclusion in the consideration choice (or evoked) set, the destination is therefore involved in the final choice.

4.3.2. Tourism product rating

After destination choice, tourists further search for information related to tourism product choices, such as accommodations, flights, or destination packages. A growing reliance on the Internet, an information source for decision making, is witnessed in the digital era (Sparks & Browning, 2011). As a result, tourists are bombarded with online information when making purchase decisions (Book et al., 2016). Therefore, online reviews and/or ratings are often consulted to enhance confidence before making decisions. Online reviews and ratings have a powerful influence on consumer purchase decisions (Sparks & Browning, 2011; Tanford & Kim, 2018). At this stage, cognitive biases can arise while assessing such information. The key bias types involved in this stage are *heuristic*, *negativity bias*, *positivity bias*, *framing effect*, and *primacy effect*.

Online ratings and reviews are considered *heuristic* cues that enable tourists to form quick judgments on available choices before making decisions (Tanford & Kim, 2018). *Negativity bias* occurs when tourists consult reviews displayed on user-generated content websites before making choices, especially in product-judgment contexts (Maheswaran & Sternthal, 1990). Accordingly, a negative input has a greater effect on attitudinal and behavioral expressions than a positive input (Cacioppo & Berntson, 1994). Moreover, negative reviews present greater impact than positive reviews (Book et al., 2016; Chen & Lurie, 2013; Park & Nicolau, 2015; Tanford & Kim, 2018). These factors support the study of Ito, Larsen, Smith, and Cacioppo (1998), who argued that negative bias largely occurs during information and choice evaluation. On the

contrary, negative cues evoke an emotional reaction, causing people to weigh them more heavily than positive cues (Taylor, 1991).

Framing effect can occur when travelers read review information. Sparks and Browning (2011) claimed that framing reviews (negative or positive information) can influence tourist destination choice. Consumers are influenced by early negative information, especially when the overall set of reviews is negative. Nevertheless, if the reviews are positively framed and when used together with numerical rating details, then booking intentions and trust can increase. Moreover, the sequence of reviews and ratings indicates the bias of *primacy effect* as travelers are influenced by early negative information (negative reviews come first). Reviewed comments that users receive first have a greater impact on the formed impression than those received in a later period (Park & Nicolau, 2015; Sparks & Browning, 2011).

4.3.3. Tourism product choice

After assessment, tourists must decide on tourism products. In this stage, instant price, discount, purchase risk, and willingness to pay are the few key variables that affect tourist decisions. In tourism product choice, the maximum number of biases is observed, and these biases revolve around tourist perceptions of available choices and prices before making decisions. Cognitive bias types found in this stage include *heuristics*, *cognitive miser*, *price anchoring*, *framing effect*, *loss aversion*, *primacy/recency effect*, *decoy effect*, *priming effect*, and *cognitive dissonance*. These bias types can be categorized into three groups.

4.3.3.1. Biases related to price and discount. The online travel booking environment involves multiple cues that may encourage consumers to use *System 1* or automatic processing and apply judgmental heuristics to simplify the decision process (Tversky & Kahneman, 1974). Tanford, Baloglu, and Erdem (2012) addressed that discount is perceived as a *heuristic* cue. When the discount is large, consumers simply assume that the discounted product is a good deal. Price difference influences the attributions of trust, price fairness, and purchase intentions (Grewal, Marmorstein, & Sharma, 1996; Hardesty & Bearden, 2003). When the discount is small, the perceptions of trust and fairness are influenced by other factors, such as information transparency, which can affect purchase decisions (Grewal, Hardesty, & Iyer, 2004). The idea of heuristics supports the *cognitive miser* principle (Fiske & Taylor, 1991), which theorizes that people limit the amount of cognitive effort they must exert to reach decisions (Tanford et al., 2012).

Price anchoring and *framing effect* are the two other bias types related to tourist decision making on price. Anchoring refers to the tendency to anchor a decision at an initial value and the failure to sufficiently adjust to reach the true value (Tversky & Kahneman, 1974). Anchoring effect can occur on price in the sense that compared with low-anchor

advertising prices, high-anchor advertising prices (up to a certain amount) increase potential customers' willingness to pay more (Tanford et al., 2018). Moreover, a relationship exists between price anchoring and framing effect. Framing can influence tourists' mental budgeting goal (high- or low-framed budget). Therefore, framing can impact tourist response to price anchors when purchasing products online (Wu & Cheng, 2011). However, the effect of price anchoring decreases when tourists' budget goal is incompatible with a high price anchor but is not evidenced on a low-price anchor (Book et al., 2016; Tanford et al., 2018).

Loss aversion is relevant to pricing. Evidence of loss aversion implies that changes from the reference point may be valued differently depending on whether such changes are gains or losses. People become more sensitive to losses relative to their reference point than to gains (Nicolau, 2012). Nicolau (2008) revealed that tourists react more strongly to price increases than to price decreases relative to the reference price, thus representing evidence in favor of loss aversion.

4.3.3.2. Biases related to the positioning of online tourism products. In this concept, *primacy/recency effect* exists when the tourism product position (such as hotel accommodations) affects the likelihood of selection. The bias occurs from the fact that hotels listed at the top (primacy) and bottom (recency) are more likely selected than those listed in the middle (Ert & Fleischer, 2016).

With regard to selecting and rejecting options, *decoy effect* can occur when a new alternative is added into a choice set, thereby increasing the existing options (Huber, Payne, & Puto, 1982; Kim, Kim, Lee, Kim, & Hyde, 2018). If the decoy makes the target appear as a middle option in the choice set, then the preference increase of the target represents the compromise effect (Pechtl, 2009). Decoy effect breaks the basic economic assumption, which states that the attractiveness of one alternative is independent of the remaining alternatives in the choice set (Schoemaker, 1982). Therefore, decoy effect creates bias in decision making.

4.3.3.3. Biases related to information overload. Tourists are exposed to information overload during product selection. *Priming effect* is the cognitive bias observed in the marketing area and is used as a technique to help promote sales. This effect involves how ideas prompt other ideas without individuals' conscious awareness. Thai and Yuksel (2017) showed its evidence in tourism by using the priming effect to boost self-confidence and reduce the choice overload effect. In addition, *bounded rationality* limits individuals' cognitive abilities for analyzing and comprehending online information (Lu, Gursoy, & Lu, 2016a). Moreover, *cognitive dissonance* is observed in situations involving choice overload and when customers perceive regrets after making decisions. Perceived regret can be a sense of disappointment or sadness due to the choice individuals make or do not make (Simonson, 1992). Park and Jang (2013) suggested that when tourists are exposed to less than 22 choices, tourists who made a decision have less regret than those who did not. However, when more than 22 choices are given, the choice group feels more regret than the "no-choice" group. The choice group may question whether the foregone alternatives are better than the chosen one, leading to the perceived regret of making choices. Therefore, cognitive dissonance occurs as a result of decision making.

4.4. On-site and post-trip experiences

Cognitive biases in on-site experiences are few. Two types of cognitive bias are investigated during the retail/shopping experience, namely, *loss aversion* and *present bias*. Nguyen (2016) investigated the link among *loss aversion*, *present bias*, and *traveling expenditure patterns*. The result reveals that tourists with high loss aversion and high present bias likely overspend. However, the role of group identity is regarded as a de-biasing factor, supporting the fact that individuals behave in accordance with the standard economic models when making decisions in

groups.

Post-trip biases are influenced by the *recall of emotion* after tourists return home. The memory of emotional experience is reconstructed on the basis of past experiences and current beliefs (Aaker, Drolet, & Griffin, 2008; Levine, 1997). Thus, the active reconstructive process provides an opportunity for different cognitive and motivational biases to come into play (Watson & Spence, 2007). Robinson and Clore (2002) stated that the bias of retrospective emotions is attributed to individuals' capacity to remember and integrate subtle distinctions in expressing their experiences when they report bygone emotions. Consequently, individuals provide a biased account of their emotions when recalling past emotional experiences (Thomas & Diener, 1990). Lee and Kyle (2012) directly referred to the memory recall of emotion and addressed the potential of recall inaccuracy (*recall bias*) by investigating these two stages of emotions during and after tourists experience festival events. Their findings support the notion that memories of emotions are inaccurate reflections of actual emotions. On the contrary, Smith, Li, Pan, Witte, and Doherty (2015) supported the point that *recall bias* arises when tourists are asked for their post-experience perceptions because recall is often shaped or distorted by events following the trip.

4.5. Others

Other key articles relate to cognitive bias but cannot be included in the three stages of tourist experience. These articles pose as either conceptual papers that state contents related to irrational tourist decision making or empirical papers in which the context and phenomenon do not occur within the three tourism stages.

Smallman and Moore (2009) stated that tourist decision-making processes are complex and involve considerable sub-decisions. Although their article proposes the process view of tourist decision making, aspects of prospect theory (Kahneman & Tversky, 1979), regret theory (Loomes & Sugden, 1982), heuristics, and bounded rationality (Simon, 1972) are mentioned to point out that the rationality of tourists may not always follow the classical economic concept. Moreover, tourists may become irrational given the contextual facts, perceptions, or evaluative judgments of relatively high-risk decisions.

Higham et al. (2019) discussed the aspect of carbon emission in air travel and the problem of cognitive biases that lead to unsuccessful effects. Various bias types cause irrational decisions when tourists fly and trade off the risk of accelerating global warming. Such bias types include *availability bias* (when asked to judge relative risks, people rely on their ability to remember instances of the harms in question, and carbon emission risk and global warming still seem far away), *confirmation bias* (when frequent air travelers rely on information that supports their decision to fly), *probabilistic reasoning and conjunction fallacy* (the undependable ability of travelers to estimate the real risk posed by global warming and hence may underestimate the cost of their own individual acts of air travel onto themselves), *price anchoring* (how airlines place the low-framed anchor on the carbon offset payment), and *scope insensitivity* (the amount that people are willing to pay is relatively insensitive to the actual nature and extent of harm to be ameliorated).

Time perspective bias plays an important role in travel motivation (Lu, Hung, Wang, Schuett, & Hu, 2016b). Whether people have a present-time or future-time perspective affects their motivation to travel. Different psychological distances (e.g., temporal, social, or spatial) can make individuals construe objects differently and hence affect their preferences on such objects' attributes Trope, Liberman, & Wakslak (2007). Kah, Lee, and Lee (2016) addressed the effect of construal level theory (CLT) on temporal and spatial distances. CLT explains that an increased temporal distance highlights the desirability-related aspects of intended actions, whereas a short temporal distance emphasizes the feasibility-related aspects of intended actions (Trope & Liberman, 2003). Therefore, bias on the perception toward the selected object's

attributes may arise. Moreover, a marketing implication explains that if a prospective customer plans a purchase in the distant future, then a marketer should emphasize factors that enhance consumption desirability. Conversely, if a prospective customer is planning an immediate purchase, then a marketer must emphasize factors that enhance purchase feasibility.

5. Conclusion, implications, and future research

This study conducts a systematic literature review on cognitive biases in tourist decision making from three leading journals, JTR, ATR and TM. Tourists are revealed to make irrational decisions during the three tourism stages. In addition, bias types that affect certain areas of managerial implications are disclosed. Most of the selected articles provide insights for tourism and hospitality audiences regarding potential tourist biases. Moreover, the selected articles provide implications and recommendations that relate to the following three aspects of the tourism industry.

1) Implications/recommendations on tourism management

- For the environmental concern on air travel, the “nudge” strategy can be applied with regulatory impositions during the pre-trip stage to enhance tourists' consciousness of their impact on carbon emission, which can lead to the change in tourists' behaviors toward carbon offsetting.
- To lessen the prejudice toward a destination, destination marketing organizations can reinforce the destination's positive attributes and implement ways to manage its negative attributes, thus reducing potential tourist social biases or stereotypes.
- To reduce recall bias that can affect tourists' intention to return, emotional experience must be designed in a way that leaves them a positive feeling before a trip ends because incidents occurring toward the end of the trip can greatly affect post-trip recall (Smith et al., 2015).

2) Implications on marketing, social media, and pricing

- To market tourism products (e.g., hotels, restaurants, airlines, attractions), service providers can improvise the framing of marketing messages, display tourism products in a way that helps lessen customer information (choice) overload, and/or manage the product sequence that appears on the tourism website.
- To manage social media and online comments, tourism service providers can focus on means to handle negative review contents and monitor review sequences to reduce the negativity bias of potential customers toward the business.
- To set the product price for pricing strategy, service providers may consider the anchoring effect and set an appropriate starting price as a referencing point in relation to customers' willingness to pay. How customers relate the set price with mental budgeting and review comments before making decision should likewise be considered.

3) Policy implications

Public and non-profit organizations can develop policies on the basis of prevalent biases to protect consumers and ensure producers' efficient resource utilization.

Similarly, the findings infer that companies can use behavioral data to build descriptive models that can increase the opportunity to generate additional revenue from the appropriate target market and enhance consumer satisfaction. At the same time, consumers should learn the possible biases in decision making that can lead to low satisfaction of travel experience.

The selected articles also indicate that the effect of cognitive biases vary from a trivial to a large degree as tourists' irrational decision making can affect individual to society levels. These irrational decisions include decision making based on the process of product choices (e.g., choosing accommodation, willingness to pay, and reading reviews

before making decisions) or the post “memory recall of emotion” of trips that affect future destination choices. Although these decisions can cause individuals' deviation from the optimum choice, such decisions can still pose mild consequences. However, certain irrational decisions occurring collectively can pose harm and have a negative effect on a society. The impact of this scale can be significant, such that it may require the policy level to provide a structural guideline or nudge behaviors. For example, an individual judgment on a destination that is influenced by social bias or a certain negative or positive stereotype can bring about collective social conflicts. Tourists' collective purchase decision on environmental policy-related issues may not help lessen the global environment problem caused by air travel. Therefore, investigating the possibility that cognitive biases can occur in the tourism context can help lay out wide and deep perspectives for audiences to enhance bias awareness on such notions.

Further recommendations for future studies are also addressed. The selected cognitive bias studies on tourism focus on an individual decision making, rather than a group decision, which can play a part in decision choice. For instance, family members influence each other's choices. Among the selected articles, only one article mentioned a group decision in on-site experience. Therefore, further research on group decision making and how such decisions influence cognitive biases is recommended.

In addition, this study discloses that most bias types occur during the pre-trip experience, especially when tourists decide on product choices. Many elements of cognitive biases can be explored in the tourism context. For instance, during the “post-trip stage,” an in-depth understanding about biases of emotional recall is necessary because recalling products and experiences affects future decisions. Tourism products are perceived as experiential products and are related to emotion and its memory recall. Articles that discuss recall bias are limited. A similar urge for additional cognitive bias studies also includes “on-site experience,” but addressing specific bias types under this stage is quite challenging. Considering the nature of the tourism industry, various tourist choices (e.g., event festivals, adventurous tours, sightseeing, and shopping), site activities (choosing one activity over the others), and topics related to cognitive bias types are under-examined and need further exploration and investigation.

Moreover, cognitive biases do not always have to be negative or flawed (i.e., leading to suboptimal or irrational choices) because cognitive biases may be important for human survival. From the evolutionary perspective, cognitive bias is an important design feature for natural adaptation (Haselton, Nettle, & Andrews, 2005). For example, cognitive load reduction through heuristics enables individuals/tourists to quickly decide and optimize valuable resources in time-limited situations (e.g., vacations). Thus, rather than seeing cognitive biases as flaw factors, further research can explore and unearth the positive viewpoints that indicate the benefits of such biases in the tourism industry (See Fig. 6).

This study also has limitations. The three selected journals exclude cognitive bias papers from other tourism journals. This limited selection hinders the opportunity to fully capture cognitive bias studies from a wide threshold. Future research may include a wide range of tourism journals that discuss the cognitive bias phenomenon in the tourism and hospitality contexts. Through a qualitative systematic analysis, this research may limit its power of generalizability on the data and content found through a quantitative meta-analysis. Moreover, aspects of cognitive biases in tourist decision making are under-examined. Nevertheless, this study still serves as a solid starting point that allows tourism academics and practitioners to focus their research directions toward crucial issues.

Declarations of interest

None.

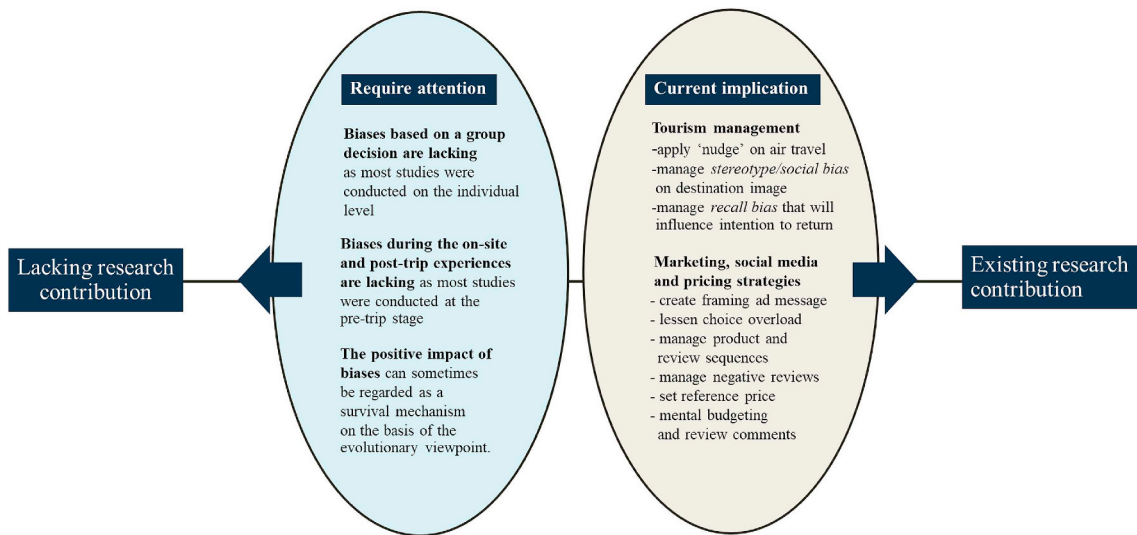


Fig. 6. Underresearched areas and existing research contributions.

Authors' contribution

Walanchalee Wattanacharoensil: Literature review, data screening, data categorisation and analysis, tables and figure creations, composing

the first draft of the article

Dolchai La-ornual: Article structural design, literature review on decision making, inter-coding reliability check on data categorisations, checking and revising the overall paper coherence.

Appendix 1. The selected articles on cognitive biases in the tourism context

No.	Author/Year	Article	Type of bias mentioned in the article	Relating Bias contents from the article	Central/ Supporting role (C/S)	Tourism Stage
Journal of Travel Research (JTR)						
1	Kneesel et al. (2010)	Gaming Destination Images: Implications for Branding	Halo effect	The authors suggested that “Well-known destination brands are associated with high awareness and familiarity, more positive overall images, and more affective descriptions, which might create a <i>halo effect</i> on evaluations of cognitive attributes, visitation intention, and word of mouth.	S	Destination choice selection
2	Nicolau (2012)	Asymmetric Tourist Response to Price: Loss Aversion Segmentation	Loss aversion	The author looks into the heterogeneity in <i>loss aversion</i> which is a prominent psychological human trait that causes asymmetric price reactions. The objective of the study is to detect how dispersed loss aversion is in tourism and to observe whether different degrees of loss aversion can lead to the different loss-aversion-based segments.	C	Destination choice selection
3	Lee and Kyle (2012)	Recollection Consistency of Festival Consumption Emotions	Recall bias	The authors investigated the variation in visitors' <i>recall</i> of their emotional experiences at festivals over time. The results demonstrate that respondents reported a higher intensity of positive emotions but reported a consistent intensity of neutral and negative emotions when asked to evaluate their emotions on-site during their festival visit.	C	Post-trip experience
4	Tanford et al. (2012)	Travel Packaging on the Internet: The Impact of Pricing Information and Perceived Value on Consumer Choice	Cognitive miser	In the study, the authors apply principles of <i>decision heuristics</i> and the <i>cognitive miser</i> principle to online travel package purchases.	C	Tourism product choice selection
5	Chen, Lin, and Patrick (2013)	Social Biases of Destination Perceptions	Stereotype	The study proposes that the process of <i>international stereotyping</i> might be triggered when two countries have conflicts, resulting in the formation of negatively biased country and destination images. The results show that individuals who have higher identification with their own country (guest country) might possess poorer evaluations of the host country and that biased perceptions are fairly solid in that they might not be dispelled after actual visitation.	C	Destination choice selection
6	Tanford and Montgomery (2015)	The Effects of Social Influence and Cognitive Dissonance on Travel Purchase Decisions	Cognitive dissonance	The study investigates the <i>cognitive dissonance</i> in hotel choice on guests with pro-environmental attitudes and hotel choices. Subjects with strong pro-environmental attitudes experienced dissonance when making a non-green choice on the hotel selection. Consistent with dissonance theory predictions, guests sought out more favorable information about the resort when they experienced dissonance.	C	Tourism product choice selection

7	Ert and Fleischer (2016)	Mere Position Effect in Booking Hotels Online	Primacy effect	The study investigated the position effect in online hotel booking and found that the hotels that were listed at the top (<i>primacy effect</i>) and bottom (<i>recency effect</i>) of the list were more likely to be chosen than those listed in the middle. The study found items on the first screen, the last item on the were more likely to be selected.	C	Tourism product choice selection
8	Book et al. (2016)	Understanding the Impact of Negative and Positive Traveler Reviews: Social Influence and Price Anchoring Effects	Price anchoring	The study investigates how social influence (both in the form of negative or positive traveler reviews) influences the price and willingness to pay. Results indicate that no amount of price reduction was sufficient to offset the impact of unanimously negative reviews, although an extreme price reduction influenced decisions when negative reviews were not unanimous. <i>Price anchoring</i> occurred for positive reviews, such that a higher reference price increased willingness to pay.	C	Tourism product choice selection
9	Higham et al. (2009)	Tourist Aviation Emissions: A Problem of Collective Action	Availability bias; Confirmation bias; Anchoring; Conjunction fallacy; Scope insensitivity	The study uses decision-making theory on <i>heuristic and cognitive biases</i> to explore why individuals have been generally unwilling or unable to act upon the threats of unconstrained and accelerating emissions associated with air travel and threaten everyone's well-being. A number of cognitive biases listed in the left column are used to explain why an individual uses the irrational decision making to response to the problem.	C	Other
10	Stepchenkova et al. (2019)	Marketing to Tourists from Unfriendly Countries: Should We Even Try?	Social bias	The study focuses on how tourists respond to marketing materials in a situation where the destination country and the source market country are engaged in constant political, economic, diplomatic, and/or military conflict. The notion of <i>social bias (in-group/out-group)</i> has been addressed to indicate the perception of people on the two conflicted nations.	S	Destination choice selection
11	Tanford and Kim (2018)	Risk versus Reward: When Will Travelers Go the Distance?	Heuristic/prospect theory Negativity bias	In this study, <i>prospect theory and judgmental heuristics</i> are employed as a theoretical foundation for the prediction of tourists purchase decision based on the online review and location. When both resorts had neutral reviews, location was the main determinant of lodging choice. The findings suggest that locational superiority can be offset by negative reviews, whereas locational inferiority can be overcome by maintaining good reviews online.	C	Tourism product review and rating
12	Gkritzali, Gritzalis, and Stavrou (2018)	Is Xenios Zeus Still Alive? Destination Image of Athens in the Years of Recession	Social bias	This study examines the evolution of the destination image of Athens from 2005 to 2015. The findings reveal that the destination image of Athens is partially shared by individuals residing inside and outside Greece, and that non-Greek residents have more favourable perceptions toward the destination. The findings suggest that the perceptions on the affective image of Athens are not overall consistent but only partially shared between Greek and non-Greek residents, being <i>socially biased</i> . Therefore, the findings confirm the subjective character of destination image.	S	Destination choice selection
13	Tanford et al. (2018)	The Influence of Pricing Strategies on Willingness to Pay for accommodations: Anchoring, Framing, and Metric Compatibility	Anchoring effect Framing effect Heuristics	The study uses experimental methods to test the effects of <i>price anchors, framing, and metric compatibility</i> (price per night versus the mental total budget) on willingness to pay for a Spring Break vacation. Travel providers advertise low prices to attract customers, which can decrease willingness to pay through <i>anchoring effects</i> . Customers often approach purchases with a budget goal, which can influence price interpretation due to <i>framing effects</i> . A high anchor increases willingness to pay compared to a low anchor. Anchoring effects are reduced when the budget goal is incompatible with a high anchor but not a low anchor. The findings can be attributed to dual processing systems and asymmetry effects.	C	Tourism product choice selection
14	Kim et al. (2018)	The Influence of Decision Task on the Magnitude of Decoy and Compromise Effects in a Travel Decision	Decoy effect	This research assesses the effects of choice alternatives on the travel destination decisions of travelers. The <i>decoy effect</i> , which is the phenomenon where consumers tend to change their preferences between the two choices when presented with the third choice and caused the bias in decision choices, was tested through a series of scenario-based experiments.	C	Tourism product choice selection
Annals of Tourism Research (ATR)						
15	Smallman and Moore (2010)	Process studies of tourists	–	Mentioned about heuristic in tourist decision making, the factor of bounded rationality and the need to incorporate prospect theory and regret theory into the understanding.	S	Other
16	Park and Nicolau (2015)	Asymmetric effects of online consumer reviews	Heuristics Negativity bias	Star ratings in online reviews are a critical heuristic element of the perceived evaluation of online consumer information. The results of this study show that people perceive extreme ratings (positive or negative) as more useful and enjoyable than moderate ratings. <i>Negativity bias</i> was mentioned to be the tendency for a unit of activation to bring about a greater change in output by the negative	C	Tourism product review and rating

17	Lu et al., 2016a, b	Antecedents and outcomes of consumers' confusion in the online tourism domain	Bounded rationality	motivational system compared with the positive motivational system. The paper proposes a research model examining the antecedents and outcomes of online tourism information confusion faced by consumers. <i>Bounded rationality</i> was mentioned as a cause that limits individuals' cognitive abilities for analysing and comprehending the incoming stimuli which affect the possibility of tourists' confusion when a tourist is searching and processing online information.	S	Tourism product choice selection
18	Kah et al. (2016)	Spatial-temporal distances in travel intention-behavior	Time perspective bias and construal level Theory (CLT)	The study investigates non-travelers' behavior, focusing on the influence of spatial and temporal distances on decisions not to travel and their effects on the gap between travel intention and actual behavior. The study also employed the concept of <i>Construal Level Theory (CLT)</i> which explains the different attributes being focused by the individual based on how they are construed both the spatial and temporal dimensions.	C	Other
19	Thai and Yuksel (2017)	Too many destinations to visit: Tourists' dilemma?	Priming effect	In this study, the <i>priming effect</i> is recommended to promote the sales techniques. Boosting participants' self-confidence by priming them to believe that they were experts will help reduce the information overload effect as literature supports the relation between self-confidence and expertise. As self-confidence attenuates choice overload effects, high self-confidence can be conveniently integrated into sales communications by travel advisors online or in face-to-face interactions with clients.	S	Tourism product choice selection
20	Chi, Ouyang, and Xu (2018)	Changing perceptions and reasoning process: Comparison of residents' pre- and post-event attitudes	Confirmation bias	The study incorporates the <i>positive confirmation bias theory</i> to explain residents' changing perceptions toward a mega-event. Under the confirmation bias, individuals tend to search evidence to confirm their initial judgments. This fundamental reasoning tendency for humans is expected to impose significant effects on residents' perceptions of event impacts, as well as their responses to the government and the event per se. The findings support confirmation bias and clearly demonstrate that residents' trust in government(s), attachment to the event, perceptions of the event's impacts and ultimate support to the event have changed in a predictable manner over time. Individuals' direct experience with the event alters the associations between their cognitive/affective evaluations and attitudes towards the event	C	Other
Tourism Management (TM)						
21	Larsen, Brun, & Ogaard, (2009)	What tourists worry about – Construction of a scale measuring tourist worries.	Impact bias	This paper explores the concept of tourist worry. The cognitive bias is found in the tourist samples who seem to underestimate the level of worrying. <i>Impact bias</i> is mentioned when the authors explained the tendency of tourists to overestimate the intensity of future emotions.	S	Destination choice selection
22	Castelltort and Mäder, 2010	Press media coverage effects on destinations – A Monetary Public Value (MPV) analysis.	Stereotyping, Heuristics	The present study examines the extent, source and nature of reporting about Spain as a tourist destination among Swiss German language newspapers by using the Monetary Publicity Value (MPV). In regards to cognitive biases, media coverage is mentioned by scholars to be a stereotype and consumers are imperfectly informed and consume more bad news stories than good ones. News media has impact to the destination image which is mentioned to be a heuristic factor.	S	Destination choice selection
23	Sparks and Browning (2011)	The impact of online reviews on hotel booking intentions and perception of trust.	Framing effect, Primacy effect	The study explores the role of factors that influence perceptions of trust and consumer choice. Consumers seem to be more influenced by early information, especially when the overall set of reviews is negative, indicating <i>primacy effect</i> , meaning information is presented before has some influence on shaping evaluation. Positively framed information (<i>framing effect</i>) together with numerical rating details influences both booking intentions and consumer trust.	C	Tourism product review and rating
24	Park and Jang (2013)	Confused by too many choices? Choice overload in tourism.	Cognitive dissonance	Choice overload phenomenon exists in tourism products. The study results showed that having more than 22 choices increased the likelihood of making 'no choice,' regardless of destination type. When fewer than 22 choices were provided, participants who made a choice perceived less regret than those who made 'no choice'. However, the opposite results were found when tourists were provided with too many choices. Perceived regret is the negatively and cognitively determined emotion that can arise after a tourist starts to consider the favourable qualities of other options which could cause cognitive dissonance and the feelings of regret eventually.	S	Tourism product choice selection
25	Park and Jang (2014)	Sunk costs and travel cancellation: Focusing on temporal cost.		The study aims to understand the effects of temporal sunk costs on potential travelers' cancellation intentions in	C	

			Sunk cost effect Cognitive dissonance	addition to monetary sunk costs. Theoretically, sunk cost is associated with <i>cognitive dissonance theory</i> as once a subject is induced to expend effort on a challenging task, they will evaluate the value upward and will increase willingness to expend further resources on the task compared to the resources that would be allocated by a subject not having made a prior effort investment. The results of this study suggested the possibility that temporal costs can be converted into monetary costs, but the conversion relationship may not be linear and that travelers' intentions to cancel a travel product decreased as the temporal and monetary sunk costs increased. Repeat visitors' intentions to cancel their reservations are more influenced by temporal sunk costs than first-time visitors.		Tourism product choice selection
26	Smith et al. (2015)	Tracking destination image across the trip experience with smartphone technology.	Recall bias	This study is to examine changes to tourists' image of a destination throughout a trip experience by examining a group of Canadian student travelers to Peru. Through the use of Blackberry technology, students were asked to record images and experience in the five stages namely pre-trip, upon arrival, halfway, departure, and post-trip. The results show that destination image evolves throughout their trip and can be affected by certain incidents. <i>Bias of recall</i> was mentioned to explain that incidents which happened close to the end of the trip seemed to have a greater effect on the post-trip recall scores than those that occurred during earlier parts.	S	Post-trip experience
27	Lu et al., 2016a, b	Do perceptions of time affect outbound-travel motivations and intention? An investigation among Chinese seniors.	Temporal thinking bias/ time perspective bias	The study investigates Chinese seniors' outbound-travel motivation and intention with particular reference to time perspective since how people conceptualise time, indicating <i>time-perspective bias</i> , can play a critical role in their travel intention. The findings showed that present-time perspective and future-time perspective were directly related to travel motivation, and that the associations between present and future perspectives and travel intention were fully mediated by travel motivation.	C	Other
28	Kapuściński and Richards, 2016	News framing effects on destination risk perception.	Framing effect	The study takes the <i>framing effects theory</i> and existing knowledge of perceived risk in tourism in order to seek to understand whether different media frames concerning hazards influence tourists' judgment of risk as news coverage of hazards is often commented to be of critical importance to individuals' perceived risk associated with tourist destinations. The findings showed that the use of risk amplifying frame and risk attenuating frame result in higher and lower ratings of risk respectively. Moreover, tourist psychographic characteristics were found to moderate the influence of news frames on perceived risk.	C	Destination choice selection
29	Berdychevsky, Gibson, and Bell (2016)	"Girlfriend getaway" as a contested term: Discourse analysis.	Stereotype	The study explores the meanings associated with the "girlfriend getaway" term, using discourse analysis to understand the ways women build significance, activities, identities, relationships, politics, connections, and sign systems and knowledge with respect to it. The analysis revealed that "girlfriend getaway" is a term with contested and polysemous meanings. While some women found it to be adequate, accurate, cute, and reflective of their all-female tourist experiences, others described it as <i>stereotypical</i> , narrow/claustrophobic, "pink," inadequate, and unreflective of their experiences. At times, the same symbolic meanings attracted some women but alienated others. This gives implication to tourism marketers to identify and engage with different strands within their female clientele to ensure that their strategies appropriately respond to various preferences and lifestyles.	S	Other
30	Zhang, Zhang, and Yang (2016)	The power of expert identity: How website-recognized expert reviews influence travelers' online rating behavior.	Negativity bias	The study explores the effects of some prominent reviews on subsequent consumer behavior. Customers tend to see negative reviews and information to be more values for them. Voicing less favourable attitudes tends to attract attention (Kanouse & Hanson, 1987), therefore, ordinary users on the website may be prone to <i>negative bias</i> from the negative reviews they have read, particularly if those negative reviews come from experts.	C	Tourism product review and rating
31	Nguyen (2016)	Linking loss aversion and present bias with overspending behavior of tourists: Insights from a lab-in-the-field experiment.	Loss aversion Present bias	The study explores how behavioural factors influence the probability of overspending among outbound leisure travellers, by applying the concept of loss aversion and present bias. The study explores the link between the measured preferences to overspending behaviour. The findings reveal a link between loss aversion, present bias and traveling expenditure patterns: outbound tourists with high loss aversion and high present bias are more likely to overspend. The study also highlights the role of group identity in de-biasing. Specifically, individuals are more	C	On-site experience

32	Tseng (2017)	Why do online tourists need sellers' ratings? Exploration of the factors affecting regretful tourist e-satisfaction.	Cognitive dissonance	likely to behave according to standard economic models when making decisions in groups. The study responds to the research questions: are higher tendency-to-regret (TTR) tourists more likely to experience post-purchase <i>cognitive dissonance</i> than lower TTR tourists after online purchases? And how does post-purchase cognitive dissonance (PCD) influence the relationship between tourists' tendency-to-regret and e-satisfaction? The results indicate that the influence of regretful personality on e-satisfaction was fully mediated via post-purchase cognitive dissonance. The effect of valid sellers' ratings on raising regretful tourist e-satisfaction was also confirmed.	C	Tourism product choice selection
33	Ouyang, GURSOY, and SHARMA (2017)	Role of trust, emotions and event attachment on residents' attitudes toward tourism	Positive bias	This study examines the effects of residents' trust in government and their emotions toward an event on their perceptions of potential impacts and their support. Findings indicate that residents' support is a function of both cognitive and affective assessment of perceived impacts. Trust in government influences directly residents' support and indirectly through perceived impacts and experienced emotions toward an event. Moreover, findings further suggest that those residents with high level of event attachment pose more <i>positive bias</i> towards perceptions of impacts.	S	Other
34	Letheren et al. (2017)	Effects of personification and anthropomorphic tendency on destination attitude and travel intentions	Subconscious bias	The study examines how individual differences in anthropomorphic tendency (the tendency to humanize non-human agents/objects) influence how people respond to destination marketing communications. The study specifically examined whether individual-level anthropomorphic tendency and text-personification of destination marketing communications interact to influence destination attitude and travel intentions. The process of anthropomorphism is mentioned to be mindless or <i>subconscious bias</i> , indicating that while individuals are likely to respond better to human cues, they are unlikely to be aware of what has occurred, or why they feel more favorable towards the message they have just seen. Results from a study revealed that destination attitude and travel intentions were most favorable for people with high levels of anthropomorphic tendency and who were exposed to personified tourism messages.	S	Destination choice selection
35	Xiang, Du, Ma, and Fan (2017)	A comparative analysis of major online review platforms: Implications for social media analytics in hospitality and tourism	Positivity bias Heuristic	The study applies the text analytics with the review data from the three data sources of three major online review platforms, namely TripAdvisor, Expedia, and Yelp to examine information quality (in terms of their linguistic characteristics, semantic features, sentiment, rating, usefulness as well as the relationships between these features) related to online reviews about the entire hotel population in Manhattan, New York City. The findings show that there are huge discrepancies in the representation of the hotel industry on these platforms. Different types of cognitive biases relating to the review data on the social media were mentioned namely <i>availability bias, positivity bias and heuristic</i> .	S	Tourism product review and rating
36	Zhang et al. (2018)	Message framing and regulatory focus effects on destination image formation	Framing effect	This study examines the impacts of attribute framing effects of destination advertising messages on travellers destination image perceptions and visit intentions, by utilising attribute framing and regulatory focus fit theories. This study also examines the mediating role of cognitive fluency and emotional state on attribute framing effects on destination image formation and visit intentions. Findings indicate that framing of marketing messages exerts significant influences on consumers' decision making and destination selection process. Consumers under gain-framed message condition tend to have higher destination image perceptions compared to those under loss-framed message conditions. A match between attribute framing and regulatory focus results in formation of better destination image perceptions compared to mismatch.	C	Destination choice selection
37	Tan, Lv, Lui, & Gusoy (2018)	Evaluation nudge: Effect of evaluation mode of online customer reviews on consumers' preferences	Cognitive bias Heuristic	The study utilises two experimental designs to examines the relationship between evaluation mode of online reviews and evaluators' preferences and decision-making for tourism products by applying an "evaluation nudge". The consumers' preferences for tourism products are dependent on whether the online information about alternative products is presented jointly (joint evaluation mode) or separately (separate evaluation mode). <i>Cognitive bias</i> was founded in the case of making decision in isolation as some negative attributes were being ignored. Hence, the	C	Tourism product choice selection (stronger emphasis) & Tourism product review and rating

information processing mode is found to mediate the impact of evaluation mode on preference for restaurant alternatives. For the hotel choices, the study reveals the different impacts of evaluation mode on preference for hotel alternatives resulting from negative valence of customers' reviews.

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