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Understanding destination brand love using machine learning and content analysis method

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1 **Understanding Destination Brand Love using Machine Learning and Content**
2 **Analysis method**

3

4 **Abstract**

5 This study aims to apply the concept of brand love in tourist destinations in order to identify
6 the core-elements that could have influential impacts on generating destination brand love. This
7 has been carried out by using a mixed-method of machine learning and content analysis. We
8 have discovered that the topics have been generated for historical landmarks and destinations
9 by analyzing the visitors' on-line reviews are architecture, historical sites, tradition and shrine
10 places, which could be similar to other tourist historical destinations in different part of the
11 world. However, this study has the potential to be a model for other researches related to
12 different destinations with possible different topics emerged. Our study contributes by
13 providing both researchers and managers a novel method to understand what attributes of
14 destination brand love they need to posit more emphasize to attract more visitors based on the
15 destination type.

16 **Keywords:** Destination Brand Love; Online Reviews; Latent Dirichlet Allocation (LDA);
17 Support Vector Machine (SVM); Content Analysis

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19 Brand love is a concept in academic studies which has been described as an emotional
20 attachment generated from customer satisfaction with a particular brand (Huang, 2019). Brand
21 love in recent years has gained popularity and attention among both researchers and
22 practitioners not only because of its positive outcomes on brands, but also due to its impact on
23 brands' performance (Bairrada, 2018). It has been argued that brand love could be positively
24 correlated with electronic word of mouth (e-WOM) (Karjaluoto et al., 2016) and resistance to
25 negative information (Albert et al., 2008; Batra et al., 2012). Furthermore, based on prior
26 studies, it has been proven that brand love is a better and more reliable predictor of loyalty
27 compared to other marketing concepts such as satisfaction, yet it has not been widely
28 investigated in the context of tourism (Aro et al., 2018).

29 In recent years there have been several studies that have investigated the people-place
30 relationship based on place bonding and attachment, whereas there have been few studies that
31 have investigated the concept of brand love or how it is formed (Cheng & Kuo, 2015).

32 Moreover, according to (Aro et al., 2018), there has been a limited number of studies that have

33 focused on the implications, applications, antecedents and consequences of brand love in the

34 context of destination branding. These studies are mainly focused on either the development of

35 the constructs or the investigation of relationships between some concepts such as self–brand

36 integration, passion-driven behaviors and brand love by using traditional data gathering

37 methods including questionnaire surveys.

38 On the other hand, the emergence of online platforms like TripAdvisor enables tourists to post

39 their experiences in online comments. These online reviews contain valuable information such

40 as concerns, sentiments, and opinions of visitors on products or services that they have received

41 Using online reviews as a source for research data (Guo et al., 2017; Pournarakis et al., 2017)

42 could potentially have major advantages for firms and organizations. Thus, to understand the

43 love of visitors toward a destination brand, and to fill the gap in the existing knowledge of

44 destination brand love, the authors analyzed the data collected through comments posted online

45 to gain insights about how brand love is generated towards the destination brands by using a

46 mixed-method of machine learning and content analysis.

47 This study responds to the call for additional research on destination brand love in the tourism

48 area (Aro et al., 2018) by analyzing the online reviews of Iran's historical landmarks. This have

49 resulted in generating four different topics; architecture, historical sites, tradition and shrine

50 places, which help to identify the most important and commented core-elements that could

51 directly influence shaping the destination branding. Furthermore, in terms of methodological

52 contribution of this study given the shortcoming and limitation of traditional methods for

53 evaluating visitors' opinion, this study offers a more suitable method that combines the two

54 methods of machine learning and content analysis that will certainly reduce the expense of

55 destination marketing research. The sections of this paper are as follows: Section 2 briefly

56 reviews the relevant literature of brand love and destination brand love; Section 3 presents a

57 methodology utilized in the study; Section 4 employs a case study of the proposed method to

58 clarify its use and finally, in section 5, we discuss the results and present a conclusion.

59 **Literature background**

60 *2.1 The concept of brand love*

61 Brand love as a construct has been explored in different disciplines, including marketing, by

62 both scholars and practitioners (Ahuvia, 1992; Carroll & Ahuvia, 2006; Fournier, 1998). Brand

2

63   love is one of the most well-known marketing constructs and has been defined as the degree of
64   emotional and passionate affection that a satisfied consumer has with a particular brand (Carroll
65   & Ahuvia, 2006) . Love as a deep and long lasting emotion is the main element of the
66   consumer-brand relationship (Maia et al., 2019), hence, numerous studies on brand love have
67   used interpersonal love theory to explain the concept (Sternberg, 1986) or to conceptualize the
68   love of consumers toward brands (Batra et al., 2012) . For example, a study by (Carroll &
69   Ahuvia, 2006) explains that brand love constructs are comparable to sensual love in the
70   interpersonal love theory and, moreover, (Reimann et al., 2012) presents more proof on the
71   similarities between brand love constructs and interpersonal love theory. In fact, the three
72   common constructs of love in the interpersonal theory are (a) intimacy (b) passion and (c)
73   decision/commitment. Intimacy describes connection, closeness, and passion - the initiators of
74   romance, physical attraction, sexual attractiveness, and commitment which are the basis for
75   any decision to be with a person in the short-term or a commitment to extend the relationship
76   for the long-term. The strengths of these components describe the amount of love a person
77   feels.

78   However several researchers have criticized interpersonal love theory (Batra et al., 2012),
79   arguing that interpersonal love theory is not applicable in the context of brand love, and the
80   connection between two concepts should be made only after its conceptualization based on the
81   more profound insight into the consumer's experience. Their argument is based on good reasons
82   including first, as the most crucial distinction, respondents who participated in their research
83   believed that love toward a brand is less important than interpersonal love; second,
84   interpersonal love is involved with altruistic feelings toward the loved one as a person, however
85   the same feeling does not exist in the case of branding; third, in a healthy relationship among
86   individuals, a mutual feeling exchange including love occurs, but when it comes to brand love,
87   it is not a reciprocated feeling and, finally, self-brand integration, which is about the integration
88   of the brand into customers' identity, is not mentioned in intrapersonal love theory (Aro et al.,
89   2018). Considering this argument, as (Batra et al., 2012) explains, interpersonal love theory
90   cannot truly act as a suitable approach to underpin the concept of brand love.

91   As a result, this study has adopted a proposed model by (Batra et al., 2012) in which the nature
92   and consequences of brand love have been investigated by applying grounded theory.
93   However, due to the tourism context in this study, a modified model consist of first-order and
94   higher-order structural models have been used. Seven core elements have been considered in
95   higher order model; self–brand integration, passion-driven behaviors, positive emotional

96   connection, long-term relationship, positive overall attitude valence, attitude certainty and
97   confidence (strength), and anticipated separation distress. Furthermore, high quality/perceived
98   quality of the place has been considered as the antecedent for the destination brand love in this
99   research, and loyalty, WOM and resistance to negative information have been considered as
100 the consequences of the brand love.

101 Following the view of (Batra et al., 2012), in this study brand love can be also defined as a
102 deep, long-lasting relationship between consumers and brands (Fournier, 1998) that (Rubin,
103 1973) referred to it as the attitude of consumers, including their feelings, behavior, and thinking
104 about a particular brand. Also, in the work of (Huang, 2019) brand love is considered as the
105 emotional attachment of a satisfied customer toward a brand. Such attachments improve long-
106 term connections between consumers and brands and influence the consumers' loyalty
107 positively. Therefore, customers with higher feelings of satisfaction and love for a brand are
108 probably more committed to follow a repeat-purchase pattern than others (Aro et al., 2018).
109 Hence, it is understandable that brands strive to build a powerful connection with consumers
110 because it has been proved that such a connection increases their financial performance (Malär
111 et al., 2011). On the other hand, brands that generate more love in customers are probably more
112 able to achieve competetive advantages which consequently enhance the organizational
113 performance as compared to other brands that emphasize other marketing concepts more, such
114 as satisfaction (Drennan et al., 2015).

115 Brand love can also be a useful marketing variable in the tourism context, indeed, the exposure
116 of tourism industry to international competition requires the creation of brand love for tourism
117 destinations that intend to distinguish themselves from other competetiors, probably with a
118 lower marketing cost. In addition, the main advantage of brand love for tourism destinations
119 can be a memoribale experience for the customers so that recollecting them creates pleasing
120 emotions that influence their future travel decisions (Manthiou et al., 2018). Moreover, it worth
121 mentioneing that brand love and the positive emotions generated from a memoriable
122 experience in the visitors could gardualy decline, thus, destinations need to adopt marketing
123 strategies that could create a sense of nostalgia about the destination and provoke the past
124 pleasurable feelings in the visitors, which could encourage them to pay a revisit to the
125 destination (Suzanne et al., 2020).

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2.2. *Conceptualizing destination brand love*

2.2.1 *Antecedent of destination brand love*

Although brand love as a concept has gained popularity among scholars in recent years, destination brand love, which has been derived from brand love, has received limited attention. In a recent study about international students from the Erasmus program of the European Union, Amaro et al. (2020) have adopted destination image as the antecedent of the destination brand love, based on the fact that satisfaction among customers could generally result in brand love. In other words, satisfied customers are more likely to experience brand love, which is aligned with the previous studies (Aro et al., 2018). Although previous researches indicate that satisfaction could be only counted as a requirement and necessity for brand love (Carroll & Ahuvia, 2006), which means not all the satisfied customers could experience brand love, Aro et al. (2018) argue that satisfaction is an antecedent of destination brand love. Furthermore, they introduced more novel antecedents for destination brand love which could be categorised into three themes; *brand experience* (long term relationship, frequent interaction, first visit, positive service interaction, satisfaction, hedonism, attachment to destination, people, feelings), *tourist dependent* (Anthropomorphism, identification to brand, identification to typical tourists), *brand dependent* (Place dependence, uniqueness, self-expressiveness of the brand, activity opportunities).

 In another study about brand love in destination brand communication, Strandberg et al. (2019) argued that destinations' residents play a substantial role in forming destination brand love due to the reason that their characteristics and values affect the customers' perspective about the destination brand. Indeed, they have adopted self-congruity and self-expressiveness as the antecedents of destination brand love. Based on the results, self-congruity is indirectly related to destination brand love however self-expressiveness has been proved to have a significant positive relationship with destination brand love, which is aligned with past studies in this area (Aro et al., 2018). Moreover, Swanson (2015, 2017) have identified basics of a quality tourist destination as the antecedent of destination brand love, which is consist of things to do, weather, people, logistics. However, in our study we have adopted the high quality as the antecedent of destination brand love based on the Batra's brand love model, which represents the tourists' perception about high performance, design and trustworthiness of the brand (Batra et al., 2012).

159 *2.2.2 Destination brand love*

160 The tourist destination market has become increasingly competitive because most of the
161 destinations offer the same type of tourism services to visitors (Castañeda-García et al., 2019).
162 In such a dynamic market, creating a positive perception for brands plays a notable role in
163 acquiring new customers. Hence, due to the need for building a positive mental association
164 with brands, branding concepts have been increasingly used in tourism studies. The usage and
165 modification of the branding concepts to fit the tourist industry are categorized as destination
166 branding (Ashworth & Kavaratzis, 2007; Govers & Go, 2009). In fact, destination branding is
167 the result of the interaction between the perceived image of places and their inner identity
168 (Hanna & Rowley, 2011b).

169 The first and most common aim of destination branding is to initiate positive connections and
170 to clarify the differences of a place with other places (Hanna & Rowley, 2011). Hence, a
171 significant number of organizations that are in charge of location management endeavour to
172 implement the concept of place branding in practice (Blain et al., 2005). In people-place
173 relationships, two forms of emotional relationships are mostly investigated in the literature
174 (Aro et al., 2018). The first one is place bonding that defines the associated positive emotional
175 connection of a person with a specific place (Cheng & Kuo, 2015). In Steele's (1981) view,
176 place bonding is a process that a person goes through to bring together multiple experiences
177 with a place. The second and the most salient one is place attachment (Aro et al., 2018), which
178 can be defined as a connection that develops psychologically and emotionally between a person
179 and a place (Prayag & Ryan, 2012; Tsai, 2012). It is also worth mentioning that tourist places
180 may initiate different positive senses in an individual (e.g., security, trust, confidence,
181 attractiveness), and given the importance of emotions in marketing constructs, place attachment
182 is considered as a marketing strength for tourist places (Tsai, 2012). In fact, it is generated
183 through the involvement of a person with a tourist place (Prayag & Ryan, 2012), and their
184 emotions such as attractiveness and trust (Hou et al., 2005).

185 Although place attachment and destination brand love have overlaps, and prior studies have
186 used them interchangeably in the literature (Hammitt et al., 2009), these two concepts seem to
187 have some differences as well. First, and the most crucial difference, is that the destination
188 brand love is a more comprehensive concept than place attachment in terms of describing the
189 relationship between visitors' and places (Prayag & Ryan, 2012; Tsai, 2012). Second, place
190 attachment is mostly investigated based on the places and not the place brands. Due to the fact

191   that destination branding is a much more attractive and sophisticated concept as compared to
192   destination attachment, it could be more useful and practical to investigate the relationship
193   between the visitors and places through destination brand love rather than simply assuming
194   place attachment is an appropriate and unique approach in defining the people-place
195   relationships.

196   Moreover, investigating people-place relationships, (Ahuvia, 1992) shows that people can feel
197   love, being defined as a deep-seated emotion (Maia et al., 2019), towards places. This love can
198   exist in places that have not even been seen by the visitors (Swanson et al., 2017); nevertheless,
199   every individual's experiences do not generate love (Ahuvia, 2005). Three different sorts of
200   love exist between people and places. (1) philia, (2) storage, (3) eros. Philia describes the type
201   of love that has similarities with friendship, while storage as a kind of love that is associated
202   with affection and eros is a passionate and romantic love (Aro et al., 2018). Swanson et al.
203   (2017) suggest that different destinations attract different types of love, and therefore,
204   destination marketing should understand the kind of love that current loyal visitors feel to make
205   the place adorable for them and other visitors, and also to maintain a long-term relationship
206   with visitors. In conclusion, based on the arguments provided, it could be deduced that the two
207   concepts of brand love and destination concept could bring together to create a new concept of
208   destination brand love, which is more sophisticated, attractive, comprehensive and possibly
209   useful in the tourism context.

210   **3. Methodology**

211   *3.1. Data collection*

212   The data for this study was collected from TripAdvisor, an online platform
213   (https://www.tripadvisor.com) which is one of the most used platforms by visitors to share their
214   opinions and experiences. All the reviews written by customers could be categorized as
215   positive, negative or neutral. Positive reviews are defined as those reviews that contain words
216   that could be used to investigate the aspects of the places which lead to a positive experience
217   and which result in customer satisfaction whereas negative reviews are those that could be used
218   to investigate the aspects that lead to a negative experience and result in dissatisfaction. Neutral
219   reviews are those that only contain information about the place such as location, services or
220   even weather. The data collection was carried out using the available reviews from October
221   2008 until July 2019. The total number of reviews were used in this study were around 14604
222   from 95 places including landmarks and sites section of the website. The reason behind

223 choosing landmarks and sites is rooted in the fact that Iran as a historical country possess
224 different historical destinations, which are the main visiting attractions for both domestic and
225 foreign tourists. For example Persepolis as a historical place, which was the ceremonial capital
226 for the Achaemenid Empire (ca. 550–330 BC) is among the most famous and visited site
227 among both domestic and foreign tourists. This place has been declared as a world heritage site
228 by the UNESCO in 1979.

229 In order to standardize the data, places with less than 30 reviews were excluded from the
230 dataset. A large portion of the reviews were from ancient sites like Persepolis or Bistoon which
231 are considered as the country's main attractions for both foreign and domestic visitors.
232 Furthermore, there is a large number of reviews that can be found online for other tourist
233 attractions like religious sites including mosques, cathedrals, or traditional shopping locations
234 like bazaars.

235 *3.2. Research approach*

236 New methods of research, such as text mining, in comparison to traditional ones, like surveys
237 or interviews, enable researchers to study an enormous amount of textual data more easily.
238 Considering the amount of data, we chose text mining to overcome possible information
239 overload (Xu & Li, 2016) in order to identify the relevant topics among visitors.

240 In this study, the proposed method consisted of two steps which were the extraction of topics
241 and content analysis. As the first stage of the first step, we used LDA , a popular technique of
242 the machine learning methods in order to identify the discussed topics in reviews (Guo et al.,
243 2017; Tirunillai & Tellis, 2014) which is widely used in order to identify relevant topics in
244 large-scale texts by different scholars (Blei et al., 2001) LDA is an algorithm in which each
245 review is considered as a combination of different topics in which words represent a specific
246 "meaning" (Blei et al., 2003; Poria et al., 2016). The number of chosen topics must be selected
247 manually in the LDA algorithm. To obtain the best results, various models with different
248 numbers of topics were created, and the optimum number of the topics was identified by
249 choosing the model exhibiting the lowest score on perplexity.

250 LDA assumes that the document is comprised of number of different topics, which each word
251 in the document is in relation with one of the topics. In this method the output extracted from
252 the LDA algorithm include number of keywords that according to LDA algorithm are related
253 with each other. In order to obtain the best results, there is a need for different models to be
254 generated with different number of topics. The outputs of the model which are the relevant

keywords must be investigated manually in order to remove the irrelevant keywords that have been wrongly selected by the model (Bi et al., 2019). The most efficient tested model has to be selected by perplexity number which is an indicator for the efficiency of the model. This means that the model with the less perplexity number represents the most efficient one. In the next step, a name is given to each topic based on the remaining keywords For example, mosque, square, palace and architecture have been generated under a topic, which all these share a common characteristic which based on the structure of the building, hence the topic was named as architecture.

Perplexity is the indicator which is used to evaluate the appropriateness of a model to describe a set of texts. A lower perplexity score shows that the model describes the text better. Having said that, there are some noisy words in generated topics by LDA, which are not representative of the created topic, also some of them may overlap with each other. Therefore, to enhance the results from those created topics they were examined again, and those noisy words were removed. The remaining keywords

Topic keywords were used as filters to specify the sentences containing information about each discussed topic or aspect of the places and sentences that included each keyword were categorized as the container of customer sentiments about each topic.

In the second stage of the extraction step, reviews of each topic are categorized based on their sentiments. Multiple methods have been used in the context of tourism to classify online reviews based on the visitors' sentiments. The most preferred methods among scholars in tourism studies are Naïve Bayes and Support Vector Machines (SVM). These methods work best when categorizing the input text into two classes, positive and negative, in the case of sentiment analysis. SVM is an algorithm that requires training by the labeled data to find the optimal hyperplane for dividing a set of data into different groups while Naïve Bayes considers each feature independently and uses Bayes's theorem to categorize the data (Alaei et al., 2019) Since more than two classes have been considered for sentiment analysis, in this study, we have used OVO-SVM as the most accurate algorithm for multi-class sentiment classification (Bi et al., 2019).

Generally speaking, reviews can be classified into the three classes of positive, neutral or negative which are needed to train the machine in each set of labeled data. These sets of training data were created by reading a proportion of reviews and labeling them manually before training the machine. In the next stage, both the training set and unlabeled data had to be

287 converted into features. Therefore, a Bag-of-word (BOW) model was adapted to construct the
288 features. Following the feature generation step, along with the study of (Alaei et al., 2019), to
289 optimize the outcome of the machine, the most appropriate features were selected using
290 the information gain (IG) algorithm. These features were used to train the (OVO-SVM)
291 classifier.

292 In the final step, to investigate the brand love constructs in the reviews, we used content
293 analysis. It is defined as systematic and detailed analysis of different types of data to identify
294 latent meanings, themes, and assumptions (Berg & Latin, 2011, ; Leedy & Ormrod, 2005)

295 . Since love is a positive emotion, in the content analysis of this study only positive reviews of
296 each topic were used. Brand love in online reviews can be investigated through the analysis of
297 the keywords frequency and phrases that are used by the visitors of the place. For example, if
298 a visitor uses a phrase like "this place makes me relaxed", it can be concluded that the "positive
299 emotion connection", which is one of the constructs in the proposed model by (Batra et al.,
300 2012), is available in the review. The process of the used methodology for the study is shown
301 in figure (1).

302 **"Insert Figure 1 here"**

303 **4. Findings**

304 In this section, a case study of the proposed method is given to demonstrate the usage of the
305 method. In this section, first the specifications of the data set are given and then the procedure
306 is explained.

307 *4.1. Extracting discussed topics among visitors*

308 Along with the procedure explained in section 3, discussed topics among visitors are extracted
309 in this step. Four topics are discovered to be discussed among visitors. Discussed topics are
310 architecture, tradition, historical sites, and shrine places, which are mainly considered as the
311 tourists' attractions in countries, such as Iran. This could be due to the fact that majority of
312 tourist with the taste of adventure or archeological background would consider visit historical
313 countries to experience a different culture and tradition.

314

315

. After the manual analysis of the generated keywords for each topic, noisy words are removed, and the remaining keywords are used to filter the sentences of the reviews by the topics. The summary of the procedure is shown in Table 1. In Table 1, "Topic keywords" are the words extracted from the topic modeling process. "The number of words" is the number of the remaining words used to obtain reviews of each topic, and "the number of reviews" is the number of reviews in which each topic is discussed.

"Insert Table 1 here"

4.2. Extracting sentiments associated with each attribute

OVO-SVM is used to extract sentiments from reviews associated with each topic. Reviews are classified into three classes: Class 1: Positive, Class 0: Neutral, Class -1: Negative. The neutral category consists of reviews that only have information about the place. For example:

"Located a little less than an hour..., this world-famous archaeological site was.... Like most large structures built by the Persian Empire, it was built...."

It only contains information about the location and history of the place and does not seem to contain any positive or negative sentiments. While:

"Our driver gave us a bit of historical background. The place was really interesting.' 'We have visited the Towers of Silence ... it was the best what we have seen this day...!"

represents a positive sentiment of a visitor and:

"please don't waste your time by going there .we saw different billboards for Saryazd and fortress and buggy road and safaris but when we drove 30 min and saw there found all of them were bubble and no more we came back to see Amir Chaghmagh sq.
"

represents a negative sentiment about the destination. In order to train the classifier, 750 reviews were manually labelled. A summary of the results of the sentiment analysis is shown in Table 2.

"Insert Table 2 here"

11

348 *4.3. Content analysis*

349 The constructs of brand love proposed by (Batra et al., 2012) were used as a reference to start

350 the manual coding. To begin this stage, first, frequent phrases in positive reviews of each topic

351 were extracted and organized in a spreadsheet. In the next step these extracted phrases where

352 categorized under the constructs of the adopted model. For example, the word fantastic which

353 is used by a person when a positive emotion towards a place emerges was categorized under

354 positive emotional connection construct. In the method proposed by (Batra et al., 2012), 14

355 underlying elements of brand love were extracted by factor analysis. These first-order

356 constructs were categorized in a higher-order hierarchical structure. The definition for each

357 construct is explained in Table 3.

358 **"Insert Table 3 here"**

359 Since the proposed model by (Batra et al., 2012) was developed for consumer goods, to apply

360 the model for the tourism industry, some of the construct's definitions were modified by the

361 research team. For example, the antecedent of brand love is defined as the functional quality

362 of the brand, which does not seem to be applicable in the tourism industry since the place has

363 no function for the visitor. Instead of this concept, the perceived quality of the place is defined

364 by this construct. The quality of the place can be investigated by counting keywords like

365 *amazing*, *fantastic*, etc. Phrases associated with brand love for each topic are shown in figure

366 2.

367 **"Insert Figure 2 here"**

368 For example, in the review below:

369

370 *"**Love** the place. The house is **amazing**….This house has **beautiful** gardens which were*

371 *especially **good** ... Everything has been restored to **perfection**. **Definitely worth a visit**"*

372

373 Phrases that can be categorized as constructs of brand love are shown in Table 4.

374 **"Insert Table 4 here"**

375

376 Table 5 shows the accumulated frequency of keywords and phrases of each topic. Since the

377 number of associated reviews with each topic differentiates it from other topics, the

378 accumulated frequencies are normalized by the number of available phrases in all topic

379 reviews. The normalized accumulated frequencies are shown in Table 6.

380 **"Insert Table 5 here"**
381 **"Insert Table 6 here"**

382

383 Since the primary purpose of this study is to investigate the destination brand love and different
384 aspects of the place brands, each topic is explained separately.

5. Discussion

385

386 In this study, four different topics have been generated by analyzing the online reviews posted
387 on TripAdvisor about the most visited landmarks and sites in Iran. Analysis of the reviews in
388 this study is based on the brand love constructs which were borrowed from (Batra et al., 2012),
389 which are: High Quality; Self-Brand Integration; Passion-Driven Behaviors and Positive
390 Emotional Connection; Long-Term Relationship; Anticipated Separation Distress; Attitude
391 Valence, and Attitude Strength. In addition, the consequences of the antecedents mentioned
392 above are loyalty, WOM and resistance that have also been shown in Table 6.

393 The first topic extracted from the reviews, with around 5292 comments was about the design
394 and the structure of the places which so the topic was designated as "architecture". On the
395 measuring of brand love, the antecedent used for this topic, with around 1500 comments, was
396 Perceived Quality of the places, which plays the main role in generating a positive feeling for
397 visitors. In addition, according to (Hanna & Rowley, 2011a) the primary aim of destination
398 branding is to create a positive connection and a good image for visitors which could be
399 achieved through Perceived Quality. As a result, according to (Suzanne et al., 2020) an
400 appropriate destination image could influence the visitors' decision about their travel,
401 purchasing and investing. On the other hand, Attitude Strength, which has been defined as
402 thinking and talking about the brand frequently, is the most commented core-element of
403 destination brand love. This could potentially mean customers have created an emotional
404 attachment with the place which could lead to their revisit due to positive past memorable
405 experience that may cause the tourists to follow a repetitive decision pattern for their future
406 travels (Manthiou et al., 2018). In other words, creating an online brand community, where
407 tourists could share their information and opinion about the destination could be a solution for
408 maintaining and reinforcing the relationship with the former visitors. This not only could
409 encourage the former visitors to pay a revisit but it could also attract more tourists to the
410 destination (Arnaldo et al., 2019).

411   In addition, both Perceived Quality and Attitude Strength have positive impacts on both WOM
412   and E-WOM (Karjaluoto et al., 2016) that could lead to possible reduction in marketing
413   expenses and eventually help the brand to distinguish itself from others (Qumsieh & Tajeddini,
414   2016).

415   Historical sites are the second most discussed topic among visitors. It was discussed in around
416   5041 review comments posted online. Similar to architecture, Perceived Quality received a
417   high number of comments, which could indicate that there is a positive feeling and attachment
418   between visitors and places (Hanna & Rowley, 2011b) In addition, the most commented on
419   core-element in this topic is Positive Emotional Attachment. Given that Positive Emotional
420   Attachment is much deeper than a simple positive feeling, (Drennan et al., 2015) argue that
421   those brands that are capable of creating a positive emotional attachment are more able to
422   attract deeper love from the visitors, which could result in creating a stronger competitive
423   advantage for their brand as compared to others that do not. In other words, according to (Batra
424   et al., 2012) those brands that have a root in the hearts of their producers more easily find a
425   place in their customers' hearts as well. On the other hand, the second most commented on
426   core-element of brand love that is discussed in the topic of historical sites is Anticipated
427   Separation Distress. From reading the comments posted online it could be induced that the
428   reason for the large number of comments on this core-element has a root in the fact that there
429   is general distress and anxiety among visitors on the potential disappearance of the historical
430   sites in the near future as a result of natural (e.g. earthquake) or manmade damage (e.g. new
431   constructions). Another reason for the high number of comments on this core-element could
432   possibly be because visiting historical sites, such as Persepolis with its magnificent architecture
433   and rich history, creates an emotional attachment among visitors and, therefore, the possibility
434   of damage to such places could cause anxiety and worry among visitors who love or have
435   emotional attachment toward them. Moreover, it worth mentioning that the number of
436   comments on the core-element of attitude strength on the topic of history is far lower than what
437   have been found and mentioned on the topic of architecture. In the first view the results seems
438   to be surprising, since majority of tourism scholars strive to highlight the importance of the
439   historical sites in Iran, as more attractive tourism sectors, rather than other tourism attractions.
440   However, having said that, this could be due to fact that the way this study categorized the
441   core-elements where, for example under the architecture topic, there are places, such as mosque
442   and palace, which in terms of number they are far greater than historical sites, which includes
443   ancient and unique places like Persepolis.

The third most commonly discussed topic among visitors was tradition, which is related to visitors' feelings toward the peoples' values, beliefs and traditions of the host country. In this topic, the perceived quality antecedent has been emphasized less as compared to architecture and historical sites. On the other hand, the positive emotional core-element has been commented on more compared to the other two topics. The reason for there being a high number of comments on this core-element could be related to the rich cultural and historical background of Iran, which is amazingly diverse in terms of its religions, languages, dialects and rituals (Khodadadi & Donnell, 2017). Therefore, as (Batra et al., 2012) argue, positive emotional attachment can create an intuitive feeling of rightness, so brands must act in a way to generate more positive emotion among visitors by highlighting their authenticity which has its root in their history. Furthermore, positive comments by the travelers, which indicate emotional attachment towards a place, could potentially create an opportunity for the brands not only to generate excitement among future visitors but also create a sense of closeness and bonding toward the brand among people who have yet to visit (Swanson et al., 2017). On the other hand, the analysis of the visitors' comments illustrate that the core-element of Self-Brand Integration only exists with the topic of tradition, which could signal the importance of both extrinsic (e.g., transportation) and intrinsic (e.g., happiness) reward factors among visitors. For brands to generate brand love among visitors, they need to create an experience that is not only based on relaxation and entertainment but also more importantly has a root in the existential meaning of life that creates a deep connection and emotional attachment between visitors and the place's cultural and historical values (Batra et al., 2012).

The final topic generated from the visitors' comments was shrine places, which is about holy and spiritual places. The data shows, as compared to other topics, this topic has received far fewer comments in all antecedent and core-elements of brand love. This could be as a result of religious differences between locals and visitors, which possibly make the holy and spiritual places become less attractive for them as compared to other landmarks and sites. As (Khaksari et al., 2014) argues, tourism development strategies in Muslim countries such as Iran will not necessarily lead to attracting more travelers, so long as the authorities are unwilling to alter or relax some customary rules and regulations. However, as can be seen in Table 6, although, shrine places has received positive comments from visitors, the number of comments specifically for WOM and E-WOM were far fewer than for the other topics. This could be an fruitful basis, for both scholars and practitioners, for future studies of religious and spiritual tourism.

5.1. Overall destination brand love

478 As a result of the content analysis, it could be deduced that the intensity and the number of the
479 comments posted online on each antecedent and core-element of brand love for each topic, is
480 very much dependent on visitors' emotional feelings and attachment to the place, which may
481 be different case by case. Furthermore, our results show that architecture as a topic plays the
482 most important role in creating brand love among visitors with historical places in second place.
483 In terms of the antecedent and core-elements of brand love, Perceived Quality received the
484 greatest number of comments with Positive Emotional Connection in second place. This could
485 indicate that the importance of both Perceived Quality and Positive Emotion in creating
486 Emotional Attachment, which eventually could result in brand love. In a general overview, Out
487 of seven core-elements introduced by (Batra et al., 2012) to measure brand love in general in
488 this study, only three of them have been mentioned by the visitors in great detail in the context
489 of landmarks and sites and the other four either have not been mentioned at all or have been
490 mentioned infrequently. The reason behind not receiving any comments on these two core-
491 elements; passion-driven behaviors and long-term relationship could be due to the fact that
492 current political situation in Iran that has made the country economically and politically
493 isolated could be counted as the substantial obstacle for the foreign tourists not to maintain a
494 long relationship with the tourist destinations in Iran.

495 Furthermore, another conclusion that can be drawn from the analysis is that positive WOM and
496 E-WOM can be achieved when visitors' emotional feeling is at a high level, which could
497 potentially create brand love. In our study both architecture and historical sites as two main
498 topics of brand love generated a large amount of WOM and E-WOM, which could indicate
499 visitors felt a strong connection and emotional attachment with the architecture, design and
500 atmosphere of the places.

501 **6. Theoretical and practical implications**

502 Customer online reviews have recently gained attention among scholars and practitioners in
503 the tourism and hospitality industry (Xu & Li, 2016). This study used a mixed method of
504 machine learning and content analysis to investigate the process of creating destination brand
505 love in the tourism context by using the (Batra et al., 2012) brand love model. The current
506 research is the first of its kind that uses the (Batra et al., 2012) model for measuring brand love
507 and expanding it to the context of tourism to measure destination brand love specifically
508 through comments posted online.

6.1. Theoretical implications

510 Our study offers several contributions including theoretical, practical and methodological ones.
511 The theoretical contribution of this study lies in the fact that by reviewing online comments we
512 have managed to generate topics that are influential in creating destination brand love in the
513 tourism context of historical and ancient places, such as Iran. To do so, this study has chosen a
514 conceptual model proposed by (Batra et al., 2012) which consists of service quality as an
515 antecedent and seven core-elements for identifying the precise impact of each construct in this
516 model on brand love creation. Adopting the mentioned model into other consumption
517 categories such as destination could provide knowledge for academics to understand what a
518 destination can offer to satisfy its visitors and increase the chances of a revisit. In addition,
519 obtaining information about the visitors through online reviews, assists academics and
520 researchers to recognize the influence of each destination attribute on the tourists' decision for
521 selecting or not selecting a destination. This could indicate that destinations, in order to create
522 competitive advantage and distinguish themselves, require a set of benefits for the visitors that
523 is not only based on entertainment and relaxation, but is also able to create positive feelings
524 and emotional attachment during the experience of visiting the place (Batra et al., 2012;
525 Swanson et al., 2017). These results indicate that destination brand love, as a specific type of
526 brand love, requires its own construct and measurement which might be similar in some
527 respects, but certainly different in many other respects, from measuring brand love in general.
528 Therefore, this study has shed a light on the importance of conducting future studies in this
529 specific field of the tourism industry.

530 Additionally, in terms of method this study also contributes to the existing literature by
531 proposing a mixed method comprising machine learning and content analysis to investigate the
532 concept of destination brand love by analysing visitors' online reviews. In fact, using online
533 reviews as a source of data to conduct research has a number of advantages compared to
534 traditional data sources. First, traditional data gathering methods generally produce a very
535 limited amount of information which can also result in biased analysis and incorrectly drawn
536 conclusions (Guo et al., 2017). Furthermore, traditional data collection methods can generate
537 results that make a very limited contribution that prevent researchers from having a deeper
538 understanding of the concept (Barsky, 1992; Fornell, 1992). Second, unlike traditional data
539 sources, online reviews can be gathered in large quantities because online reviews are
540 generated daily by passionate and consciousness customers, who love to share their experiences
541 with others (Guo et al., 2017), and it is independent from the time of data gathering.

6.2. Practical implications

543   Besides the theoretical implications, this study makes several practical contributions. First, by
544   considering the crucial outcomes of brand love (e.g., positive WOM and resistance to negative
545   information), it is essential for the destination decision-makers to monitor brand love as a
546   performance indicator for their brands. While the traditional methods have several limitations,
547   the proposed method enables decision-makers to measure destination brand love in less time
548   and with less effort. Furthermore, by adopting this method marketers and managers can identify
549   those factors that are more influential in creating brand love among visitors and, as a result,
550   they will be able to allocate resources more efficiently helping them to reduce the cost of
551   marketing in the long run.

552   On the other hand, there is increasing competition among destinations to attract more tourists
553   (Medway et al., 2010), and therefore, it is very challenging for any destination to maintain their
554   unique brand identity (Jamrozy & Walsh, 2008). Hence, selecting appropriate positioning plays
555   a significant role in attracting visitors to destination brands. Therefore, the proposed model
556   could potentially help managers to select the most appropriate attribute of the place for
557   positioning destination brands better by investigating more efficiently those attributes that help
558   to create emotional attachment and love between the visitors and the place. Thus, the practical
559   contribution of this study lies in the fact that this knowledge enables tourist managers to
560   recognize what attributes of the places they need to emphasize in the destination marketing to
561   distinguish their brands from others and also how they can tailor the destination to fulfill the
562   customers' need (Qumsieh & Tajeddini, 2016).

563   *6.3. Future studies*

564   Due to the limitations of this study, which are related to the measurement resistance of negative
565   on line-reviews and the use of an optimized algorithm, it is proposed that future studies be
566   based on cross-culture analysis with more data. Similarly, by the virtue of technology
567   advancement, future studies in this area and in the context of tourism will require more
568   sophisticated and optimized algorithms of machine learning that enable researchers not only to
569   collect a larger data set, but also to analyze collected data more efficiently and effectively.
570   Another limitation of this study is data collection, which is based on secondary data and in
571   future study's authors or researchers could also add primary data for better understanding the
572   concept. In addition, it is suggested that in future studies researcher should consider collecting
573   data both from local and international tourists by considering different culture exist among

574 these visitors. Furthermore, this study has a limitation in looking only at historical landmarks,

575 thus future studies could focus on other consumption categories, such as hotels.

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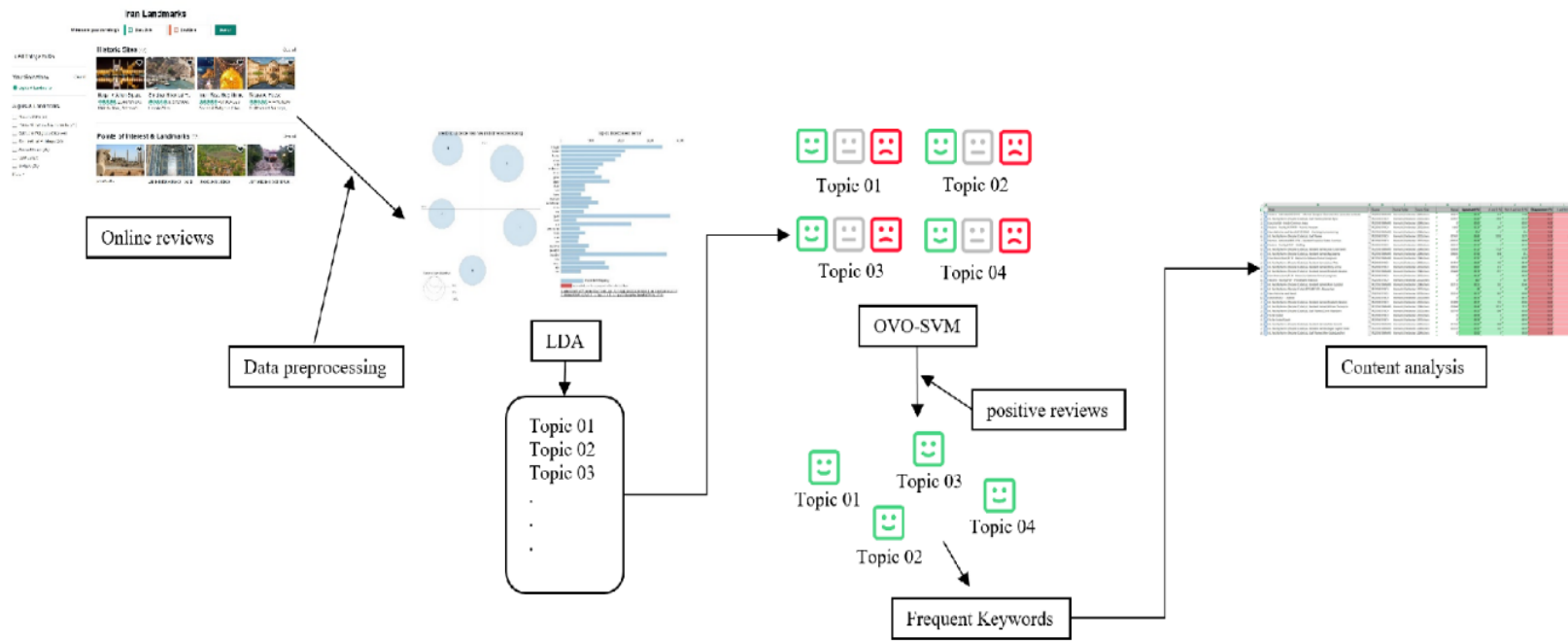*Figure 1 framework of the research*

Figure 2 -Frequent keywords of topics

Architecture

Shrine places

Tradition

Historical sites

Table 1 - Topic keywords, number of words and number of reviews

Topic	Topic keywords	Number of words	Number of reviews
Architecture	mosque, square, palace, architecture, …	7	5292
Tradition	restaurant, people, food, traditional, …	9	4303
Historical sites	history, museum, ancient, castle, …	7	5041
Shrine places	shrine, holy, cathedral', 'mosque', …	6	2202

Table 2 - The summary of the result of the sentiment analysis

	Positive	Neutral	Negative
Architecture	4151	801	340
Historical sites	3549	957	535
Tradition	3006	699	598
Shrine places	1557	425	220

Table 3 -The definition for each construct of brand love

Antecedent		
High Quality	The attitude about the functional quality of the brand	<mark>(Batra et al., 2012)</mark>
Core-elements		
Self–Brand Integration	**Current self-identity:** The sharing attribute between self and brand **Desired self-identity:** The sharing attribute between self and brand **Life meaning and intrinsic rewards:** The brand is perceived as a means to create meaning for life	<mark>(Batra et al., 2012)</mark>
Passion-Driven Behaviors	**Willingness to invest resources:** Willing to spend resources including money, time and energy for the brand **Passionate desire to use:** The feeling of passion and desire toward the brand **Things that are done in the past (involvement):** Past interactions with the brand	
Positive Emotional Connection	**Intuitive fit:** The ability of the brand to meet the psychological needs of the consumer **Emotional attachment:**	

	The emotional bond between the consumer and the brand **Positive affect:** the positive feelings (relaxing, excited, etc.) towards the brand	
Long-Term Relationship	The feeling of commitment for a long period for consumers	
Anticipated Separation Distress	The negative feelings that consumers have during separation with brand	
Attitude Valence	The ability of the brand to meet the expectations of the consumer	
Attitude Strength	**Attitude strength 1: frequent thoughts (part of self–brand integration)** Consumers frequently talk and think about the brand **Attitude strength 2: certainty and confidence** The certainty and confidence of the consumer in his/her attitude about the brand	
Consequences		
Loyalty/WOM/Resistance	Willingness to use again/ sharing positive WOM/ resistance to negative things about the brand	<mark>(Batra et al., 2012)</mark>

Table 4 - Sample of phrases

High Quality	Amazing, lovely, beautiful, good, perfection
Antecedent	
Self–Brand Integration	-
Passion-Driven Behaviors	-
Positive Emotional Connection	Love
Long-Term Relationship	-
Anticipated Separation Distress	-
Attitude Valence	-
Attitude Strength	Definitely worth a visit
Consequence	
Loyalty/WOM/Resistance	worth a visit

Table 5 -Accumulated frequency of keywords and phrases concerning each topic

Topic	Architecture	Historical sites	Tradition	Shrine places
Number of sentences	5292	5041	4303	2202
Antecedents				
Perceived quality of the place	4571	2903	2182	1124
Core-elements				
Self–Brand Integration	-	-	130	-
Passion-Driven Behaviors	-	-	-	-
Positive Emotional Connection	582	644	724	111
Long-Term Relationship	-	-	-	-
Anticipated Separation Distress	101	102	73	-
Attitude Valence	172	162	81	88
Attitude Strength	1666	343	318	-

	Consequences			
Loyalty/WOM/Resistance	1537	1433	1050	593

Table 6 -Normalized accumulated frequencies

Topic	Architecture	Historical sites	Tradition	Shrine places
Antecedent				
Perceived quality of the place	0.018	0.014	0.011	0.011
Core-elements				
Self–Brand Integration	-	-	-	-
Passion-Driven Behaviors	-	-		-
Positive Emotional Connection	0.002	0.003	0.004	0.001
Long-Term Relationship	-	-	-	-
Anticipated Separation Distress	-	0.014	-	-
Attitude Valence	-	-	-	-

Attitude Strength	0.006	0.001	0.001	-
Consequence				
Loyalty/WOM/Resistance	0.006	0.006	0.005	0.005

.