

Study of correlation and uniformity between customer review ratings on different online travel agent websites

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Abstract

The study is to find out whether there is a correlation and uniformity between the customer review ratings on different online travel agent websites. There are a huge number of online travel agent websites in the world. Each website has its own modus operandi and a different way of displaying the content. The various websites have their own customer review systems with different measurement scales. When a free individual traveler wants to select a hotel, he is confused due to the diverse rating scales on the different websites. The study focuses on reducing this customer dilemma. The study considers 50 hotels which are 3 star and above from Pune city and 6 major online travel agent websites. The Karl Pearson's correlation coefficients were determined as the primary step to check the level of correlation followed by a one-way ANOVA and f-test. Then the simple linear regression was done to determine the regression equation between the customer review ratings and the star ratings of the hotel. In the end, the findings, conclusions, and limitations are defined.

Keywords-Sources of Reservation, Online Travel Agent Website, Star rated Hotels, Hotel Star Rating, Customer Review Rating,

Introduction

The tourism and hospitality sector has grown by leaps and bounds in the past two decades. The hotel rooms inventory in the entire world is growing each and every day with new hotels opening worldwide (Martin-Fuentes, E., Mateu, C. and Fernandez, C. 2018). The customers go and stay in these hotels based on their individual perception about the hotel. If the hotel standards and services match their perception, they are highly satisfied and if they do not match their perception, they have a sense of dissatisfaction. The level of satisfaction can be measured through the online reviews of the guests (Filieri, R. and McLeay, F. 2014). These reviews can be given on various channels like hotel websites, hotel applications, web browsers, meta search engines, online travel agent websites and hotel's own feedback system (Tewari 2009).

In terms of distribution channels, the online travel agent websites are majorly contributing to providing hotels with room sales. These websites are not just booking channels but also a source where any random customer can see the hotel's performance through the reviews and customer review ratings. With time, a huge number of online travel agent websites started operations worldwide and each website adopted their own measures of rating customer reviews. The scales of measurement are different for various online travel agent websites (Martin-Fuentes E, Mellinas J, Parra-Lopez E 2021)

A free individual traveler if wants to go and stay in a particular hotel, he will search online reviews and ratings on these websites. As various websites have different measurement scales, it is difficult for him to conclude with a median rating for that hotel. The purpose of this study is to find out whether there is uniformity between customer review ratings on the various online travel agent websites. This will help the customer to reduce his dilemma in decision making when he uses multiple online travel agent websites to check the review ratings

Literature Review

Online travel agent websites are distribution channels used by different hotels to assist in selling the available room inventory of the hotel to the target customers (Hereter 2020). There are a vast number of online travel agent websites in the entire world and with the advent of internet and technology worldwide they have gained a huge popularity worldwide as a primary source of booking a hotel room (Lo, A. Yao, S. 2019). These online travel agent websites have features like the photos of the hotel, information about the services and facilities and a review system where customers can give their reviews and ratings based on various parameters and overall experience (Filieri, R. 2016). The large number of reviews posted on these online travel agent websites about the hotel rooms and other services lead to an overload of information (Lamest and Brady, 2019; Martin-Fuentes, 2018). This creates a confusion in the mind of the customer while choosing the hotel. The best way to overcome this confusion is to view the customer review ratings (Filieri and McLeay, 2014). The various online travel agent websites have different measurement scales (Martin-Fuentes E, Mellinas J, Parra-Lopez E 2021). So, this again creates a dilemma in front of the customer when he is viewing the same hotel on different online travel agent websites. Hence, the focus of this research is to study the correlation between the customer review ratings of various online travel agent websites which will make the decision-making process for any customer easy.

Research Objective and hypothesis

The study is an exploratory study where the emphasis is on finding on the correlation between customer review ratings on different online travel agent websites. The primary objective of the research is to study if there is uniformity in the customer review ratings across various online travel agent websites irrespective of the measurement scales they are using. Further, the study also wants to find out if there is any relation between the star rating of the hotel and customer review ratings received by the hotel.

Hypothesis

H₀ – There is a no significant difference between the customer review ratings on various online travel agent websites irrespective of the measurement scale.

H₁ – There is a significant difference between the customer review ratings on various online travel agent websites irrespective of the measurement scale.

Research Methodology

For the research 50 hotels from Pune district in Maharashtra in India were considered. The hotels selected are part of a hotel chain and comprise of hotels which are 3 stars and above. The star rating of the hotels is either given by Ministry of Tourism of India or it is self-proclaimed on their website based on the brand positioning of that particular hotel. As per Statistica report (2020), the six major online travel websites in India are makemytrip.com, booking.com, goibibo.com, cleartrip.com, agoda.com and yatra.com. These six online travel agent websites are considered for the study. Out of these six websites makemytrip.com, goibibo.com, cleartrip.com and yatra.com use the measurement scale of 1 to 5 while booking.com and agoda.com use the measurement scale of 1 to 10. For the statistical purpose the review ratings for booking.com and agoda.com have been converted into a scale of 1 to 5. As of May 2023, the review ratings on various online travel agent websites are as follows.

Sr No	Hotel	No of rooms	Star rating (As per Hotel)	Make my trip		Booking.com		Goibibo		Cleartrip		Agoda.com		Yatra.com	
				Customer Review Ratings	No of Reviews										
1	Ibis Hinjawadi	136	3	3.9	1931	7.8	1268	4	866	4	966	7.8	2815	4.4	4342
2	Keys select Pimpri	101	3	4	1579	6.2	62	4	798	4.1	1857	7.2	152	4.1	4127
3	Ginger Pimpri	97	3	3.8	2254	7.1	88	3.7	3657	4	673	7.2	151	3.5	93
4	Holiday Inn Express Hinjawadi	104	3	3.7	1786	6.8	1358	3.8	603	4	467	7	2930	4.2	2553
5	Holiday Inn Express Pimpri	142	3	3.7	1169	6.6	538	3.8	454	4.1	113	7.6	251	4.3	2421
6	Fern residency	40	3	4.2	998	7.4	39	4.3	1008	4.1	180	8	31	4.2	1615
7	Central Park	73	3	3.9	1198	6.9	263	4.1	1410	4.1	2529	7.8	509	4	3722
8	Keys Prima Parc Estique	115	3	3.9	3503	5.9	493	3.8	1979	4	651	7.5	366	4	4322
9	Royal Orchid Central	115	3	4	2023	7	635	4	1363	4.2	1663	7.7	998	4.1	2151
10	St Laurn	84	3	3.7	3963	7	152	3.7	3935	4	1080	7.3	1280	3.9	11544
11	Royal Orchid Golden Suites	71	4	4	2160	7.1	436	4.1	1710	4.1	1132	7.9	768	4	621
12	Courtyard by Marriott Hinjawadi	153	4	4.5	382	8.8	237	4.4	88	4.4	1398	8.8	291	4.3	6522
13	Tip Top International	207	4	3.8	229	7.5	384	4.1	122	4.2	90	7.9	733	4.1	776
14	Vivanta By Taj Hinjewadi	150	4	4.4	1724	8.1	525	4.3	258	4.2	1141	8.3	357	4.4	6153
15	Double tree by Hilton Chinchwad	115	4	4.5	536	8.5	202	4.4	101	4.3	1199	8.6	257	4.3	4419
16	Enrise by Sayaji	29	3	4	727	7.7	132	4.2	502	4	49	7.9	155	4	1221
17	Ramee Grand	88	4	4.1	1651	7.7	436	4.3	954	4	594	8.1	291	4.2	1446
18	Hotel Hindusthan International	48	4	3.5	2358	7	202	3.3	1236	3.7	369	6.8	71	3.9	2100
19	Lemon Tree Hinjawadi	69	3	3.9	2867	6	217	3.8	1438	4	3015	7.3	303	4	3897
20	Fort Jadhavgarh	58	4	4.2	1025	8.1	512	4.3	463	4	1548	8.3	202	4.3	5351
21	Fairfield By Marriott	109	3	4.1	1058	7.9	816	4	351	4.2	649	8	950	4.2	2502
22	Lemon Tree Premier	201	5	4.2	3036	7.1	433	4.1	1207	4.3	1046	8.1	474	4.3	4401
23	Orchid	346	4	3.9	4564	7.3	2226	4	3121	4.2	3335	7.6	2609	4.2	17713
24	Hyatt Pune	209	5	4.2	1202	7.8	1578	4.2	481	4.2	3538	8.1	251	4.4	9434
25	IHCL SeleQtions Blue Diamond	110	5	4.4	807	8.3	592	4.5	225	4.2	1906	8.7	103	4.4	7219

Sr No	Hotel	No of rooms	Star rating (As per Hotel)	Make my trip		Booking.com		Goibibo		Cleartrip		Agoda.com		Yatra.com	
				Customer Review Ratings	No of Reviews										
26	Marriott Suites	109	5	4.6	312	8.8	293	4.7	81	4.7	2867	9.1	47	4.6	4978
27	Westin	277	5	4.4	745	8.5	262	4.3	129	4.4	2497	8.6	101	4.4	22413
28	Aamby Vally city resort	500	5	3.7	1963	6.2	1667	3.5	28	4	1469	7.5	169	3.7	5437
29	Hilton Shillim retreat	99	5	4.3	1340	8	611	3.8	135	4	2097	8.2	754	4.4	2169
30	Amanora the Fern	26	5	4.4	916	8	8.2	4.5	352	4.5	2566	8.1	117	4.5	5361
31	The Pride hotel	111	4	3.7	1665	6.3	328	3.8	826	4	1147	7.5	160	4	6494
32	Corianthins resort and club	146	5	4.4	3892	8.5	1102	4.5	1574	4.5	2725	8.6	659	4.4	3188
33	Radisson Blu Kharadi	141	5	4.3	2322	7.8	1326	4.2	738	4.2	2496	8.2	172	4.3	11177
34	Ramada Plaza by Wyndham	172	5	3.9	1168	7.5	166	3.8	216	4.2	1170	7.6	237	4.1	5396
35	Ginger Wakad	127	3	3.7	5023	5.9	274	3.7	3657	4	1026	7.1	128	3.6	97
36	Ibis Pune	160	3	3.9	1931	7	1843	3.7	662	4.1	1474	7.4	2124	4.3	8576
37	Courtyard Marriott Chakan	177	4	4.5	253	9.1	110	4.4	48	4.4	857	8.9	147	4.4	5104
38	Hyatt Place	117	4	4.3	787	8.1	590	4.3	448	4.2	1126	8.4	706	4.2	4153
39	Crowne Plaza	103	5	4.1	1415	7.3	346	4.2	177	4.1	57	7.9	139	4.1	6738
40	Four Points by Sheraton	217	5	4.1	4150	7.4	1398	4.1	1314	4.2	2377	8.2	338	4.3	11264
41	J W Marriott	414	5	4.4	667	8.9	420	4.6	138	4.6	5172	9	522	4.6	32400
42	Novotel Pune	223	5	4	3836	7.2	2430	3.9	1124	4.1	2216	8.1	384	4.4	15631
43	Sayaji	243	4	4.3	1834	7.6	583	4.2	826	4.2	1545	8.4	124	4.3	17043
44	O Hotel	111	5	4	2902	7.1	653	3.8	1989	4	1171	7.9	464	4.1	1010
45	Conrad Hilton	310	5	4.6	1278	8.8	475	4.6	246	4.6	3564	9.1	137	4.6	15778
46	Grand Sheraton	177	5	4.5	447	8.4	344	4.8	48	4.5	1555	8.5	746	4.5	13836
47	Hyatt Regency	222	5	4.4	732	8.2	418	4.3	229	4.3	3618	8.7	132	4.5	11236
48	Hilton Garden Inn Wakad	144	4	4	146	7.6	345	4.2	32	4.2	71	7.8	360	4.2	521
49	Ritz Carlton Pune	198	5	4.6	363	9.4	393	4.7	243	4.7	782	9.4	422	4.7	4324
50	Lemon Tree Vimannagar	120	4	4.1	2054	7.5	361	4.1	860	4	241	7.9	346	4.2	1513

Table no 1- List of hotels with customer review ratings on various online travel agent websites

Data analysis

The first step in data analysis was the descriptive statistics as below-

Sr No	Hotel Name	Mean	Standard Error	Median	Mode	Standard Deviation	Sample Variance	Kurtosis	Skewness	Range	Min	Max	Sum
1	Ibis Hinjawadi	4.02	0.08	3.95	3.9	0.194	0.038	4.678	2.116	0.5	3.9	4.4	24.1
2	Keys select Pimpri	3.82	0.16	4	4	0.397	0.158	1.667	-1.536	1	3.1	4.1	22.9
3	Ginger Pimpri	3.69	0.08	3.65	#N/A	0.186	0.034	0.250	0.936	0.5	3.5	4	22.15
4	Holiday Inn Express Hinjawadi	3.77	0.12	3.75	#N/A	0.301	0.091	-1.023	0.281	0.8	3.4	4.2	22.6
5	Holiday Inn Express Pimpri	3.83	0.14	3.8	3.8	0.344	0.119	0.397	-0.246	1	3.3	4.3	23
6	Fern residency	4.08	0.09	4.15	4.2	0.214	0.046	1.878	-1.339	0.6	3.7	4.3	24.5
7	Central Park	3.91	0.10	3.95	3.9	0.242	0.058	3.370	-1.730	0.65	3.45	4.1	23.45
8	Keys Prima Parc Estique	3.73	0.16	3.85	4	0.397	0.158	4.659	-2.098	1.05	2.95	4	22.4
9	Royal Orchid Central	3.94	0.10	4	4	0.246	0.060	2.040	-1.320	0.7	3.5	4.2	23.65
10	St Lourn	3.74	0.07	3.7	3.7	0.180	0.032	-0.541	0.318	0.5	3.5	4	22.45
11	Royal Orchid Golden Suites	3.95	0.08	4	4	0.205	0.042	4.315	-1.987	0.55	3.55	4.1	23.7
12	Courtyard by Marriott Hinjawadi	4.40	0.03	4.4	4.4	0.063	0.004	2.500	-3.184	0.2	4.3	4.5	26.4
13	Tip Top International	3.98	0.07	4.025	4.1	0.181	0.033	-1.875	-0.282	0.45	3.75	4.2	23.9
14	Taj Gateway	4.25	0.06	4.25	4.4	0.141	0.020	-1.481	-0.239	0.35	4.05	4.4	25.5
15	Double tree by Hilton Chinchwad	4.34	0.04	4.3	4.3	0.092	0.008	0.862	1.236	0.25	4.25	4.5	26.05
16	Enrise by Sayaji	4.00	0.05	4	4	0.114	0.013	2.500	0.911	0.35	3.85	4.2	24
17	Ramee Grand	4.08	0.06	4.075	#N/A	0.157	0.025	-0.034	-0.120	0.45	3.85	4.3	24.5
18	HHI Pune	3.55	0.09	3.5	3.5	0.217	0.047	0.068	0.795	0.6	3.3	3.9	21.3
19	Lemon Tree Hinjawadi	3.73	0.15	3.85	4	0.379	0.144	3.530	-1.839	1	3	4	22.35
20	Fort Jadhavgarh	4.17	0.05	4.175	4.3	0.125	0.016	-1.715	-0.221	0.3	4	4.3	25
21	Fairfield By Marriott	4.08	0.04	4.05	4	0.108	0.012	-2.214	0.265	0.25	3.95	4.2	24.45
22	Lemon Tree Premier	4.08	0.11	4.15	4.3	0.280	0.079	3.422	-1.765	0.75	3.55	4.3	24.5
23	Orchid	3.96	0.09	3.95	4.2	0.220	0.048	-1.322	-0.146	0.55	3.65	4.2	23.75
24	Hyatt Pune	4.16	0.07	4.2	4.2	0.169	0.028	0.695	-0.262	0.5	3.9	4.4	24.95
25	Vivanta By Taj Blue Diamond	4.33	0.05	4.375	4.4	0.133	0.018	-1.188	-0.422	0.35	4.15	4.5	26
26	Marriott Suites	4.59	0.05	4.6	4.6	0.111	0.012	1.142	-0.991	0.3	4.4	4.7	27.55
27	Westin	4.34	0.03	4.35	4.4	0.066	0.004	-2.253	-0.326	0.15	4.25	4.4	26.05
28	Aamby Vally city resort	3.63	0.12	3.7	3.7	0.303	0.092	1.757	-0.984	0.9	3.1	4	21.75
29	Hilton Shillim retreat	4.10	0.09	4.05	4	0.219	0.048	-0.781	0.171	0.6	3.8	4.4	24.6
30	Amanora the Fern	4.33	0.10	4.45	4.5	0.236	0.056	-1.808	-0.880	0.5	4	4.5	25.95
31	The Pride hotel	3.73	0.13	3.775	4	0.313	0.098	2.991	-1.576	0.85	3.15	4	22.4
32	Corianthins resort and club	4.39	0.04	4.4	4.4	0.102	0.010	-1.419	-0.302	0.25	4.25	4.5	26.35
33	Radisson Blu Kharadi	4.17	0.06	4.2	4.3	0.151	0.023	1.531	-1.270	0.4	3.9	4.3	25
34	Ramada Plaza by Wyndham	3.93	0.08	3.85	3.8	0.184	0.034	-1.282	0.816	0.45	3.75	4.2	23.55
35	Ginger Wakad	3.58	0.14	3.65	3.7	0.347	0.121	2.952	-1.278	1.05	2.95	4	21.5
36	Ibis Pune	3.87	0.12	3.8	3.7	0.294	0.087	-0.859	0.418	0.8	3.5	4.3	23.2
37	Courtyard Marriott Chakan	4.45	0.03	4.425	4.4	0.063	0.004	-0.781	0.889	0.15	4.4	4.55	26.7
38	Hyatt Place	4.21	0.04	4.2	4.2	0.092	0.008	1.356	-0.944	0.25	4.05	4.3	25.25
39	Crowne Plaza	4.02	0.08	4.1	4.1	0.197	0.039	2.819	-1.645	0.55	3.65	4.2	24.1
40	Four Points by Sheraton	4.08	0.08	4.1	4.1	0.204	0.042	3.420	-1.572	0.6	3.7	4.3	24.5
41	J W Marriott	4.53	0.04	4.55	4.6	0.088	0.008	-1.925	-0.495	0.2	4.4	4.6	27.15
42	Novotel Pune	4.01	0.11	4.025	#N/A	0.262	0.068	1.458	-0.141	0.8	3.6	4.4	24.05
43	Sayaji	4.17	0.08	4.2	4.2	0.186	0.035	4.649	-2.066	0.5	3.8	4.3	25
44	O Hotel	3.90	0.08	3.975	4	0.197	0.039	1.534	-1.315	0.55	3.55	4.1	23.4
45	Conrad Hilton	4.56	0.03	4.6	4.6	0.080	0.006	4.640	-2.148	0.2	4.4	4.6	27.35
46	Grand Sheraton	4.46	0.09	4.5	4.5	0.215	0.046	0.240	0.415	0.6	4.2	4.8	26.75
47	Hyatt Regency	4.33	0.05	4.325	4.3	0.133	0.018	1.601	-0.714	0.4	4.1	4.5	25.95
48	Hilton Garden Inn Wakad	4.05	0.07	4.1	4.2	0.176	0.031	-1.925	-0.495	0.4	3.8	4.2	24.3
49	Ritz Carlton Pune	4.68	0.02	4.7	4.7	0.041	0.002	6.000	-2.449	0.1	4.6	4.7	28.1
50	Lemon Tree Vimannagar	4.02	0.06	4.05	4.1	0.157	0.025	1.001	-0.925	0.45	3.75	4.2	24.1

Table no 2- Descriptive analysis of sample hotels

The average value of the customer review ratings is calculated using median as a measure of central tendency. If there are any extreme values, the median function will be more robust compared to arithmetic mean.

The next step was to find out the correlation between the customer review ratings taking into consideration two online travel agent websites at the same time. To find the correlation, the Karl Pearson's correlation coefficient was used.

	<i>Make my trip</i>	<i>Booking.com</i>	<i>Goibibo</i>	<i>Cleartrip</i>	<i>Agoda.com</i>	<i>Yatra.com</i>
Make my trip	1					
Booking.com	0.8509	1				
Goibibo	0.8910	0.8077	1			
Cleartrip	0.8069	0.7431	0.8276	1		
Agoda.com	0.9266	0.8882	0.8725	0.8191	1	
Yatra.com	0.7799	0.7581	0.7438	0.7242	0.7909	1

Table no 3- Karl Pearson's Correlation Coefficients of customer review ratings

In the above table we see that there are 15 correlation coefficients calculated using 2 online travel agent websites at the same time. The value of all correlation coefficients is above 0.7. This concludes that there is a high positive correlation between the customer review ratings on various online travel agent websites.

Hypothesis testing

For testing the hypothesis, we are using the one-way ANOVA and f-test to find out the result.

SUMMARY				
<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>
Ibis Hinjewadi	6	24.1	4.016667	0.037667
Keys select Pimpri	6	22.9	3.816667	0.157667
Ginger Pimpri	6	22.15	3.691667	0.034417
Holiday Inn Express Hinjewadi	6	22.6	3.766667	0.090667
Holiday Inn Express Pimpri	6	23	3.833333	0.118667
Fern residency	6	24.5	4.083333	0.045667
Central Park	6	23.45	3.908333	0.058417
Keys Prima Parc Estique	6	22.4	3.733333	0.157667
Royal Orchid Central	6	23.65	3.941667	0.060417
St Lourn	6	22.45	3.741667	0.032417
Royal Orchid Golden Suites	6	23.7	3.95	0.042
Courtyard by Marriott Hinjewadi	6	26.4	4.4	0.004
Tip Top International	6	23.9	3.983333	0.032667
Vivanta By Taj Hinjewadi	6	25.5	4.25	0.02
Double tree by Hilton Chinchwad	6	26.05	4.341667	0.008417
Enrise by Sayaji	6	24	4	0.013
Ramee Grand	6	24.5	4.083333	0.024667
Hotel Hindusthan International	6	21.3	3.55	0.047

Lemon Tree Hinjewadi	6	22.35	3.725	0.14375
Fort Jadhavgarh	6	25	4.166667	0.015667
Fairfield By Marriott	6	24.45	4.075	0.01175
Lemon Tree Premier	6	24.5	4.083333	0.078667
Orchid	6	23.75	3.958333	0.048417
Hyatt Pune	6	24.95	4.158333	0.028417
IHCL SeleQtions Blue Diamond	6	26	4.333333	0.017667
Marriott Suites	6	27.55	4.591667	0.012417
Westin	6	26.05	4.341667	0.004417
Aamby Vally city resort	6	21.75	3.625	0.09175
Hilton Shillim retreat	6	24.6	4.1	0.048
Amanora the Fern	6	25.95	4.325	0.05575
The Pride hotel	6	22.4	3.733333	0.097667
Corianthins resort and club	6	26.35	4.391667	0.010417
Radisson Blu Kharadi	6	25	4.166667	0.022667
Ramada Plaza by Wyndham	6	23.55	3.925	0.03375
Ginger Wakad	6	21.5	3.583333	0.120667
Ibis Pune	6	23.2	3.866667	0.086667
Courtyard Marriott Chakan	6	26.7	4.45	0.004
Hyatt Place	6	25.25	4.208333	0.008417
Crowne Plaza	6	24.1	4.016667	0.038667
Four Points by Sheraton	6	24.5	4.083333	0.041667
J W Marriott	6	27.15	4.525	0.00775
Novotel Pune	6	24.05	4.008333	0.068417
Sayaji	6	25	4.166667	0.034667
O Hotel	6	23.4	3.9	0.039
Conrad Hilton	6	27.35	4.558333	0.006417
Grand Sheraton	6	26.75	4.458333	0.046417
Hyatt Regency	6	25.95	4.325	0.01775
Hilton Garden Inn Wakad	6	24.3	4.05	0.031
Ritz Carlton Pune	6	28.1	4.683333	0.001667
Lemon Tree Vimannagar	6	24.1	4.016667	0.024667

Table no 4- Summary of one-way ANOVA- Hypothesis Testing

ANOVA							
Source of Variation	SS	df	MS	F	P-value	F crit	
Between Groups	22.42001	49	0.457551	1.405386342	0.0412	10.01462	
Within Groups	11.42208	250	0.045688				
Total	33.84209	299					

Table no 5- Hypothesis Testing- one-way ANOVA

In the ANOVA table, we can see that the critical value of F is greater than the calculated value. So, we reject the alternative hypothesis and accept the null hypothesis. Hence, we can conclude that there is no significant difference between the customer review ratings on various online travel agent websites irrespective of the measurement scale.

Regression Analysis

We have found that there is uniformity between the customer review ratings on various online travel agent websites. Now, we need to find out whether there is a relation between the customer review ratings and the star ratings of the hotel. For this we will be using simple linear regression where we predict the customer review rating based on the star rating of the hotel.

Sr No	Hotel	Star rating (As per Hotel)	Median Customer Review Ratings
1	Ibis Hinjewadi	3	4.0
2	Keys select Pimpri	3	4.0
3	Ginger Pimpri	3	3.7
4	Holiday Inn Express Hinjewadi	3	3.8
5	Holiday Inn Express Pimpri	3	3.8
6	Fern residency	3	4.2
7	Central Park	3	4.0
8	Keys Prima Parc Estique	3	3.9
9	Royal Orchid Central	3	4.0
10	St Lurn	3	3.7
11	Royal Orchid Golden Suites	4	4.0
12	Courtyard by Marriott Hinjewadi	4	4.4
13	Tip Top International	4	4.0
14	Vivanta By Taj Hinjewadi	4	4.3
15	Double tree by Hilton Chinchwad	4	4.3
16	Enrise by Sayaji	3	4.0
17	Ramee Grand	4	4.1
18	Hotel Hindusthan International	4	3.5
19	Lemon Tree Hinjewadi	3	3.9
20	Fort Jadhavgarh	4	4.2
21	Fairfield By Marriott	3	4.1
22	Lemon Tree Premier	5	4.2
23	Orchid	4	4.0
24	Hyatt Pune	5	4.2
25	IHCL SeleQtions Blue Diamond	5	4.4

26	Marriott Suites	5	4.6
27	Westin	5	4.4
28	Aamby Vally city resort	5	3.7
29	Hilton Shillim retreat	5	4.1
30	Amanora the Fern	5	4.5
31	The Pride hotel	4	3.8
32	Corianthins resort and club	5	4.4
33	Radisson Blu Kharadi	5	4.2
34	Ramada Plaza by Wyndham	5	3.9
35	Ginger Wakad	3	3.7
36	Ibis Pune	3	3.8
37	Courtyard Marriott Chakan	4	4.4
38	Hyatt Place	4	4.2
39	Crowne Plaza	5	4.1
40	Four Points by Sheraton	5	4.1
41	J W Marriott	5	4.6
42	Novotel Pune	5	4.0
43	Sayaji	4	4.2
44	O Hotel	5	4.0
45	Conrad Hilton	5	4.6
46	Grand Sheraton	5	4.5
47	Hyatt Regency	5	4.3
48	Hilton Garden Inn Wakad	4	4.1
49	Ritz Carlton Pune	5	4.7
50	Lemon Tree Vimannagar	4	4.1

Table No 6- Median customer review ratings of sample hotels

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R		0.577482046						
R Square		0.333485513						
Adjusted R Square		0.319599795						
Standard Error		0.228331978						
Observations		50						
ANOVA								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	1.252109	1.2521089	24.0164	0.000011298			
Residual	48	2.502504	0.0521355					
Total	49	3.754613						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>

Intercept	3.3144	0.1626	20.3813	0.0000	2.9874	3.6414	2.9874	3.6414
Star rating	0.1905	0.0389	4.9007	0.0000	0.1123	0.2687	0.1123	0.2687

Table no 7- Regression Analysis of customer review ratings and hotel star ratings

From the above table we see that the significant value in the ANOVA table is less 0.00001 which is less than 0.05. This means the star rating of the hotel has a positive impact on the customer review ratings. The value of R Square is 0.3334, which also shows a strong relationship between the two variables.

The linear equation used for a regression analysis is $y = a + bx$ where y is the dependent variable, which is customer review ratings, x is the independent variable which is the star rating of the hotel, a is the constant and b is the regression coefficient of the independent variable. From the above table $a = 3.3144$ and $b = 0.1905$. The regression equation is defined as below-

$$y = 3.3144 + 0.1905x$$

To determine the strength of the regression equation we need to find out the standard residuals. The rule determines that the values of the standard residuals should be between -2 to +2 with a 5% acceptance level.

RESIDUAL OUTPUT			
<i>Observation</i>	<i>Predicted Median Ratings</i>	<i>Residuals</i>	<i>Standard Residuals</i>
1	3.885942029	0.064058	0.2834548
2	3.885942029	0.114058	0.5047035
3	3.885942029	-0.235942	-1.0440372
4	3.885942029	-0.135942	-0.6015399
5	3.885942029	-0.085942	-0.3802912
6	3.885942029	0.264058	1.1684495
7	3.885942029	0.064058	0.2834548
8	3.885942029	-0.035942	-0.1590425
9	3.885942029	0.114058	0.5047035
10	3.885942029	-0.185942	-0.8227886
11	4.076449275	-0.076449	-0.338286
12	4.076449275	0.323551	1.4317034
13	4.076449275	-0.051449	-0.2276617
14	4.076449275	0.173551	0.7679574
15	4.076449275	0.223551	0.9892061
16	3.885942029	0.114058	0.5047035
17	4.076449275	-0.001449	-0.006413
18	4.076449275	-0.576449	-2.5507728
19	3.885942029	-0.035942	-0.1590425
20	4.076449275	0.098551	0.4360844
21	3.885942029	0.164058	0.7259522
22	4.266956522	-0.116957	-0.5175295
23	4.076449275	-0.126449	-0.5595347
24	4.266956522	-0.066957	-0.2962808

25	4.266956522	0.108043	0.4780895
26	4.266956522	0.333043	1.4737086
27	4.266956522	0.083043	0.3674652
28	4.266956522	-0.566957	-2.5087676
29	4.266956522	-0.216957	-0.9600269
30	4.266956522	0.183043	0.8099626
31	4.076449275	-0.301449	-1.3339051
32	4.266956522	0.133043	0.5887139
33	4.266956522	-0.066957	-0.2962808
34	4.266956522	-0.416957	-1.8450216
35	3.885942029	-0.235942	-1.0440372
36	3.885942029	-0.085942	-0.3802912
37	4.076449275	0.348551	1.5423277
38	4.076449275	0.123551	0.5467087
39	4.266956522	-0.166957	-0.7387782
40	4.266956522	-0.166957	-0.7387782
41	4.266956522	0.283043	1.2524599
42	4.266956522	-0.241957	-1.0706512
43	4.076449275	0.123551	0.5467087
44	4.266956522	-0.291957	-1.2918999
45	4.266956522	0.333043	1.4737086
46	4.266956522	0.233043	1.0312112
47	4.266956522	0.058043	0.2568409
48	4.076449275	0.023551	0.1042113
49	4.266956522	0.433043	1.916206
50	4.076449275	-0.026449	-0.1170373

Table no 8- Output of residual regression analysis

Of the 50 observations, only 2 observations do not fall between the range of -2 and +2. The rule also has a 5% acceptance level which means 2 observations if do not fall between this range, it is acceptable. So, based on the above observations we can conclude that the regression equation is highly applicable and acceptable.

Findings

After a detailed data analysis, we have found out that there is a high positive correlation between the customer review ratings on all the online travel agent website. The highest correlation is between makemytrip.com & agoda.com, makemyteip.com & goibibo.com, and booking.com & agoda.com. The least correlation is between cleartrip.com & yatra.com and cleartrip.com & booking.com.

During the hypothesis testing we found out the critical value of F was greater than the calculated value and so we have accepted the null hypothesis. Also, the p value was less than 0.05 which means we have to accept the null hypothesis.

In the regression analysis between hotel star rating and customer review ratings we found an R Square value of 0.334 which indicates a strong relationship between the independent variable and the dependent variable. The regression equation was defined. The standard residual values of all the observations were within the acceptable limits which concludes that the regression equation is highly applicable and acceptable.

Conclusion

From the study, we can conclude that the customer can use any of the online travel agent website for booking purposes and need not refer different sites for review ratings as there is a correlation and uniformity in the customer review ratings across the various online travel agent websites. There is no significant difference between the customer review ratings across different online travel agent websites irrespective of the measurement scale.

The regression equation defined between the hotel star rating and customer review rating shows a strong relationship and is highly applicable and acceptable. This can be tested in various other sample hotels in different parts of the worlds.

Limitations

The research is based on the data collected from the six online travel websites mentioned in the study. The hotels which are not classified by the ministry of tourism are selected just by considering only two points- that it they are part of hotel chain, and they have self-proclaimed themselves as three star or above in star rating based on the brand positioning. The hotels are from Pune district of Maharashtra state in India.

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