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INFLUENCE OF TRIPADVISOR REVIEWS ON GUEST SATISFACTION WITH RESTAURANTS IN MAJOR CITIES OF FORMER YUGOSLAVIA

Uticaj komentara sa sajta Tripadvisor na zadovoljstvo gostiju u restoranima velikih gradova bivše Jugoslavije

Abstract

In the era of urban tourism expansion, restaurants in major cities of former Yugoslavia (Belgrade, Zagreb, Ljubljana, Sarajevo, Skopje, Podgorica, which are also the capitals of the newly emerged countries) are very important factors in meeting the needs of tourists. The Internet with specialized websites and social networks provides a wealth of information to potential restaurant visitors. Tripadvisor is one of the most popular hospitality websites that gives its users an insight into past experiences of restaurant customers. Previous research has shown that there is a close relationship between the number of reviews on the website and the financial performance of restaurants. The aim of this paper is to examine the relationship of visitor satisfaction between the mentioned capitals, as well as the trends in the number of reviews and satisfaction over time, including the correlation between the number of written comments and visitor satisfaction via the analysis of ratings and comments left on the Tripadvisor site.

Keywords: *restaurant, Tripadvisor, restaurant visitor satisfaction, restaurant service, reviews on Tripadvisor*

Sažetak

U eri ekspanzije gradskog turizma restorani u glavnim gradovima bivše Jugoslavije (Beograd, Zagreb, Ljubljana, Sarajevo, Skoplje, Podgorica) predstavljaju značajan element turističke ponude na prostoru bivše SFRJ. Specijalizovani sajtovi i društvene mreže na internetu obezbeđuju izuzetno veliki broj relevantnih informacija potencijalnim posetiocima restorana. *Tripadvisor* je jedan od najpopularnijih sajtova u oblasti ugostiteljstva, koji korisnicima pruža uvid u prethodna iskustva posetilaca ugostiteljskih objekata. Ranija istraživanja su pokazala da komentari utiču na povećanje profita restorana. Cilj ovog rada jeste da se ispita odnos zadovoljstva posetilaca restorana u pomenutim glavnim gradovima, kao i trendovi u broju komentara i zadovoljstvu kroz vreme i povezanost broja napisanih komentara sa zadovoljstvom korisnika restorana u pomenutim gradovima kroz analizu ocena i komentara ostavljenih na *Tripadvisor* veb sajtu.

Ključne reči: *restorani, Tripadvisor, zadovoljstvo posetilaca restorana, restoraterska usluga, komentari na sajtu Tripadvisor*

Introduction

In contemporary times, most restaurants recognize the need to use specialized sites and social networks in their business. With the help of these modern information tools, restaurants are becoming more accessible to a large number of potential consumers [45].

In addition to their basic role of meeting consumers' needs in terms of food and drink, for different types of consumers (business people, families, groups of friends) restaurants have become presenters of national cuisines and drivers of new forms of tourism, such as gastro-tourism, wine tourism, rural tourism, etc. [20]. The caterers have an important task: to leave the best possible impression on visitors – not only by fulfilling their expectations, but also by striving to surpass them. Therefore, it is extremely important for the economy of each country to have educational institutions and good restaurant and hotel professionals, including practitioners from other fields fostering tourism development, as that is a prerequisite for financial growth of this economic activity [48]. Growing tourism trends are also reflected in restaurants in major cities, as guests are inclined to search for insightful information using IT technologies [54].

A large part of catering companies recognize the importance of social networks for business, as well as the necessity of using sites such as Tripadvisor, Booking.com, etc. With these tools, restaurants achieve greater market visibility generating thereby higher revenues. Today, the use of information technologies has become a necessity of every catering facility and restaurant [16].

In the modern age, digitally literate restaurant guests do not shy away from sharing their impressions of catering establishments on social networks, sites that specialize in certain types of reviews, and similar popular venues. In that sense, online social networks have been given primacy held until recently by traditional media. The population born after 1995 is characterized by the use of the Internet, mobile technologies and social networks – all to a large extent. It is a great unknown how these generations will behave as employees and as consumers in the future [38]. A “word-of-mouth” marketing, proven to be the best advertising, is becoming more and more

present in the form of electronic “oral” marketing (eWOM). Today, accessing data via the Internet is rather easy, the problem is how to quickly get quality information from an often inconceivable amount of data [39]. Restaurant visitors leave an extremely large quantity of information about the service received on social networks (Facebook, Instagram, etc.) and specialized sites (Tripadvisor, Booking.com and others). Judging by the number of reviews left, customers are happy to write their impressions on Tripadvisor, while potential restaurant visitors, reading such comments, can get an impression about a particular catering facility – and even decide whether they would like to visit it. In addition to writing reviews on the site, and the overall satisfaction rating from 1-5, it is also possible to individually evaluate the four offered restaurant attributes (food quality, service quality, atmosphere and value for money). Guest satisfaction expressed through evaluation of these attributes on Tripadvisor is positively correlated with repeated purchase [46]. The analysis of these reviews is the starting point of the research part of our paper. The first objective of the paper is to examine the trend in the number of reviews in the observed period from 1 January 2015 through 31 December 2019. The second objective is to establish whether there are trends in the level of restaurant visitor satisfaction over time and whether such trends depend on the city. The third objective is to determine whether there is and what is the association between the number of reviews and the expressed satisfaction of restaurant visitors.

The conclusions drawn should serve as guidelines for caterers in designing future planning and operational activities of the catering establishment. On the other hand, the results will show the influence of reviews left by restaurant guests on visitors' satisfaction.

Literature review

Reliability of user-generated restaurant reviews on the Internet and Tripadvisor

Reviews that consumers leave on the Internet are one of the major sources of information prior to tourism consumption [52]. The survey has shown that in a situation

when one of the two catering establishments of the same type, with identical price lists and the same rating on the site, upgrades its current review score from 3 to 4, it can increase its prices by approximately 11%, while maintaining the same chances of being selected [3]. Data of the U.S. national hospitality industry for 2011 show that 59% of the adult population uses the Internet for food choice, while 33% of Americans choose restaurants based on online reviews [52]. Increased number of positive reviews boosts the consumer confidence in the service quality [3]. Restaurant consumers write reviews for three reasons. Care for other users is the first reason; in this way, future consumers are warned about an unsatisfactory product, or, to the contrary, they are given insight into a positive experience, which can help them in choosing a restaurant. Second, a satisfied customer has a desire to share his/her experience with other potential consumers. Third, by writing a review, a satisfied service user wants to help the catering facility [23]. As the number of Internet users is expected to grow in the future, the increase in the number of written reviews of catering facilities is also expected to increase. This refers particularly to the countries characterized by a high level of individualism. Such population is more inclined to write reviews than societies characterized by collectivism [27].

There are many empirical studies in various economic fields that have investigated the impact of written reviews on company performance. They obtained significant results regarding the manner of understanding as to how the number of reviews left affects revenues, reservations, sales [25]. A study from 2016 set up a hypothesis that reads [25]: "The number of online reviews is positively correlated with restaurant performance". It was concluded that online reviews have a positive effect on both the sales and the number of guests, as well as on the financial results. It was also concluded that the satisfaction of a future guest with such initial information they read is the first and very important step of their overall satisfaction with the catering facility and its service [18]. Public posting of consumers reviews (eWOM) increases the business value of a restaurant [45].

Tripadvisor is one of the most popular sources of information in the hospitality industry [5]. Many

restaurant-related articles raise the issue of reliability of information posted on Tripadvisor; more precisely, it's effectiveness in helping guests decide about dining in a potential restaurant [10].

The issue of validity of Tripadvisor ratings is also owed to the fact that it allows writing of reviews for a large number of facilities, without recognizing differences in consumers' attitudes as a psychologically and socially important factor which does not have to have the same effect on all types of review readers and potential service users which the comment referred to: users can have different views about the same item, and expectations may differ as well. A study from 2013 [10] claims that Tripadvisor is a reliable tool for managers and consumers. On the other hand, the study also points to the presence of fake reviews on this site, as well as the presence of comments intentionally written in a positive fashion with a view to attracting guests (for which the tourists concerned are offered discounts by such restaurants as a counter-service). The authors estimate that Tripadvisor should look for mechanisms which would prevent publishing of false comments [10]. On the other hand, numerous studies have confirmed the veracity of reviews posted on Tripadvisor: they are often the main precondition for a decision of the future service user on where and how to spend the money in hospitality industry [3]. In cases where a potential guest is thinking about several restaurants, comments on Tripadvisor help make a choice [47].

Issues are also raised as to how effective this platform is for creation of positive or negative consumer attitudes, as well as whether there is a connection between the ratings assigned to a restaurant and the financial performance of the company providing the service. One of the problems encountered is a noticeable number of biased comments, which can diminish the credibility not only of the reviewers, but also of the facility concerned, and even the platform itself which enables such a thing.

Restaurant sector in the countries of former Yugoslavia

Countries created from the breakup of the former Yugoslavia and their capitals recorded a steady increase in the number of tourists in the 2015-2019 period.

Foreign exchange inflows in the tourism sector in the countries of former Yugoslavia are constantly increasing, and accordingly this industry has a positive impact on GDP of these countries [21]. For every 1% growth in tourist arrivals in the Western Balkans, GDP grows by 0.08% per capita [41]. Consumption growth in the business and recreational tourism sectors has a direct impact on GDP and employment [2]. The increase in the number of tourists also requires former Yugoslav countries to adjust the offer to their expectations; the adjustment would also result in an improvement in the economic effects expressed in these countries' GDP [12]. A study of restaurants [51] showed that the perception of local gastronomy significantly depends on demographic and sociological characteristics of restaurant visitors. The level of service and quality of the restaurant can be enhanced by monitoring these elements.

Popular festivals strongly attract visitors coming to the countries of the former Yugoslavia, while restaurants, in particular those with an authentic offer, play a major role in completing the overall experience of these guests [11]. However, the restaurants of the countries that emerged from the disintegration of Yugoslavia are experiencing a “problem” of Europeanization of cuisine. The rapprochement of the countries of the Western Balkans with the EU has brought certain changes in the restaurant service

and production processes, which to a lesser or greater extent endangers the authentic service establishments and their national cuisines [42]. On the other hand, the authentic offer of restaurants in the countries of the Western Balkans region is similar. Offered food specialties such as sarma (cabbage leaves stuffed with minced meat), baklava, moussaka, feta cheese are similar products with, depending on the country, different names [9]. The restaurants of the countries of the region are important in creating an image [35]. That said, the Western Balkans countries face a challenge mirrored in the need to overcome the existing differences and find ways to initiate/improve mutually beneficial cooperation [41].

The tourist market in Serbia follows world trends. In the period from 2014 to 2019, the tourism growth rates in Serbia exceeded the world and European average [7]. Foreign tourists obtained most information about the tourist offer of Serbia via the Internet (64%), then from magazines (10%) and, to a lesser extent, through print materials, TV and other media [31]. Of all tourist destinations in Serbia, Belgrade attracts the largest number of tourists. The diversity of the offer in the capital includes rich cultural heritage, a larger number of shopping centers, entertainment facilities and restaurants. The richness of the content satisfies the individual demand of a modern tourist [33]. According to the data of the Statistical Office of the Republic of Serbia

Table 1: Summary of tourist arrivals and overnights in the Western Balkans countries in the 2015-2019 period

Country	Tourist arrivals (in 1000)					Overnights (in 1000)				
	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019
Croatia	14343	15594	17431	18667	19566	71605	78050	86200	89652	91243
Slovenia	4374	4834	5503	5933	6230	11654	12648	14209	15695	15775
Bosnia and Herzegovina	1030	1115	1308	1468	1641	2143	2376	2678	3040	3374
Macedonia	816	857	999	1127	1185	2394	2461	2775	3177	3262
Montenegro	1713	1814	2000	2205	2645	11055	11250	11953	12930	14456
Serbia	2437	2754	3086	3431	3690	6652	7534	8325	9336	10732

Table 2: Overview of the number of overnight stays in capital cities of the Western Balkans countries

Capital	Overnights				
	2015	2016	2017	2018	2019
Zagreb	120308	128255	148810	202606	225561
Ljubljana	1373436	1553802	1782983	2179916	2227669
Sarajevo	351321	502571	605052	652604	771130
Skopje	378253	392798	498661	565812	607786
Podgorica	155410	177191	261219	282757	310593
Belgrade	1686017	1867150	2190674	2480516	2696832

(SORS), of the total number of foreign tourists who visited Serbia in the period March 2019 – February 2020, 57% had overnight stays in Belgrade. Restaurants in Belgrade have modern and attractive traditional dishes in their gastronomic offer, and they make use of the fact that food has become one of the main reasons for travelling [8].

For the Republic of Croatia, tourism is one of its most important economic branches. Tourism in Croatia directly or indirectly accounts for 22% of GDP and 40% of exports [6].

Tourism in Croatia is characterized by a long tradition and offer that relies on mass “sun and sea” tourism. Croatia wants to complete its offer and that is why new, specific types of tourism are emerging [37]. Croatia is the country with the richest heritage in the tourism industry of all the countries of the former Yugoslavia – it accounted for 75% of the total tourist visits. Croatian tourismologists have recognized the importance of gastronomic offer in the tourist industry of their country, promoting branding of food heritage as one of the most important goals of Croatian tourism. Croatian restaurants with local gastro offer attract millions of tourists. The poor supply of local food in the best Croatian restaurants, however, turned out to be a problem. According to research, the offer in Croatian restaurants relies on foreign cuisines although its restaurants have quality chefs. By enriching local gastronomic offer, Croatia would gain a lot in quality. Restaurants in Croatia need to promote their own cuisine. Such cuisine is easily associated with culture, heritage and identity [19].

In Slovenia, tourism is one of the most important industries. In 2015, it accounted for 13% in GDP [34].

Data of the Statistical Office of Slovenia [43] show that in the 2015-2019 period there was a constant growth in the number of tourists in Slovenia, which is directly correlated with the growth of tourism-generated revenue.

Slovenia has a wide range of tourist products. Catering in this country took a new direction in the '90s of the last century, when the country gained independence, and when significant funds, through privatization, were invested in tourist facilities. Thanks to European funds for regional development, Slovenia has invested 97 million euros in 96 infrastructural projects. Such investments have significantly raised the level of the restaurant offer of this

country [4]. Most restaurants are part of the SME sector, operating mainly as family restaurants. Restaurants in Slovenia have a great impact on transport, trade, natural environment and society [26].

Bosnia and Herzegovina (BIH) has the potential to achieve notable results in the tourism. Tourism industry can become its largest export branch. Tourism composed of elements essentially consisting of local products, tradition, culture, natural heritage and human resources are an integral part of the plan adopted by the country in its Development Strategy of the Federation of Bosnia and Herzegovina for the period 2008-2018 [22]. To make a satisfactory shift in tourism development, Bosnia and Herzegovina needs a fundamental approach based on raising the visitor satisfaction to a higher level [17]. The Agency for Statistics of Bosnia and Herzegovina records a steady increase in the number of tourists in the country [1].

Bosnia and Herzegovina is dominated by Sarajevo as one of the most important geopolitical centers in Southeast Europe. Tourists find Bašćaršija to be the most attractive; even today, with its restaurants, it is the main point of tourist visits [15].

North Macedonia is currently not an attractive tourist destination globally, although statistics show a steady increase in the number of tourists [29].

From the aspect of the restaurant industry, the long-term strategy of Macedonian tourism development puts Skopje in the first place as a destination, whose potential should be used. A better and more present offer on the market may generate more significant financial effects in the country in the future (increase in the share of GDP). The policy should define the tourism development with a view to achieving better results in all segments of the tourism industry [30]. That is why North Macedonia has adopted several strategic documents in the field of tourism, such as the National Strategy for Regional Development 2009-2019, the National Strategy for Rural Tourism 2012-2017 and the National Strategy for Tourism 2016-2021 [13]. In 2017, the contribution of tourism to GDP was 6.6%, while the share in GDP and the number of tourists continue to grow in 2018 [32]. There are restaurant chains in Skopje that operate on a global level, but for the reasons of future catering industry development, the emphasis is

on promoting national restaurants. National restaurants called “Meani” are attractive for both domestic and foreign guests. According to the law on catering of the Republic of North Macedonia, national restaurants must include in their offer a minimum of 70% of local traditional dishes followed by 80% of local wines. The exterior and interior decoration of the facility, as well as the accompanying music in restaurants should exude tradition (Strategy for the Development of the City of Skopje 2020-2023).

Montenegro is a coastal country with access to the warm sea and is therefore attractive to tourists from around the world. Its weakness is a pronounced seasonal character, i.e., influx of a large number of tourists in a short period during the year (July and August). Having in mind the number of tourist arrivals, coastal places have a share of 90% in the tourism of Montenegro, while the capital of Podgorica participates with only 4.6% and only 1.7% of overnight stays. In order to complete the tourist offer to make Montenegro an attractive destination not only 45 days a year but longer, it is necessary to activate other tourist offers that will be less contingent on weather conditions, such as cultural monuments, gastronomic offer, wine tours and rural tourism [28]. According to the World Tourism and Travel Council (WTTC), Montenegro ranks 34th in the world in terms of contribution of the hospitality and restaurant industries to the national economy. According to the long-term growth forecast for the 2015-2025 period, it ranks third in the world. Tourism’s direct contribution in Montenegro has been growing over the years, reaching a share of 9.5% in 2014, with projected increase in 2015 and 2016 [28]. The Statistical Office of Montenegro Bulletin [49] records a rise in the total number of tourists in the 2014-2019 period.

The pronounced seasonal character has a direct impact on the restaurant business in Montenegro, with revenues increasing along with the hotel occupancy increase. Montenegrin restaurants achieve the best results in the peak season [35].

Methodology

The research part of this paper relies on the restaurant visitors’ comments collected from the Tripadvisor website

(www.tripadvisor.com). Each comment contains the name of the reviewer, location, user information (its level, date of joining the site...), restaurant rating, review title, view date and experience date. Analyzed were the reviews of restaurants in the capital cities (Belgrade, Zagreb, Ljubljana, Sarajevo, Skopje, Podgorica) of the six countries that emerged from the disintegration of Yugoslavia (Serbia, Croatia, Slovenia, Bosnia and Herzegovina, Macedonia and Montenegro) which, according to the author’s opinion, are the main presenters of the restaurant industry of their respective countries. Data from the site were automatically generated in January of 2020 using R script [44]. First, a list of all restaurants on Tripadvisor from the indicated cities was collected, and then, for each of these restaurants the following data were collected: 1. review ID, 2. review date, 3. user location, 4. rating (1-5), 5. review web address on Tripadvisor site, 7. name of the restaurant, 8. city, 9. year. Initially, all available comments were collected, and then the data from the beginning of 2015 to the end of 2019 were filtered.

Based on established objectives, the following hypotheses were formulated:

H1: Satisfaction of restaurant visitors is the same for all cities examined over a five-year period.

H2: There is a positive growth trend in the number of comments by Tripadvisor users over a five-year period.

For hypothesis H2 we can say that positive growth is expected. Such conclusion can be inferred from the data illustrated in Table 1 (consolidated table) (Table 1).

H3: There is a positive trend in restaurant user satisfaction on Tripadvisor site over time.

For hypothesis H3 we can say that positive trend in restaurant user satisfaction over time is expected as restaurants are expected to constantly look for ways to improve their business service and image over time.

H4: There is a positive correlation between guest satisfaction and the number of their comments regarding the restaurant offer on Tripadvisor.

For hypotheses H4 we can say that a positive correlation between guest satisfaction and the

number of their comments is expected. It is to be expected that customers will visit restaurants they are satisfied with more often. It is to be expected that this will lead to an increase in cash flows. Consequently, restaurants with increased turnover can invest in improvement of their services.

Before testing the validity of the hypotheses, the reviews were divided on the basis of the ratings left of the overall impression (1 – 5) into two groups: satisfied (ratings 4 and 5) and dissatisfied (ratings 1 – 3). This was done to simplify the analysis, primarily the statistical methods used, as well as to simplify the conclusions that can be drawn based on statistical models. Logistic regression was used to statistically model the relationship between satisfied and dissatisfied reviews [50, pp. 190-199]. Logistic regression is a general linear statistical method that can be used to model the relationship between independent predictors (such as city or year) and binary dependent variables (satisfied/dissatisfied visitor). The author is convinced that in this way it is possible to draw broader conclusions than modeling the trend for each 1-5 rating separately. For the analysis of trends in the number of reviews, Poisson regression was used [50, pp. 190-199]. Poisson regression is a linear statistical method that serves to describe the relationship between a predictor that can be continuous and/or categorical and a dependent variable that has a Poisson distribution. Variables with Poisson distribution can have integers and cannot be negative, and in this paper, it is the number of reviews for a restaurant in one year. Poisson distribution can describe the number of events in an interval, and in the case of this paper, it can be used for the number of reviews for a restaurant in the

Table 3: Total number of restaurants on the site and total number of reviews

City	Number of reviews	Number of restaurants
Belgrade	36,093	1,110
Ljubljana	32,026	488
Podgorica	2,850	139
Sarajevo	11,775	329
Skopje	6,579	260
Zagreb	35,598	660
Total	124,921	2,986

Source: Author's calculations

course of one year. Hypergeometric distribution [36, pp. 39-40] was used to determine data that can describe whether positive or negative trends are significantly more represented in a city than expected based on their global representation. Hypergeometric distribution is a discrete probability distribution that describes the probability of “k” successes (random draws for which the object drawn has a specified feature) in “n” draws, without replacement, from a finite population of size N containing K object with a given specific feature.

There is an extremely large number of restaurants on Tripadvisor with a small number of reviews written. Of 2,986 restaurants in these cities that exist on the site, as many as 1,135 restaurants have 5 or fewer reviews for the observed five-year period (Table 3).

Such small samples can negatively affect the robustness of the conclusions, and therefore only restaurants having more than ten reviews per year were considered in the scope of the research. In this way, a large number of restaurants poorly represented by the number of reviews were eliminated, and the analysis included restaurants that had more than 10 comments per year during the observed five-year period, which means 68,599 reviews distributed over 242 restaurants in six cities (Table 4).

Research results

Hypothesis H1 reads: “Satisfaction of restaurant visitors is the same for all cities examined over a five-year period.”

To determine whether hypothesis H1 is true, differences in the level of satisfaction of restaurant users were examined. Satisfaction of restaurant visitors by cities is shown in Figure 1. The different letters above the

Table 4: Number of restaurants with more than 10 comments per year and the total number of reviews written by their visitors, by city

City	Number of restaurants	Number of comments
Belgrade	58	17,603
Ljubljana	72	21,390
Podgorica	4	988
Sarajevo	27	6,480
Skopje	13	3,096
Zagreb	68	19,042

Source: Author's calculations.

distribution indicate statistically significant differences ($p < 0.05$) which were determined by post-hoc Tukey method comparison using the emmeans (ref) R package.

When distributions share the same letter, the difference is not statistically significant. Thus, “a” and “ab” or “b” and “ab” are distributions that are not statistically significantly different, while “a” and “b” are statistically significantly different. The results showed that Sarajevo, followed by Belgrade, had the largest share of satisfied restaurant services’ users in the observed period, while Skopje, Podgorica and Zagreb were the cities with the least satisfied users. Based on the above, it can be concluded that hypothesis H1 is not true, because the satisfaction of restaurant visitors is not the same for all the examined cities over a five-year period.

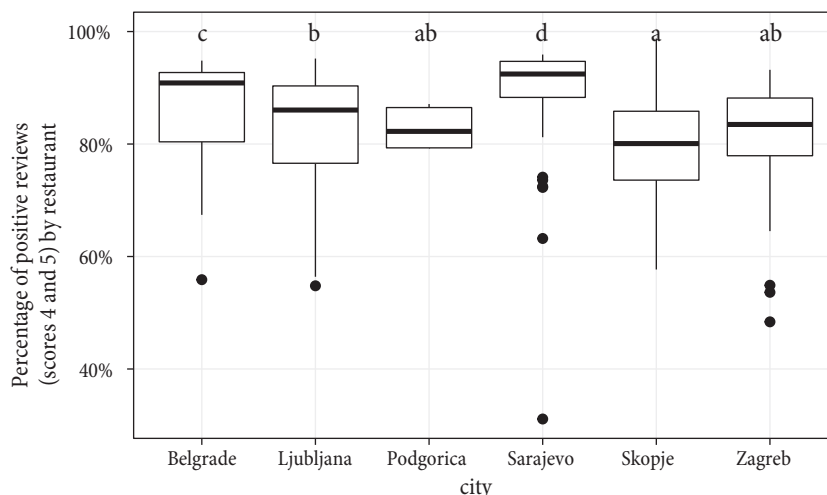
Hypothesis H2 reads: “There is a positive trend of growth in the number of comments by Tripadvisor users over a five-year period.” Statistically significant trends ($p < 0.05$) as well as their confidence intervals are shown in Figure 2.

We examined general trends by cities. Poisson regression modeled the annual share of the number of

comments for each restaurant in relation to the number of comments for the five-year period. The obtained results are graphically represented by lines with 95% confidence intervals. Lines represent trends, thus in cases where there are lines there are also trends. In the case of Podgorica, probably due to the small sample size, there is no trend.

Figure 2 gives an insight into the decline in the number of comments written about restaurants in all cities that are part of this research, and it also shows that the city of Belgrade has the largest decline in the number of comments left. In order to more realistically describe this drop and gain a more detailed insight into the decreasing number of reviews, trends at the restaurant level were analyzed by Poisson regression. A separate model of the share of the number of comments for each year in relation to the five-year period was developed for each restaurant. The results showed that as many as 104 out of 242 examined restaurants recorded a statistically significant negative trend in the 2015–2019 period, while in only 12 restaurants there was a statistically significant increase in the number of comments (Table 5).

Figure 1: Distribution of percentages of positive comments per restaurant. Each observation is one restaurant.



Source: Author’s calculations

Table 5: Number of restaurants with significant trends in the number of comments

City	Negative trend (number of restaurants)	Positive trend (number of restaurants)	Total number of restaurants
Belgrade	31	1	58
Ljubljana	27	4	72
Podgorica	1	0	4
Sarajevo	10	1	27
Skopje	2	1	13
Zagreb	33	5	68

Source: Author’s calculations.

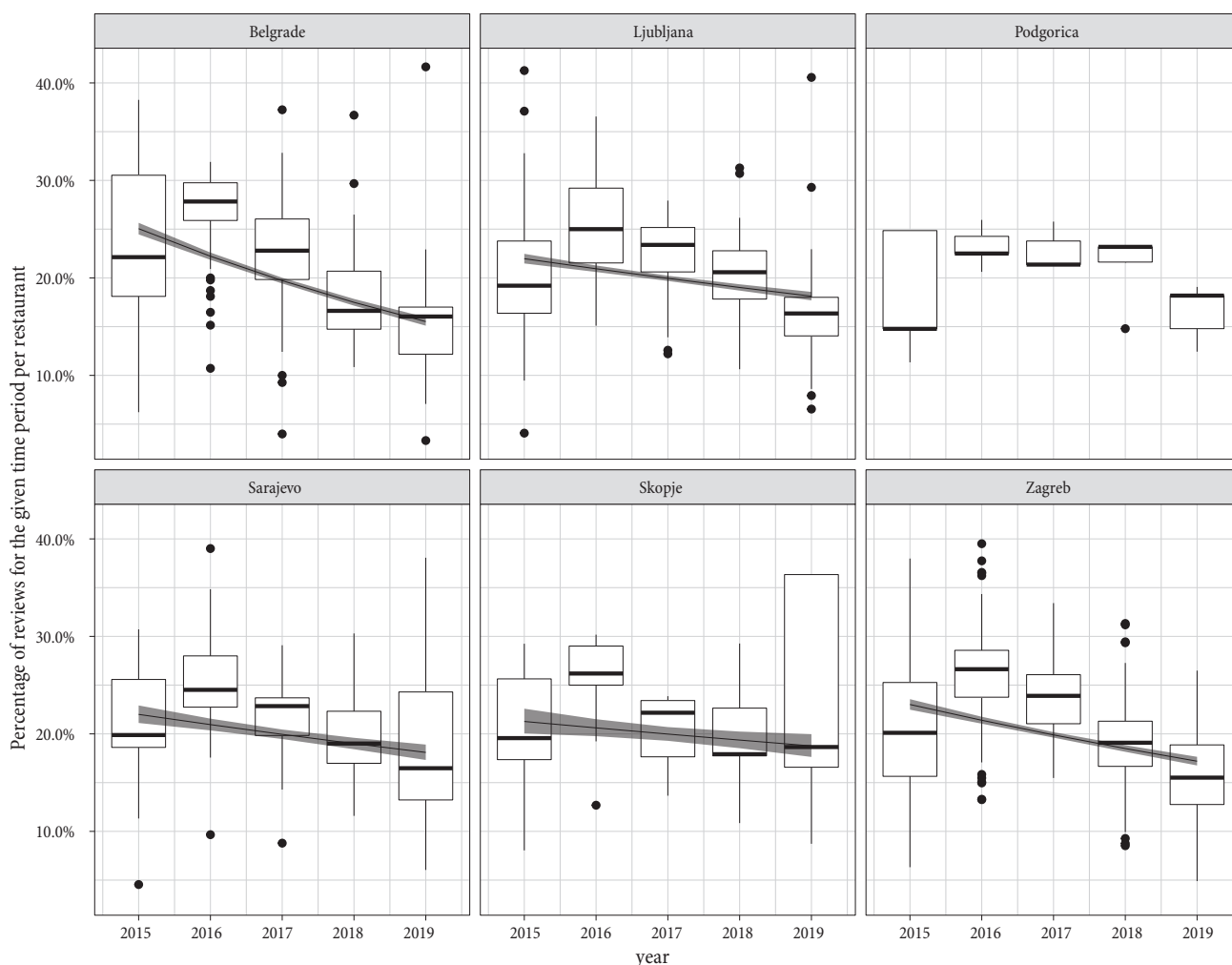
A hypergeometric test was used to determine whether the number of restaurants with a significantly negative trend differed from city to city. The test showed that Belgrade has significantly more restaurants with a negative number of comments than expected based on the total frequency in all cities; also, the test provides an explanation as to why Belgrade has the largest decline of all examined cities – it has the largest number of

restaurants with a statistically negative trend, as many as 33 out of a total of 58.

Analysis of a sample of 242 restaurants suggests that hypothesis H2 should be rejected, as the number of restaurants with a significant negative trend in the number of written comments far exceeds that with a positive trend.

Hypothesis H3 reads: “There is a positive trend in restaurant user satisfaction on Tripadvisor over time.”

Figure 2: Restaurant reviews trend for the 2015–2019 period, with confidence intervals



Source: Author's calculations

Table 6: Hypergeometric test for overrepresentation / underrepresentation of the city depending on the number of restaurants with a significant trend in the number of written comments

City	Overrepresentation p-value	Underrepresentation p-value	Number of restaurants with a significant negative trend
Belgrade	0,0454	0,977	31/58
Zagreb	0,172	0,891	33/68
Sarajevo	0,806	0,327	10/27
Podgorica	0,896	0,423	¼
Ljubljana	0,897	0,164	27/72
Skopje	0,994	0,033	2/13

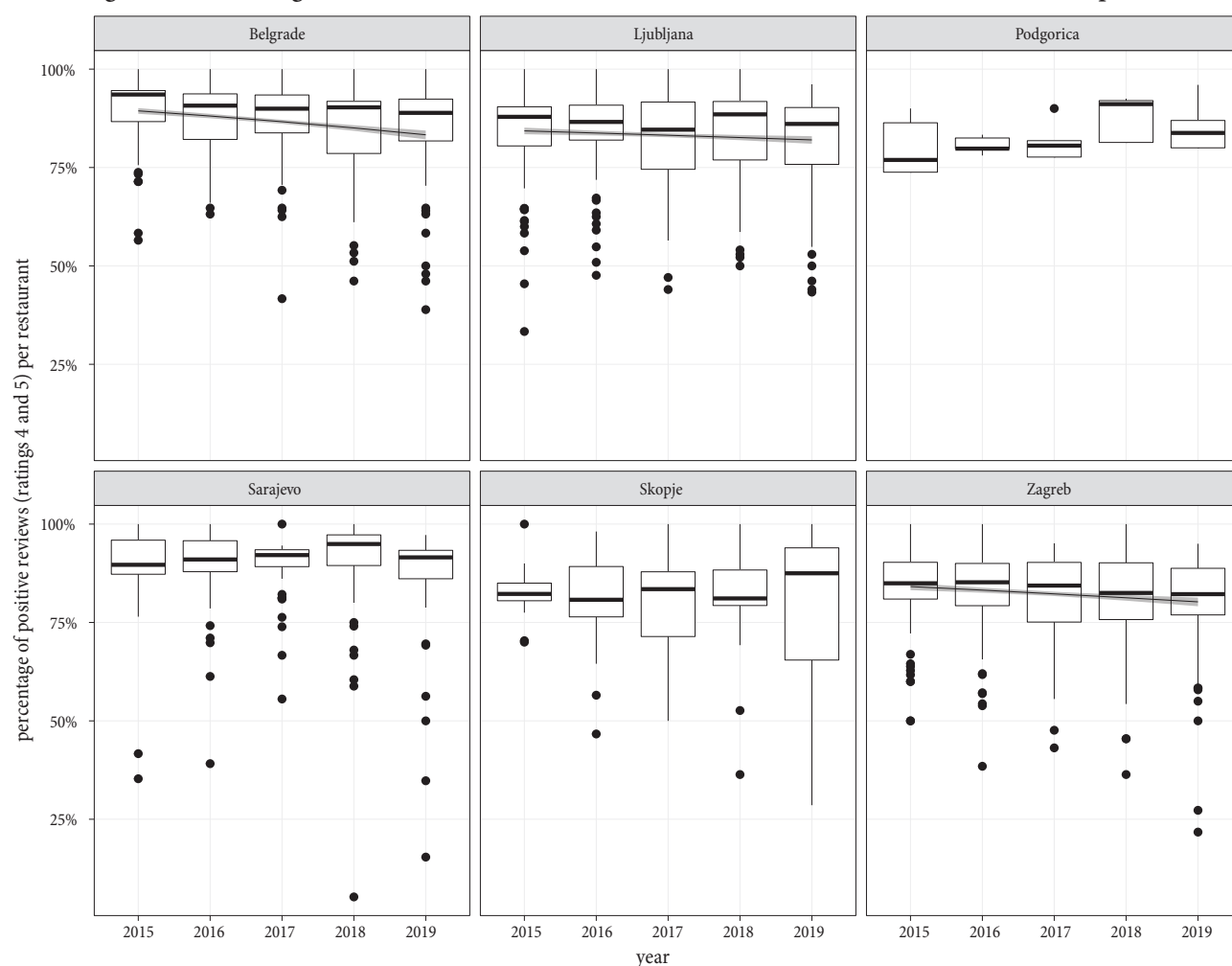
Source: Author's calculations.

For statistically significant trends ($p < 0,05$), Figure 3 shows the models and their confidence intervals. The results were obtained by logistic regression and graphically represented by lines with a 95% confidence intervals. In cases where the year as an independent variable has an impact on the satisfaction of restaurant users in cities, the model is shown in the figure.

The analysis showed that in Belgrade, Ljubljana and Zagreb there are significant trends in user satisfaction,

while for Sarajevo, Podgorica and Skopje there are no trends. In order to check the validity of hypothesis H3 in more detail, the trends in the share of satisfied users at the restaurant level were analyzed. Out of 242 restaurants, 40 had significant trends in the observed period, namely eight restaurants with a positive trend and as many as 32 with a negative trend. Summary data on trends in the share of comments expressing user satisfaction by city are shown in Table 7.

Figure 3: Trends of guest satisfaction and confidence intervals in restaurants in the 2015–2019 period



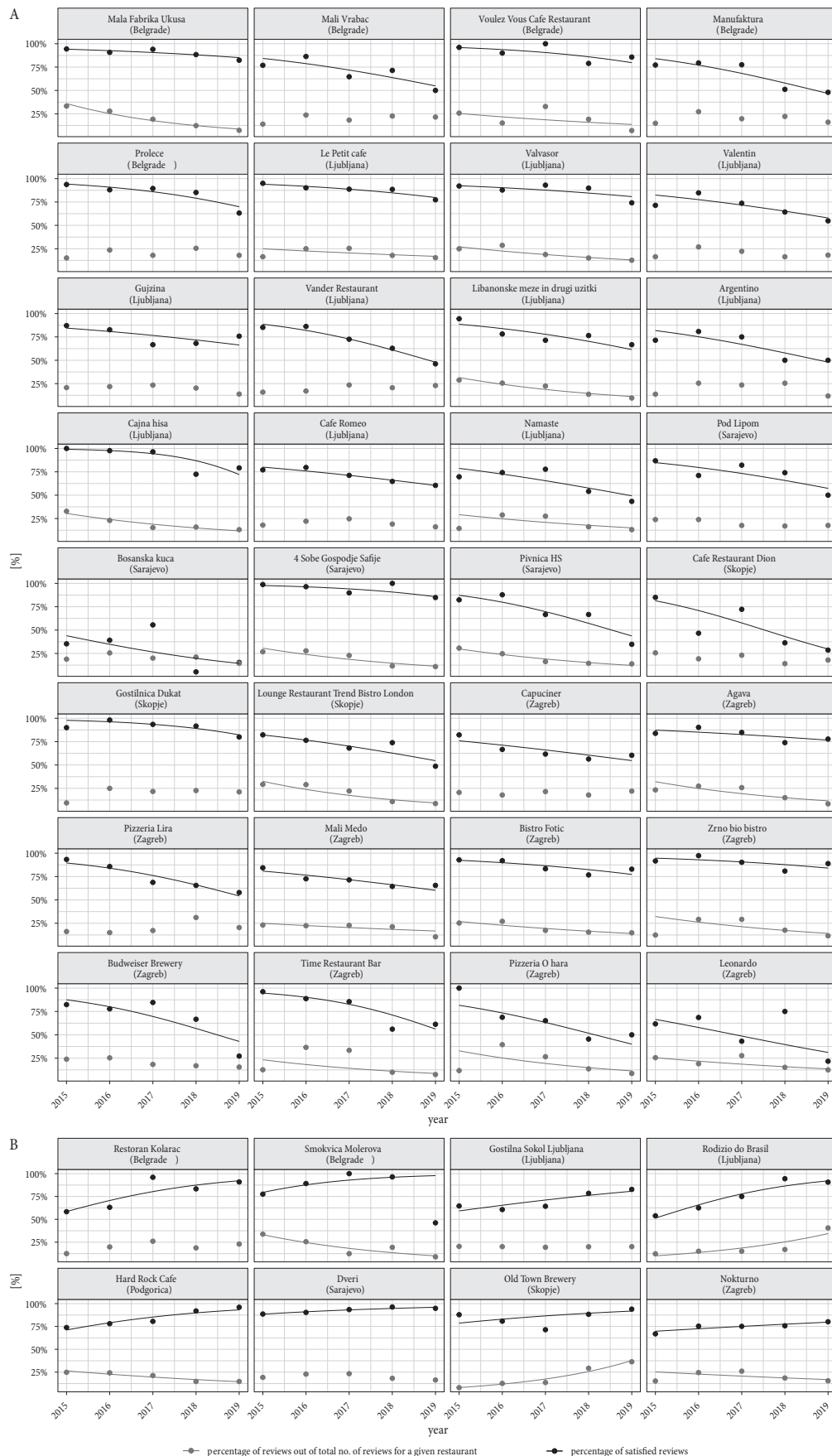
Source: Author's calculations.

Table 7: Summary – trends in the share of comments expressing satisfaction with the restaurant, by city

City	Negative trend Number of restaurants	Positive trend Number of restaurants	Number of restaurants
Belgrade	5	2	58
Ljubljana	10	2	72
Podgorica	0	1	4
Sarajevo	4	1	27
Skopje	3	1	13
Zagreb	10	1	68

Source: Author's calculations.

Figure 4: Relationship between the total number of written comments and comments expressing satisfaction



Source: Author's calculations.

The hypergeometric test showed that no city has statistically significant greater or lesser number of restaurants with a positive or negative trend in the share of comments expressing satisfaction. Only 8 out of 242 restaurants have a positive trend in user satisfaction. In the vast majority (202 restaurants), user satisfaction is stable, while in 32 restaurants there is a negative trend in satisfaction over time. Based on the above, it can be concluded that most restaurants are failing to adapt their operations so as to boost user satisfaction experience, thus H3 hypothesis should be rejected.

Hypothesis H4 reads: “There is a positive correlation between guest satisfaction and the number of their comments regarding the restaurant offer on TripAdvisor.” In order to examine the validity of hypothesis H4 i.e., to test the relationship between trends in the number of written comments and the share of satisfied users, we compared trends in the number of comments for 40 restaurants that had significant trends in the share of satisfied users (Figure 4).

Black lines represent models of logistic regression used to model the trend in the share of satisfied users (ratings 4 and 5) depending on the year, and the model is present in each graph given that the subject of this analysis are restaurants that had a significant negative or positive trend. Figure 4A shows all restaurants with

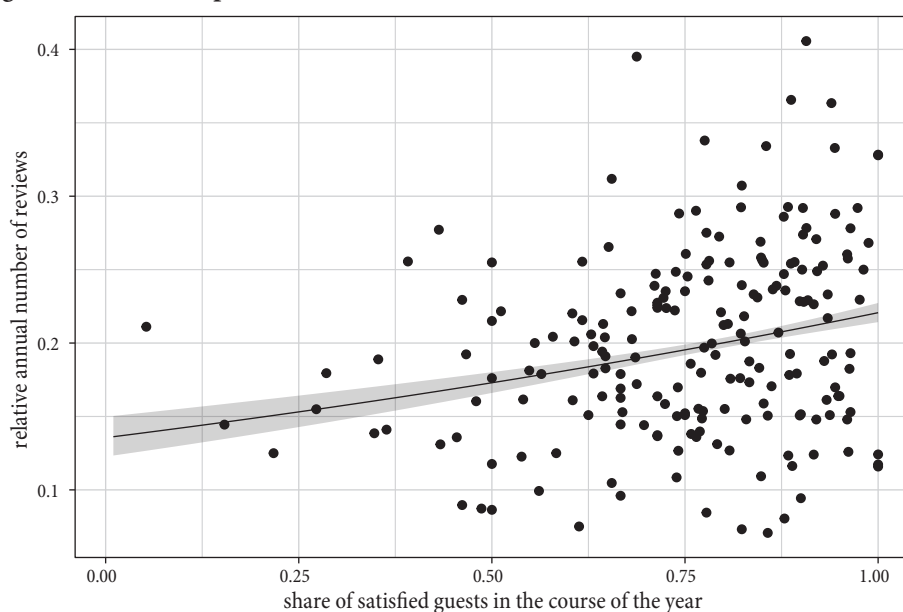
a negative trend in satisfaction, while Figure 4B shows a positive trend in satisfaction.

Red lines are Poisson regression models used to model the trend in the annual share of reviews in relation to the examined five-year period depending on the year for each restaurant. A model (line) exists only if the trend is significant.

Of the 32 restaurants with a significant negative trend in the share of satisfied users, 17 had a significant downward trend in the number of written comments, and no restaurant had a significant upward trend in the number of comments over time (Figure 4A). Of the eight restaurants that had a significant positive trend in the share of satisfied users, two restaurants had a significant upward trend in the number of comments, while three had a significant downward trend (Figure 4B). These results support hypothesis H4 because it is obvious that the negative trend in the percentage of satisfied users results in no restaurants with a positive trend, while among restaurants with a positive satisfaction trend there are restaurants that have a pronounced positive trend in the number of written comments (2/8, i.e., 25%).

Hypothesis H4 was further tested by modeling the relationship of written comments in the course of the year depending on the share of satisfied users. We analyzed the relative number of written comments for

Figure 5: Relationship between the number of written comments and user satisfaction



Source: Author's calculations.

the restaurant (the relationship between the number of written comments in the course of the year and the total number of comments for the restaurant over a five-year period observed) against the share of satisfied guests in the course of the year. Figure 5 illustrates the model trend ($p < 0.05$) and the confidence interval.

Based on the previous analysis, we can conclude that hypothesis H4 can be accepted, i.e., it has been clearly demonstrated that there is a positive correlation between guest satisfaction and the number of their comments regarding the restaurant offer on Tripadvisor.

Conclusion

Investing in social media promotion is becoming one of the priority tasks for restaurant managers. Understanding how comments on specialized sites affect consumers and the business of catering establishments is essential for restaurant industry. Electronic advertising and publicizing quickly spreads information about restaurants' business, and therefore this paper examined the connection between the comments written on Tripadvisor and satisfaction expressed by restaurant customers. Relevant literature has shown that the Tripadvisor website is frequently visited and used in the restaurant industry, with the aim of posting or reading reviews and impressions about restaurants. The conducted research analyzed comments related to consumer satisfaction with restaurants in capital cities of the former Yugoslavia in the 2015–2019 period. The analysis included 242 restaurants with 68,599 comments. The paper provided an insight into the relationship between satisfaction, displayed in the form of comments left on Tripadvisor site, and their number.

The study also showed that there is a negative trend, which is reflected in the number of comments in the observed period, as well as the decline in restaurant user satisfaction over time. Further analysis, which correlated the number of comments written on a particular restaurant with user satisfaction, led to the conclusion that catering establishments in the years with a larger number of comments have a higher share of satisfied users.

Based on the above, in order to ensure successful business management and increase in profitability rates,

managers should seek out mechanisms increasing the number of users willing to express their opinion about the restaurant on the Tripadvisor site. Such an approach would enhance the number of reviews, providing managers with more information necessary for rendering a higher-level service in the future. A quality interactive frontline employees' customer-oriented service would probably encourage guests to take a more intensive approach to the Tripadvisor site.

On the other hand, greater commitment is needed from other employees in the restaurant service and production activity system in order to achieve a set of superior services that will lead to higher traffic rates of a catering facility and thereby higher revenues. Although these conclusions are obvious, the study showed that many restaurants are not able to run and manage their business operations in a way that would allow them to reach the expected results.

Finally, it is necessary to emphasize that this paper did not take into account the structure of the geographical and cultural origin of guests (local population, guests from different parts of the world). Accordingly, for instance, visitors from Asian countries evaluate restaurant attributes differently from the guests originating from the so-called Western countries [24]. Therefore, further research should be directed toward the analysis of the answer to the question as to which of the individual groups (e.g., local guests, guests from China or guests from Western countries) have a greater impact on the decline in the number of publicly written comments. Such a study would certainly provide a more complete picture than the present research, and it would also offer new practical advice to restaurant managers.

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