

1 Online review ratings: An analysis of product attributes and competitive 2 environment

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4 Accepted for publication in the Journal of
5 Marketing Communication (issn: 1466-4445), 2022,
6 Vol. 28 (5), 487-505.
7 <https://doi.org/10.1080/13527266.2021.1951815>
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20 This work was supported by the Spanish Ministry of Science and Innovation under Grant
21 number PID2020-119994RB-I00 and Universidad de Almeria.

22 Abstract

23 Online reviews generated by consumers have reached a huge diffusion among
24 buyers and constitute an important marketing communications tool for companies
25 that allow them to successfully promote a product. This study adopts a less
26 developed approach in previous studies and tries to analyse what attributes of a
27 product or service are relevant when it comes to getting a good online assessment
28 of consumers as well as to analyse if the competitive environment of the company
29 also affects the ratings. Based on a sample of 1,870 Spanish hotels and using
30 regression analysis, our results show that vertical and horizontal differentiation,
31 age, and price are characteristics of a product that positively impact the online
32 rating given by consumers. However, pricing of additional features can reduce the
33 effect of horizontal differentiation on online rating due to the different value to
34 consumers of those features. Additionally, the competitive environment also has

35 an impact on the online rating and paradoxically, areas with a higher concentration
36 of competitors allow companies to obtain a better evaluation if the competitors are
37 not co-located very close to the company. These findings can support company
38 marketers to manage consumer online reviews and help marketers in promoting a
39 product.

40 Keywords: online product review (OPR), differentiation, price, age, competition,
41 agglomeration

42 **Introduction**

43 Online product rating (OPR) carried out by consumers are considered as a prominent way
44 in which product word-of mouth (PWoM) occurs (Chen, Luo, and Wang, 2017), currently
45 plays an essential role in the consumer journey (Hong and Pittman 2019; Park, Lee, and
46 Han 2007). Communication literatures assume that online review content in the form of
47 customer feedback enhances the credibility of a product to the prospective customers
48 (Daugherty and Hoffman 2014). Consequently, it has become in a critical advertising and
49 communication component to promote the success of a product (Kozinets et al. 2010),
50 being a valuable information for consumer decision-making in online environments
51 (Mudambi and Schuff 2010). Therefore, a substantial body of marketing research has
52 analyzed the effect of OPRs on cumulative economic outcomes (Floyd et al. 2014), but
53 essentially two metrics have prevailed volume and rating and with a disagreement about
54 which metric is the main predictor of economic outcomes (Rosario et al. 2016; You,
55 Vadakkepatt, and Joshi 2015).

56 Due to the current relevance of OPRs for the firm performance, there are numerous
57 articles focused on the OPRs generation and what features influence the rating of an
58 online consumer (Liu, Steenkamp, and Zhang 2018; Ketelaar et al. 2015; Kim, Jun, and
59 Kim 2018; Mathwick and Mosteller 2017). Despite this, to the best of our knowledge,
60 there are two research gaps in the previous literature. Firstly, most of the works adopt a

61 consumer perspective while studies focused on product characteristics are scarcer
62 (Martin-Fuentes 2016; Li and Hitt 2010). Additional arguments justify an analysis of how
63 attributes can impact the rating. Through product differentiation, companies can increase
64 sales through OPRs (Clemons, Gao, and Hitt 2006), quality may impact on the OPRs due
65 to the expectations associated with a product may be different depending on quality
66 differentiation (Manes and Tchetchik, 2018) and pricing strategy can steer and control
67 the consumer-generated information flow (Yu, Debo, and Kapuscinski 2016). With
68 respect to organizations, older companies have achieved a better reputation over the years
69 (Sahadev and Islam 2005) and OPRs can promote this reputation whereas if the size of
70 the company is disproportionate, the services offered can deteriorate due the congestion
71 (Radojevic, Stanisic, and Stanic 2017).

72 And secondly, despite the evidence of the relationship between the competitive
73 environment and online reputation (You, Vadakkepatt, and Joshi 2015), there are few
74 studies that analyze this issue (Liu, Steenkamp, and Zhang 2018) and are focused on
75 volume rather than rating, which can be counterproductive as low ratings with high
76 volume can reduce the effectiveness of OPRs as a marketing communication tool (Hong
77 and Pittman 2020).

78 Our study tries to fill these gaps by deepening into the impact of product attributes and
79 competition environment on review rating. For it, we carry out an empirical analysis
80 whose reference framework is the hotel industry. Based on a sample of 1,870 Spanish
81 hotels, we analyze the determinants of OPRs rating with regression analysis. Several
82 contributions to the marketing literature are provided with the present research. First, our
83 work extends the previous studies about ORs to understand the characteristics that
84 determine the rating of ORs. And second, this research expands results of previous studies

85 about the impact of the competitive environment on ORs to understand how the offline
86 environment may impacts on the online one (Liu, Steenkamp, and Zhang 2018).

87 **Literature review**

88 *Product differentiation and online rating*

89 Nowadays, through the Internet, consumers can compare and choose the product that best
90 suits their needs (Clemons, Gao, and Hitt 2006), so this can encourage companies to
91 develop horizontal differentiation strategies. However, there are few studies that have
92 studied as horizontal differentiation can impact on the OPRs. Recently, Liu, Steenkamp,
93 and Zhang (2018) found that the concentration of non-differentiated products can drive
94 OPRs volume up to a certain threshold.

95 Concerning the relationship between rating and differentiation, the proliferation of online
96 consumer reviews makes it easier for a consumer to find the product that best fits their
97 individual preferences. Indeed, online environment enables consumers to perform a
98 targeted information gathering, avoiding misguided choices, and reducing the uncertainty
99 of product-consumer fit and increase consumer's satisfaction (Hong and Pavlou 2014).

100 Likewise, a greater degree of horizontal differentiation can foster a greater volume of
101 online reviews (Lovett, Peres, and Shachar 2013), and increase product selling (Clemons,
102 Gao, and Hitt 2006). These suggest a positive impact of differentiation on online
103 reputation and therefore, we establish the following hypothesis:

104 **H1:** *The differentiation of a product or service has a positive impact on the online product*
105 *rating given by consumers.*

106 *Size and online rating*

107 Within the context of the service industry, the size of the company (for example, the size
108 of the hotel measured as the number of rooms available) can condition various aspects
109 related to customer satisfaction and complaints received.

110 On the one hand, large companies have more resources and can take advantage of them
111 to improve customer satisfaction (Venkataraman and Low 1994). On the other hand,
112 larger companies are more rigid and less flexible in contrast to smaller companies, which
113 can slow down their reaction when they face customer complaints (Perry-Smith and Blum
114 2000). Also, with hotel industry as a research frame, the previous literature shows that
115 size of the company can also influence OPRs generated by consumers (Au, Buhalis, and
116 Law 2014; Del Chiappa and Dall’Aaglio 2012; Radojevic, Stanistic, and Stanic 2017). Au,
117 Buhalis, and Law (2014) found that the size of the hotel impacts the volume of online
118 complaints and both Au, Buhalis, and Law (2014) and Del Chiappa and Dall’Aaglio (2012)
119 concluded that the size of the hotel can condition the complaints that customers express
120 through OPRs. Finally, Radojevic, Stanistic, and Stanic (2017) found that a
121 disproportionate size of the company cause congestion in the services offered, causing
122 them to deteriorate, which ultimately has a negative impact on the online valuation of
123 customers. Consequently, the increase of the size of a company may increase the online
124 rating up to a level from which it begins to decrease. Then, we propose the following
125 hypothesis:

126 **H2:** *There is a curvilinear, concave down relationship between the size of the company*
127 *and the online product rating.*

128 *Company age and online rating*

129 Previous studies suggest that the age of the company that offers a product or service may
130 have an influence on the online rating of customers (Chanwisitkul, Shahgholian, and
131 Mehandjiev 2018; Kim, Kim, and Heo 2016; Sahadev and Islam 2005; Xu and Li 2016)

132 On the one hand, old facilities may be the source of dissatisfaction among consumers of
133 a product or service (Xu and Li 2016) and this dissatisfaction can be reflected in negative
134 ORs (Kim, Kim, and Heo 2016) that in turn cause a decrease in the online rating
135 (Chanwisitkul, Shahgholian, and Mehandjiev 2018). Given that, more experienced
136 companies may not adequately upgrade their facilities due to the status achieved over the
137 years (Sahadev and Islam 2005; Hung, Shang, and Wang 2010), suggesting that the
138 company age can negatively influence online rating.

139 On the other hand, it has also been found that the experience of a company allows it to
140 increase its sales (Hung, Shang, and Wang 2010) due to the reputation achieved over the
141 years (Sahadev and Islam 2005) and OPRs can promote this reputation. Based on these
142 arguments, we consider the following hypothesis:

143 **H3:** *The age of the company offering a product has a positive impact on the online*
144 *product rating given by consumers.*

145 *Product quality and online rating*

146 Several marketing studies have identified quality as a key variable of customer selection
147 process (Zeithaml 1988). This effect of quality on customer behaviour also can affect
148 consumer behaviour in online environments due to OPRs reflecting the value perceived
149 by the consumer, considering the perceived value as the difference between product
150 quality and purchase price (Li and Hitt 2010). Consequently, the expectations associated

151 with a product may be different depending on quality differentiation (Manes and
152 Tchetchik, 2018) and quality may impact on the OPRs. Thus, Lovett, Peres, and Shachar
153 (2013) show a positive relation between volume of eWoM and quality, so consumers
154 generate higher volume of eWoM for higher quality brands. Neirotti, Raguseo, and
155 Paolucci (2016) found that quality moderates the OPRs impact on sales and concluded
156 that the relationship between online visibility and sales is stronger for higher quality
157 firms. Liu, Steenkamp, and Zhang (2018) found that quality moderates the effect of
158 agglomeration on the volume of OPRs.

159 Despite this, there is a lack of research on the impact of quality on the rating of OPRs (De
160 Langhe, Fernbach, and Lichtenstein 2016) and only a few previous studies have
161 considered it (Bulchand-Gidumal, Melián-González, and López-Valcárcel 2011; Martin-
162 Fuentes 2016; Radojevic, Stanisic, and Stanic 2017). This issue has particular interest
163 since through its analysis it can be ascertained if OPRs are an adequate index of objective
164 quality. Thus, based on the revised S-O-R model (Jacoby 2002), considering that it is
165 psychological reality, not objective reality, what determines our behavior, we can assume
166 that consumers prioritize public and validated sources of reliable information (Engler,
167 Winter, and Schulz 2015). Therefore, we propose that the higher the tested quality of a
168 product, the higher the rating it will receive. The following hypothesis is proposed:

169 **H4:** *The tested quality of a product has a positive impact on online product evaluation.*

170 ***Price and online rating***

171 Under the perspective that price can be considered as a pre-purchase quality signal when
172 buyers are uncertain about a new purchase (Kirmani and Rao 2000), previous research
173 has analyzed the impact of price in the buyer post-purchase satisfaction stage (Li and Hitt
174 2010), due to the mismatch between customer expectations and the actual quality of

175 products/services after consumption (Rust et al. 1999). Under this approach, consumers
176 can consider the price of products/services when they post OPRs with a negative effect
177 on the rating (Li and Hitt 2010). Furthermore, consumers can share through positive OPRs
178 the low prices they pay (You, Vadakkepatt, and Joshi 2015).

179 On the other hand, a low price can raise doubts about quality of product (Raab et al. 2009)
180 and it can negatively impact on the overall satisfaction (Cao, Gruca, and Klemz 2014).
181 Moreover, ORs can increase the consumer's willingness to pay (Kostyra et al. 2016) by
182 decreasing customer's price sensitivity so premium-price products experiment a stronger
183 impact of online rating on purchases (Maslowska, Malthouse, and Viswanathan 2017),
184 and premium-price products obtain higher online ratings (Martín-Fuentes 2016). Due to
185 these quality-signals based arguments, we suggest the following hypothesis:

186 **H5:** *Product price has a positive impact on the online product rating given by consumers.*

187 In horizontally differentiated firms, pricing additional features can diminish profitability
188 due to competitive effects that modify the perceived value (Geng and Shulman 2015).
189 Specifically, when firms are engaged in non-price competition to differentiate
190 themselves, free amenities can be regarded as add-on services that increase consumer
191 value. However, when consumers receive additional services, they avoid pay extra fees
192 (Liu et al. 2020) and can angers consumers, under highly competitive conditions as it is
193 the hospitality industry (Fruchter, Gerstner, and Dobson, 2011). Then, as the number of
194 features offered increase, the price-value perception diminishes, we posit the following
195 hypothesis that account for the negative effect of pricing:

196 **H6:** *Product price mitigates the positive impact of product differentiation on online
197 product rating.*

198 *Competitive environment and online rating*

199 Although in the previous literature there are evidence that show the impact of competitive
200 environment on OPRs, both on their generation (Liu, Steenkamp, and Zhang 2018) and
201 on their effect on economic results (Neirotti, Raguseo, and Paolucci 2016, You,
202 Vadakkepatt, and Joshi 2015), there are few previous studies that have addressed this
203 question (Gutt, Herrmann, and Rahman 2019; Liu, Steenkamp, and Zhang 2018). Thus,
204 Liu, Steenkamp, and Zhang (2018) analyzed how a greater number of competitors can
205 promote the generation of OPRs up to a threshold from which the volume of OPRs begins
206 to decrease. Their study does not clarify whether this increase in volume translates into a
207 better or worse rating, a relevant question since an increase in the volume of OPRs does
208 not always produce beneficial effects because ratings can moderates the impact of volume
209 on sales (Manes and Tchetchik 2018) and a higher volume can generate cognitive
210 overload which it might result in negative effects on consumers' purchase (Maslowska,
211 Malthouse, and Bernritter 2017; Park and Lee 2008).

212 Regarding that question, Gutt, Herrmann, and Rahman (2019) analyzes how more
213 concentrated markets present a rating distribution with a lower average and greater
214 variance, that is, concentration within the same market decreases the average online rating
215 of the market but they do not analyze the impact on each company in the market. Their
216 results suggest that when a company faces a greater number of competitors it may
217 experience a decrease in the online rating of consumers, partly because greater
218 competition can encourage negative fake reviews by competitors (Luca and Zervas 2016).
219 This negative effect together with a higher volume (Liu, Steenkamp, and Zhang 2018)
220 can be counterproductive for the credibility of OPRs and reduce their effectiveness as a
221 marketing communication tool (Hong and Pittman 2020).

222 On the other hand, agglomeration theories postulate benefits for companies generated by
223 a greater concentration of competitors (McCann and Folta 2008), due to the existence of
224 exogenous externalities like transportation infrastructure that consumers can enjoy and
225 endogenous externalities like heightened demand and reduced search costs, demand
226 spillover, resource spillover (Lee and Jang 2015) and more qualified workforce with
227 specialized skills (Almeida and Kogut 1999) who can provide better service to customers.
228 In addition, the central place theory (King 1984) postulates a concentration of economic
229 activities, so that an area of greater concentration can offer greater services to customers
230 such as entertainment or dining options (Lee and Jang 2015). For all these reasons, the
231 concentration of competitors can have a positive impact on the online evaluation of
232 customers. Then, the following hypothesis is proposed:

233 **H7:** *The number of competitors has a positive impact on the online product rating given*
234 *by consumers.*

235 Additionally, regarding the distance between competitors, there is a lack of studies that
236 analyze their impact on the online rating, although Mayzlin, Dover, and Chevalier (2014)
237 analyzed how a smaller distance to competitors also increases the probability of online
238 fake reviews and therefore we establish the following hypothesis about the impact of
239 distance on online consumer reviews:

240 **H8:** *Distance between competitors has a positive effect on the online product rating given*
241 *by consumers.*

242

243 **Methodology**

244 *Sample and variables*

245 We carried out our study within the hotel context and we considered the hotel industry in
246 Spain as a study framework through a sample of 1,870 hotels obtained with data from an
247 international group travel agency (Veturis.com), together with web scraping techniques.
248 Data was obtained for each hotel on the valuation of customers, category, price (for the
249 year 2017), services offered, number of competitors and distance to them. The hotels in
250 the sample are distributed in 66 cities and 484 commercial areas defined by the group
251 travel agency.

252 The explanatory variables considered to model the customers' online rating in this study
253 were:

- 254 • *Differentiation*. This variable measures the horizontal differentiation in the
255 services offered by hotels located in the same commercial zone based on a
256 distance measure proposed by Gimeno and Woo (1996). For a hotel i in the
257 commercial area C_i , the measure is given by:

258
$$Differentiation_i = \sum_{j \in C_i, j \neq i} \frac{\|S_i - S_j\|}{m}$$

259 where S_i is a vector with 71 dummy variables that indicate the services offered
260 (see Appendix A with the differentiating features) by the hotel i and m represent
261 the number of competitors located in the same commercial area. The greater the
262 value of the variable, the greater the differentiation, so that when its value is zero
263 the differentiation of the hotel is minimal.

- 264 • *Size*. This variable measures the hotel size through the total number of rooms in
265 a hotel.
- 266 • *Age*. This variable represents the number of years of the property.

- 267 • *Quality*. Since the hotel industry has consistent quality levels through the hotel
268 category (Manes and Tchetchik 2018), we have considered the incorporation of
269 the quality through the official hotel category assigned by the agencies based on
270 Spanish regional regulations (Silva, 2015). We consider four dummy variables
271 to represent from two stars to five stars and the category one star used as the
272 reference.
- 273 • *Price*. Because the price in the hotel industry is subject to dynamic management
274 and may change due to the seasonality and events developed in a destination, we
275 have considered the average yearly price, since it is free of price variations
276 caused by seasonality, distribution channels and events (Lee 2015).
- 277 • *Competitors*. This variable, for each hotel, measures the number of competitors
278 located in the same commercial area. The commercial areas considered are the
279 commercial areas defined by the group travel agency. This variable is not
280 constant in the analyzed sample due to the variety of commercial areas included
281 in the sample.
- 282 • *Distance*. The average distance in kilometers to the rest of the competitors
283 located in the same commercial area is represented by this variable.

284 Finally, the dependent variable represents the average evaluation of consumers on a scale
285 from 0 to 10, where 0 is the worst possible evaluation while 10 is the best possible
286 evaluation.

287 ***Model selection and estimation***

288 To test all the hypotheses proposed previously, we have considered the following model:

$$\begin{aligned}
 289 \quad Rating_i = & \alpha_0 + \beta_1 Differentiation_i + \beta_2 Size_i + \beta_3 Size_i^2 + \beta_4 Age_i + \beta_5 2_i^* + \beta_6 3_i^* \\
 290 \quad & + \beta_7 4_i^* + \beta_8 5_i^* + \beta_9 Price_i + \beta_{10} Differentiation_i * Price_i \\
 291 \quad & + \beta_{11} Competitors_i + \beta_{12} Distance_i + \varepsilon_i
 \end{aligned}$$

292 The estimation method used was OLS and the standard errors have estimated with the
 293 bootstrap methods. Through the Breusch-Pagan test we detected heteroscedasticity in the
 294 model (p-value 7.5E-5) and due to this the dependent variable was log-transformed to
 295 consider a semi-logarithmic model that can mitigate the heteroscedasticity (Kennedy
 296 2008). After log-transformation, we applied the Breusch-Pagan test again, whose *p*-value
 297 (0.9365) clearly indicates that final model is also free of heteroscedasticity. Consequently,
 298 for a continuous variable, the coefficient multiplied by 100 provides the percentage
 299 impact on rating while, for a dummy variable, the percentage effect is computed by $100 \cdot$
 300 $(e^{\beta_i}-1)$ (Halvorsen and Palmquist 1980). Table 1 shows a statistical summary of the
 301 sample considered in the study.

302

303 Table 1. Sample descriptive statistics.

Variable	Min	Q1	Median	Q3	Max	Mean	St. dev
Ln(Rating)	-1.609	1.946	2.028	2.079	2.303	2.008	0.144
Size	3	47	77	126	1500	102.4	99.695
Differentiation	0	1.144	1.768	2.281	5.174	1.795	0.723
Age	1865	2001	2004	2007	2017	2003	7.939
Price	24.96	49.84	62.18	81.01	1224.16	74.76	60.408
Competitors	1	6	19	48	323	56.85	92.565
Distance	0	0.870	1.550	2.630	20.950	2.071	2.143
Category	1*	2*	3*	4*	5*		
%	1.979	8.770	35.561	49.358	4.332		

304

305 Next, since the model includes the interaction between differentiation and price, we have
 306 standardized both variables by subtracting their respective means to avoid
 307 multicollinearity problems. The existence of multicollinearity between predictors was
 308 verified using the generalized variance inflation factor (VIF). Table 2 provides the
 309 generalized VIF values and shows that the model is free of multicollinearity since all VIF
 310 values are below the critical values (Kennedy 2008).

311 Table 2. Generalized VIF for the explanatory variables.

Variable	Generalized VIF	Df
Differentiaton	1.0701	1
Size	3.7071	1
Size²	3.4057	1
Age	1.0138	1
Category	1.2501	4
Price	1.1291	1
Differentiation×Price	1.0669	1
Competitors	1.2070	1
Distance	1.1838	1

312

313 **Results**

314 Table 3 shows the results obtained with the estimation of the final model using OLS and
315 additionally also provides R² value.

316 Firstly, hypothesis H1 is confirmed since the main effect of differentiation in services
317 impacts positively in the online ratings whereas H2 is not confirmed because both the
318 impact of *Size* on online ratings and *Size*² are not significant.

319

320 Table 3. Final model estimation.

Variable	Coefficient	Standard error	p-value
Intercept	-0.2225	0.8224	0.7867
Differentiation	0.0097**	0.0045	0.0307
Size	-2.1E-5	5.9E-5	0.7215
Size²	-1.9E-8	6.9E-8	0.785
Age	0.0011***	0.0004	0.0010
2*	0.0309	0.0248	0.2132
3*	0.0660***	0.0232	0.0045
4*	0.1363***	0.0232	5.2E-9
5*	0.2064***	0.0278	1.7E-13
Price	0.0001**	5.0E-5	0.0239
Differentiation×Price	-0.0001*	6.8E-5	0.0832
Competitors	0.0001***	3.8E-5	0.0083
Distance	0.0028*	0.0017	0.0974
R²	0.1338		

***p<0.01

**p<0.05

*p<0.1

321 Secondly, hypothesis H3 is confirmed since the number of years of experience has a
 322 significant effect on the online evaluation of users. This effect is positive, with an
 323 additional year of experience representing an increase of 0.1% in the value of the
 324 consumer OR, which indicates that customers associate a greater number of years of
 325 operations with better service which is reflected in their online assessments.

326 Regarding the effect of quality differentiation in online evaluations, its evaluation
327 requires a more in-depth analysis due to its representation through dummies. From Table
328 3 we can see the significance of each category with respect to the reference category (1*)
329 so that all the higher categories present a significant increase in the online rating of
330 consumers, except for category 2* which it does not present a significant effect with
331 respect to 1*, which means that the online evaluations of consumers are similar for both
332 categories. Additionally, for the rest of the categories we can see how if the corresponding
333 estimated coefficient increases as we consider higher quality categories, which agrees
334 with the statement set by hypothesis H4. For a more detailed analysis, we will also
335 consider the effect difference on the online rating of each pair of hotel categories.

336 Table 4 shows the pair-wise comparison between the coefficients corresponding to each
337 hotel category. Multiple comparisons show that all the associated coefficients are
338 significantly different except for the 1* and 2* pair, as already deduced from the results
339 shown in Table 3. Thus, we can see that there are significant differences in the online
340 assessment between hotels of different categories (except between 1* and 2*) and as the
341 quality category is higher, the greater the positive effect on the online rating of consumers.
342 More specifically, the online valuation of a hotel increases by 3.58% if we change its
343 category from 2* to 3*, keeping the rest of the variables in their values. Similarly, the
344 increase in online rating is equal to 7.28% when the category changes from 3* to 4*.
345 Finally, the difference in effect between the 4* and 5* categories represent an increase of
346 7.26% in favor of 5* hotels. Consequently, hypothesis H4 is confirmed, and higher quality
347 translates into better online assessment of consumers. thus, quality is a determining factor
348 to get positive reviews online.

349
350

351 Table 4. Difference effect pairwise comparison between hotel categories.

Categories	2*	3*	4*	5*
1*	0.0309	0.0660***	0.1363***	0.2064***
2*		0.0351***	0.1054***	0.1755***
3*			0.0702***	0.1403***
4*				0.0701***

***p<0.01

**p<0.05

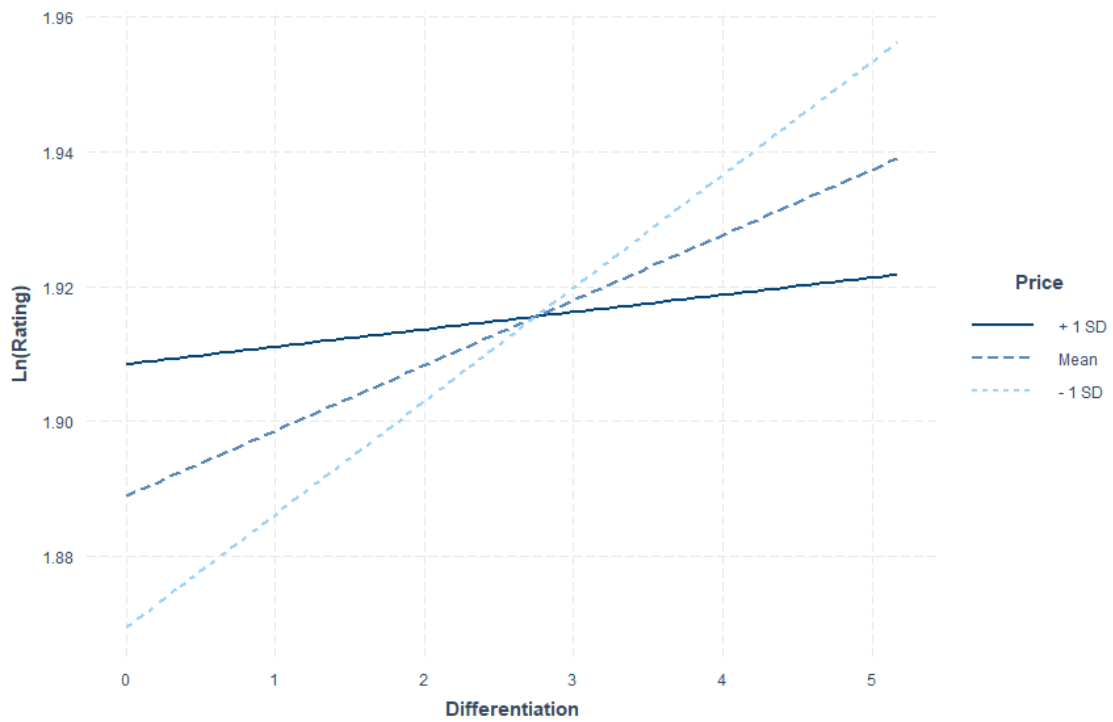
*p<0.1

352

353 Regarding price, it shows a significant main impact on online evaluations, thus
 354 confirming hypothesis H5. Next, the interaction between differentiation and price is
 355 significant and its coefficient is negative. Thus, the hypothesis H6 is confirmed and
 356 consequently the price mitigates the positive effect of differentiation on online rating. To
 357 analyze in more detail the moderation of price on the effect of differentiation, Figure 1
 358 depicts the differentiation effect on online rating for three levels of price, the average
 359 price, and the average price \pm one standard deviation. From Figure 1, the effect of
 360 differentiation is reduced with the increase in price.

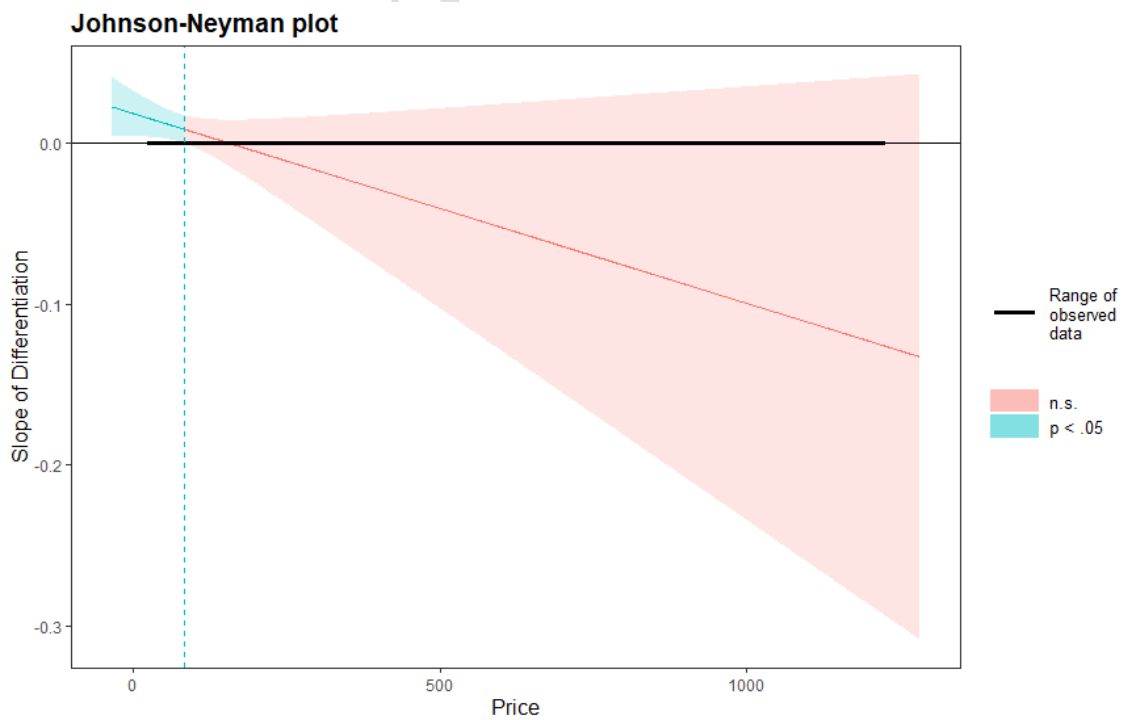
361 To clarify the moderating effect of price on the impact of differentiation on online rating
 362 vividly, we obtained the Johnson-Neyman interval (Bauer and Curran, 2005) which tells
 363 us the range of values of the price in which the effect of differentiation is significant
 364 versus not significant with a 95% confidence level (Figure 2). From Figure 2, the effect
 365 of differentiation is positively significant only when price is under 82.97 euros and when
 366 price is above 82.97, the effect of differentiation is not significant.

367 Figure 1. Moderating effect of price on the relationship between differentiation and online
368 rating.



369

370 Figure 2. Johnson-Neyman plot for the moderation of price on differentiation.



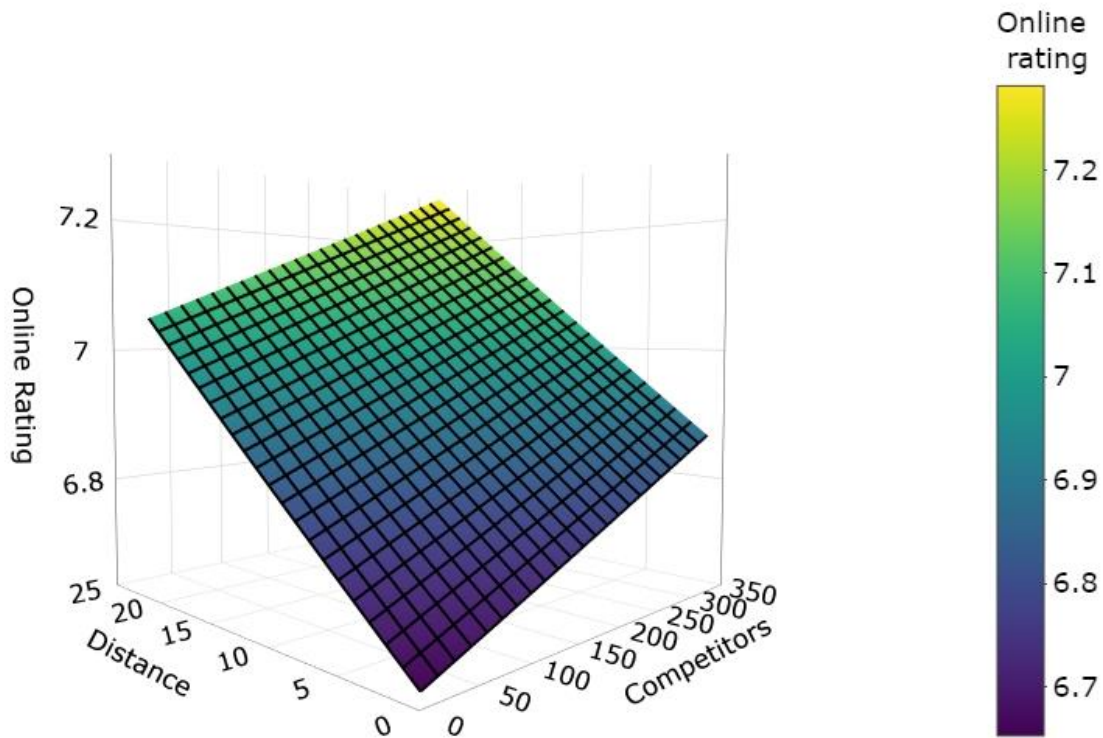
371

372 Concerning the analysis of the impact of competition on ORs, we will start with the
373 impact of the number of competitors. Table 3 shows that the impact is positive and
374 significant, one more additional competitor in the commercial area represents an increase
375 in the online rating of 0.01%. In this way, hypothesis H7 is confirmed and given that the
376 concentration of competitors has a positive effect, the relationship between number of
377 competitors and online rating is supported. Finally, with respect to the hotel
378 agglomeration, the impact of distance is also positive, which means that a greater distance
379 between competitors has beneficial effects on the online rating, confirming hypothesis
380 H8. A one kilometer increases in the distance to the competitors represents an increase of
381 0.28%.

382 These results involve that the ideal location would be in a commercial area with many
383 competitors separated by a high distance among them. However, it is unlikely to find such
384 a type of location, since an increase in the number of competitors will probably reduce
385 the distance between them. Due to this contradictory effect, we can deduce that there is a
386 trade-off between the number of competitors and the distance, i.e., it is necessary to
387 evaluate whether it is more convenient to increase the distance by decreasing the number
388 of competitors, or to increase the number of competitors thereby decreasing the distance.

389
390

391 Figure 3. Estimated rating with the final model based on competitors and distance.



392

393

394 To analyze this issue, Figure 3 displays the relationships between the predicted online
395 rating, the number of competitors and the average distance among them (other
396 explanatory variables *ceteris paribus*). Figure 3 shows that the online rating associated
397 with the maximum distance observed in the sample (e.g., 20,950 kilometers) and
398 minimum number of competitors in the sample (e.g., one competitor) is higher than the
399 online rating achieved with the maximum number of competitors (323 competitors) and
400 the minimum distance (0 kilometers). Also, it shows that, even in an isolated area without
401 competitors, the average distance to the competitors allows to achieve a higher rating than
402 in concentrated areas with less distance between competitors. Thus, from the coefficients
403 in Table 3, the increase in the OR obtained by an additional kilometer in the distance to
404 the competitors is equivalent to the increase produced by 28 additional competitors

405 (0.0001x28 = 0.0028). Equivalently, a new additional competitor yields an increase of the
406 OR provided that the average distance is not reduced by more than 0.036 km.

407 Therefore, it is preferable to locate with fewer competitors but at a greater distance than
408 in concentrated locations but with less distance between competitors.

409

410 **Conclusions, limitations, and future research**

411 Prior research has shown the relevance of product for OPR creation (Clemons, Gao and
412 2006), and that competence at the aggregate market level produced a negative effect on
413 rating (Gutt, Herrmann, and Rahman 2019). Also, from an expectation perspective, a
414 negative effect between pricing and OPR was found (Li, X., and Hitt 2010). In this article,
415 due its relevance for organization communication credibility and consumer behavior, we
416 base on signaling, the S-O-R model and agglomeration theories to explain the effects of
417 product differentiation, quality, pricing, and competition.

418 The key objective of this study is to examine the role of product pricing, differentiation
419 and competition play in consumer online review. By means of a regression analysis over
420 a database built on 1,870 hotels, the authors empirically provide evidence that vertical
421 and horizontal differentiation, pricing, agglomeration of competitors and location exert a
422 significant role on the online product review rating. To the authors' knowledge, this is the
423 first study to examine simultaneously the relationship between both dimensions of
424 competition (i.e., degree of concentration of competitors in an area and distance between
425 competitors) and OPR. Additionally, and following the call by De Langhe, Fernbach, and
426 Lichtenstein (2016), this is a contribution that can clarify the blurry relationship between
427 objective quality and review rating, supporting the quality signal role of pricing for online
428 consumers in contrast with the utility perspective (Li and Hitt 2010).

429 *Theoretical implications*

430 Several implications can be established from this study. Firstly, from a theoretical
431 perspective, our result showed that both vertical differentiation of a product (i.e., tested
432 quality) and horizontal differentiation have a positive effect on consumer's online rating,
433 revealing the role of differentiation features in reducing the uncertainty of product-
434 consumer fit. Thus, the online rating can account for both objective and perceived product
435 quality for most consumers, as posited by Engler, Winter, and Schulz (2015), extending
436 De Langhe, Fernbach, and Lichtenstein's (2016) objective quality analysis. The size of
437 the company has no significant impact on consumers' evaluation. Secondly, OPRs help
438 to promote the reputation achieved by a company over the year since companies with
439 more years of experience achieve a higher reputation online. Finally, our results reject the
440 assumption of a negative relationship between price and OPR (Li and Hitt 2010),
441 embracing the view of price as a quality cue (Martín-Fuentes 2016).

442 Although price and differentiation in isolation feed the online review, the joint effect of
443 both variables can awaken in the consumer the belief that is paying for additional services,
444 which generates a negative sentiment towards price increases and greater product
445 differentiation. Thus, we extend Fruchter, Gerstner, and Dobson's (2011) add-on analysis
446 to its implications for communication.

447 The study further contributes to the PWoM literature by examining the effect of
448 agglomeration on the online review rating, as it expands previous contributions just
449 focused on the effect of volume of PWoM associated with a higher degree of crowding
450 (Liu, Steenkamp, and Zhang 2018). The effect of agglomeration on volume and rating is
451 relevant from the perspective of marketing communication as both cues allows increasing
452 the perceived credibility of OPRs (Hong and Pittman 2020). However, a higher

453 concentration can cause a decrease in the distance between competitors, which
454 paradoxically can lead to a decrease in online rating, so opposite effects can appear due
455 to the agglomeration of competitors.

456 *Managerial implications*

457 Managerially, the findings of the research can be utilized by communication managers.
458 While the focus of many advertising agencies is to find a proper right message, or better
459 “the barrage of online messages” (Kitchen and Tourkey 2020, 12), seeking other contacts
460 consumers may have. In this way, the market offer deserves a role as axis of a marketing
461 communication plan due to their role as quality signals. Thus, a premium price does not
462 imply a negative evaluation by users, with high-priced products could receive a better
463 online review. However, marketers must be careful when communicating pricing of
464 additional features (i.e., add-ons). Specifically, they should consider the value to
465 consumers of those features and the competitive environment.

466 This research complements recent work that finds that the concentration of competitors
467 increases the volume of online review (Liu, Steenkamp, and Zhang 2018). Our results
468 show that higher competitors' agglomerations increase the rating too, promoting OPR as
469 a marketing communication tool, with potential advertising costs savings derived.
470 However, this effect implies some limits, since an over-agglomeration can be
471 counterproductive for both volume and rating (e.g., fake reviews). Though location
472 decisions depend on many factors, we further find that firms can gain location rents due
473 to more distant competitors and a reduced advertising budget required (Yoo and
474 Mandhachitara 2003), enhancing OR as a communication tool. Then, firms should adapt
475 their marketing communication to the type of location and level of competition.

476 The positive influence of company experience shows its usefulness as the basis of firm's
477 communication. Also, in case of premium price strategies, the confirmed role of price in
478 delivering a signal and OPRs join forces to guarantee the promise communicated.

479 *Limitations and directions for further research*

480 The limitations associated with this study offer scope for future research. First, authors
481 recommend that future research consider non-linear effects of the number of competitors
482 for a more in-depth analysis of the impact of competition on online reputation. Second,
483 due to the dynamic nature of OPRs, the lack of this feature emerges as a limitation.
484 Finally, this work has been developed within a pre-COVID-19 context. However, the
485 hospitality and many other industries are undergoing dramatic changes due to this
486 pandemic (Kitchen et al. 2021).

487 An extension of this work could consider what is the optimal agglomeration level through
488 the optimal trade-off between number of competitors and distance among them to attain
489 the best rating. Another extension would be to incorporate customer characteristics,
490 behaviors, consumption occasions and how to communicate add-on pricing. In particular,
491 due to the utmost importance of trust between marketers and their customers (MSI 2020),
492 since OPRs can be reduced their credibility due to perceived deceptive practices (Karabas
493 et al. 2020), it would be valuable to take into consideration an information trustworthiness
494 indicator, in order to avoid altering the utility of OPRs. This concern also gives rise to
495 assess the value of OPR as an informational device that cues certain meaning (Duncan
496 and Moriarty 1998).

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- 698

699 **Appendix A.** Summary of differentiating features included in the service vector S_i .

Sport		Meals	Hotel Style
Aerobics	Jet skis	All-inclusive	Airport hotel
Animation activities	Kayak	Bed and breakfast	Beach hotel
Aquatic Gymnastics	Mini golf	Buffet lunch	Business hotel
Archery	Paddle	Continental breakfast	Conference hotel
Badminton	Pedal boat	Diet food	City hotel
Basketball	Petanque	Dinner a la carte	Design hotel
Bicycle bike of montain	Ping pong	Dinner from menu to	Ecological hotel
Billiard american or	Ride to horse	choose	Family hotel
russian	Sailing	Dinner type buffet	Farm hotel
Boat to motor	Sports shooters	Drink included	Golf hotel
Bowling alley	Squash	Full board	Historic hotel
Catamaran	Surf	Half board	Holiday complex
Children's animation	Tennis	Lunch a la carte	Resort
Darts	Tennis de table	Lunch from menu to	Romantic hotel
Diving	Volley beach	choose	Rural housing
Golf	Volleyball	Menu a la carte	Sky hotel
Gymnastics	Water skiing	Special packages	Spa hotel
Handball	Windsurf		Thematic hotel
Hiking			Casino hotel
Horse riding			

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Accepted for publication