



British Food Journal

The influence of the structure of employees on sensory quality of restaurants' food
Dragan Tešanovic Milovan Krasavcic Bojana Miro Kalenjuc Milijanko Portic Snježana Gagic

Article information:

To cite this document:

Dragan Tešanovic Milovan Krasavcic Bojana Miro Kalenjuc Milijanko Portic Snježana Gagic , (2014), "The influence of the structure of employees on sensory quality of restaurants' food", British Food Journal, Vol. 116 Iss 3 pp. 527 - 543

Permanent link to this document:

<http://dx.doi.org/10.1108/BFJ-05-2012-0112>

Downloaded on: 10 June 2015, At: 06:14 (PT)

References: this document contains references to 54 other documents.

To copy this document: permissions@emeraldinsight.com

The fulltext of this document has been downloaded 408 times since 2014*

Users who downloaded this article also downloaded:

Kisang Ryu, Hye-Rin Lee, Woo Gon Kim, (2012), "The influence of the quality of the physical environment, food, and service on restaurant image, customer perceived value, customer satisfaction, and behavioral intentions", International Journal of Contemporary Hospitality Management, Vol. 24 Iss 2 pp. 200-223 <http://dx.doi.org/10.1108/09596111211206141>

Mamoun N. Akroush, Amjad A. Abu-ElSamen, Ghazi A. Samawi, Abdelhadi L. Odetallah, (2013), "Internal marketing and service quality in restaurants", Marketing Intelligence & Planning, Vol. 31 Iss 4 pp. 304-336 <http://dx.doi.org/10.1108/02634501311324834>

Milos Bujisic, Joe Hutchinson, H.G. Parsa, (2014), "The effects of restaurant quality attributes on customer behavioral intentions", International Journal of Contemporary Hospitality Management, Vol. 26 Iss 8 pp. 1270-1291 <http://dx.doi.org/10.1108/IJCHM-04-2013-0162>

Access to this document was granted through an Emerald subscription provided by emerald-srm:459863 []

For Authors

If you would like to write for this, or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit www.emeraldinsight.com/authors for more information.

About Emerald www.emeraldinsight.com

Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services.

Emerald is both COUNTER 4 and TRANSFER compliant. The organization is a partner of the Committee on Publication Ethics (COPE) and also works with Portico and the LOCKSS initiative for digital archive preservation.

*Related content and download information correct at time of download.



The influence of the structure of employees on sensory quality of restaurants' food

Sensory quality
of restaurants'
food

527

Dragan Tešanovic

*Department of Geography, Tourism and Hotel Management,
Faculty of Science, University of Novi Sad, Novi Sad, Serbia*

Milovan Krasavcic

*Department of Restaurant Business, College for Hotel Management,
University of Belgrade, Belgrade, Serbia*

Bojana Miro Kalenjuk and Milijanko Portic

*Department of Geography, Tourism and Hotel Management,
Faculty of Science, University of Novi Sad, Novi Sad, Serbia, and*

Snježana Gagic

*College of Professional Studies in Management and Business Communication,
Alfa University, Sremski Karlovci, Serbia*

Received 7 May 2012
Revised 2 September 2012
Accepted 6 September 2012

Abstract

Purpose – The aim of this paper is to determine the sensory quality of food in restaurants by professional food evaluators and to research the impact of education, age and number of employees on the quality of food.

Design/methodology/approach – In the first phase five trained food tasters evaluated the sensory quality of food. In the second phase, the analysis of the structure of employees was done by establishing their level of education, age and number of employees. In the third phase the regression and correlation analysis was done with the aim to establish the impact of the level of education, age and number of employees on the sensory quality of food.

Findings – The sensory evaluation has shown that the evaluated food is of moderate quality. Correlation matrix has shown that the education level of employees has a high impact on the sensory quality of food. There is a correlation between the number of employees, their age and their education.

Practical implications – Obtained results are the indicators of the quality of food in restaurants in the region and they can serve for the improvement of quality. They have shown that education and staff training can contribute to a better quality of food. Established methodology can also contribute to the practical evaluation of quality.

Originality/value – This paper is reflected on the specific application of methodology of the sensory analysis of food in restaurants. The paper pointed to the impact of employees on the sensory quality of food by statistical methods. Statistical results which point to the great impact of the level of education of employees on the sensory quality of food in restaurants are particularly valuable.

Keywords Food, Restaurants, Structure of employees, Sensory quality

Paper type Research paper



British Food Journal
Vol. 116 No. 3, 2014
pp. 527-543

© Emerald Group Publishing Limited
0007-070X
DOI 10.1108/BFJ-05-2012-0112

The authors are grateful to the Ministry of Science and Technological Development of Republic of Serbia for sponsoring part of the study in project III-046009.

1. Introduction

Tourism and hospitality industry is one of the fastest growing in our complex and turbulent environment. By analyzing their competitive factors, there is a common belief that structure and training of staff is one of the most important conditions that influence the quality of products and services, at the same time influencing the success of business (Littlejohn and Watson, 2004; Connolly and McGing, 2006). The competitive position of every business system in the global business environment depends on its flexibility, inventiveness and its focus on quality (Barron, 2008). In that way the dynamism of the trends in development of the modern world put before hospitality industry even more and more complex tasks and obligations that it has to fulfill in order to be able to follow the trends and satisfy customers as well as possible. These trends can be achieved by raising the level of education, by permanent education of employees (Jeong and Oh, 1998; Barron, 2008) and by establishing high standards of quality. Only educated, highly trained staff can establish high technological, nutritional, health safety and sensory standards of quality (Walley *et al.*, 1999; Early, 1995; Davis *et al.*, 2008), but also influence other factors that can increase the satisfaction of consumers, such as: location of the restaurant, its interior, seating arrangement, speed of service (Pratten, 2003), prices, appearance of staff and many others (Keating and Harrington, 2003; Namkung and Jang, 2007).

Hospitality industry, and restaurant industry, as its branch, employ 1,000s of young people dedicated to offer services to their customers skillfully (Furunes and Mykletun, 2005). In order for somebody to meet the demands of the working place they should have an appropriate level of education, experience, as well as functional ability (both mental and physical capacity), since hospitality workers are in permanent and immediate contact with people of different mentalities and habits.

In the restaurant industry, different factors influence the quality of food: foodstuffs, their physical and functional structure, staff, appropriate handling of food, i.e. their knowledge, adopting the quality control systems and managing (Meiselman, 2001; Opolski Medeiros *et al.*, 2011; Krasavčić *et al.*, 2012). The aim of this research is to analyse the sensory quality of food in restaurants and to perceive the influence of the structure of employees on the quality of food in restaurants of Belgrade (the capital of The Republic of Serbia). In order for the research to be acceptable, it is important to realize that people are the most important “instrument” of evaluation, who by their senses of sight, smell, taste and touch evaluate the sensory quality (Ristic, 2009). That was the reason why for evaluation of the quality of food in this paper, sensory analysis was used.

Sensory analysis is a part of science about sensory properties. It researches carriers, intensity, and the nature of sensory properties. Sensory analysis measures and evaluates food properties by one or more senses. The word “sensus” means sense, from which derives the definition formulated by Tilgner (1974), which reads: Sensory analysis of quality is the science that measures and evaluates food properties by one or more senses.

The sensory evaluation of quality was done on pork dishes – loins (musculus longissimus dorsi), thermally processed on grill, as the dishes present on menus in all analysed restaurants. This paper did not deal with the differences in quality and handling of raw meat, nor with other technological parameters, which had been dealt with by many authors (Aaslyng and Hviid, 2004; Aaslyng *et al.*, 2007; Jaworska *et al.*,

2009; Tešanovic *et al.*, 2011). Instead of that, trained professional evaluators, in accordance with the literature about the quality of pork meat (Sebranek, 1982; Boccard, 1986; O'Mahony *et al.*, 1995; Jonsäll, 2000, Foster *et al.*, 2011), did the sensory evaluation of thermally processed meat, without notice, as undercover customers.

2. Literature review

New trends in the hospitality industry require new knowledge and new types of education. The authors say that new necessary knowledge in the hospitality industry is in the field of accounting, law, economy, marketing, human resources management, planning, information technologies, innovation and management of changes (Murphy and Murrmann, 2009). Innovative knowledge in technology of food and beverages, sanitary safety, nutrition, as well as specific knowledge in the quality of products and services is also required.

Intellectual capital is the key resource of tourism, hospitality and any other company. This capital is made of human capital, structure capital, organisational structure capital, innovation structure capital, processing structure capital, organisational culture, consumer capital and relational capital (Magd, 2003).

Quality control is an essential part of the business of every restaurant facility. Human senses are efficient instrument of evaluation of sensory quality, providing reliable information based on human senses (Cardello, 1995). Therefore, sensory evaluation represents an integral part of the product quality and quality process control (Costell, 2002).

The importance of the sensory analysis is great and it can be applied in different fields: for improving the quality of products during the development process; it describes products and helps to compare them with competitors (Leppard *et al.*, 2004; Moskowitz *et al.*, 2006; Maughan *et al.*, 2012). It is necessary to have in mind the fact that the quality of foodstuffs, does not represent a mechanical set of individually measured and expressed quality properties, but that it is their integral part, at the same time highlighting many, even very complex interactive relations (Popov-Raljic and Radovanovic, 2007).

Sensory analysis is the science that measures and evaluates sensory properties of quality (appearance, consistency/texture, aroma of foodstuffs), by the human senses (Popov-Raljic and Radovanovic, 2002). It encompasses scientifically flawless preparation, execution and evaluation of sensory properties, determining, based on individual opinions and properly applied statistical processing of results, the objective sensory evaluation of quality.

The concept sensory quality (utility value) represents a total sensory impression of the sample (product-food) which is evaluated (Popov-Raljic *et al.*, 2004; Ackerman, 1995; Maruniak, 1988; Tilgner, 1974). The important influence on the sensory quality have physical and chemical characteristics of food (Lawless and Heymann, 1998; Auvray and Spence, 2008; Foster *et al.*, 2011; Tešanovic *et al.*, 2011) which are at the same time used to differentiate raw food in the course of choice and purchase (Dransfield *et al.*, 2001; Ngapo *et al.*, 2004; Cho *et al.*, 2007).

Opinion of professional food tasters is considered objective, while opinion of consumers is considered subjective. At the same time consumers' opinion can be very important because it represents at the same time acceptability of the product by consumers. Evaluators, apart from being acquainted with the defined properties of the

product must have developed senses (smell, sight, taste, touch and hearing). Unfortunately, in many restaurant facilities for certain dishes following properties are not defined: appearance by which we mean colour, size, shape, consistency; aroma, which encompasses smell, flavour, sensation of fullness in the mouth and accompanying errors; hapten-kinesthetic effects such as texture, viscosity, mechanical feeling in the mouth, accompanying errors, etc.

First observations about sensory quality of a gourmet product are made by viewing them, i.e. by seeing or observation, by using the sense of sight – visual technique. In that way, in the scope of visual impressions, we can differentiate the following concepts: colour, shape, surface, structure and other impressions. By evaluating the quality for the needs of this research the colour was not analysed. After visual impressions (appearance, colour, surface, brightness ...) in the process of sensory analysis of the product quality there is smell or olfactory impressions. The sense of smell characterises the basic sensory information for establishing the quality and intensity of smell, and apart from that, taste as well, which is of primary importance for aroma establishing. Taste is, apart from smell, one of the most important sensory properties of the product quality. Sense of taste of humans can determine and differentiate not only four primary (sweet, salty, sour and bitter), but more than several hundreds of different tastes. However, it can be said that they are mainly mixtures or successful combinations of the four basic modalities of taste. Finally, the most complex property – texture/consistency of foodstuffs – represents the combination of the physical properties and properties determined by the sense of touch (including kinesthesia and sensation in the mouth), sight and hearing (MacDougall, 1988; Popov-Raljic and Radovanovic, 2007; Kilcast, 2010).

3. Materials and methods

The research was done in 30 restaurant facilities on the territory of Belgrade (capital of the Republic of Serbia), from 1 September to 1 December 2011.

The research consisted of three parts, i.e. two separate researches, in the third part the statistical analysis was done and the correlation between the established indicators was established.

The first part was done by five professional food evaluators – tasters from the University of Belgrade and Novi Sad (the Republic of Serbia), according to ISO 5492 (2000), ISO 8586-1:1993 (2008), ISO 4121:2003 (2008) and ISO: 8587:2006 (E) (2008). They, as undercover customers, made the sensory evaluation in every restaurant, which consisted of giving grades, by every evaluator separately, to certain parameters of food quality. They evaluated: aroma, juiciness, tenderness, flavour and chewing residue, grades varying from 1,00 to 7,00. Grade 1,00 was used to describe the weakest pronounced property, and grade 7,00 was used to describe the most intensely pronounced property (see Table I).

As a sample for quality evaluation, the dishes made from the loin part of pork meat were used. The dish is made with a piece of meat of 150 grams which is thermally processed on the grill, by heating at the temperature of 175-220°C (Tešanovic, 2011), and salt is added to the meat near the end of grilling in order to improve the sensory quality of meat (Lyon and Lyon, 2001). Spices are used in the same way in order to ameliorate the appearance and taste of the meat.

Mark	Flavour	Juiciness	Softness	Taste	Residue of chewing
1.0	Very weak	Very dry	Very hard	Very weak	Very large
2.0	Weak	Dry	Hard	Weak	Large
3.0	Moderately weak	Moderately dry	Moderately hard	Moderately weak	Moderately large
4.0	Insufficient	Insufficiently juicy	Insufficiently soft	Insufficient	Medium
5.0	Moderate	Moderately juicy	Moderately soft	Moderate	Moderately small
6.0	Pronounced	Juicy	Soft	Pronounced	Small
7.0	Very pronounced	Very juicy	Very soft	Very pronounced	Very small

Source: Tešanović *et al.* (2010)

Table I.
Numerical-descriptive
scale of sensory
evaluation of thermally
treated pork chops
samples

The second part was conducted by interviewing the managers, when the a about 480 employees from 30 restaurants were collected. The level of education and age of employees was examined, as well as the number of professional workers (managers, chefs, waiters, etc.), others workers (warehouse clerks, drivers, security guards, etc.) and auxiliary workers (dish washers, hygienists, etc.)

In the process of perceiving the level of education, the index of qualification structure was calculated by using the conventional grade system, where the highest grade 10 was given to employees with university degree, grade 9 was given to employees with college degree, grade 8 to the employees with specialisation after secondary school, grade 7 to employees with high school degree, grade 6 to skilled labor, 5 to unskilled labor (Krasavcic, 2012). Degrees and level of education were given in accordance with the National Nomenclature of Occupations in the Republic of Serbia.

With the aim of establishing the basic characteristics of observed variables (quality of food and structure of employees) as well as for their description, the following indicators of the descriptive statistical analysis were calculated, as the primary tool (Meilgaard *et al.*, 1999; Stojkovic, 2008): the average value (\bar{X}); extreme values (minimum and maximum); standard deviation (σ) and the coefficient of variation (V).

With the aim of establishing the degree and type of influence and dependence between the structures of employees on the sensory quality of food, the regression analysis method was applied (the simple linear regression and the multiple linear regression).

Initiating with the analysed phenomena in the paper the adequate statistical models were chosen. They reflect the influence of the structure of employees, expressed by the level of education, age and the number of employees, on the sensory quality of food in restaurants.

The phase of verification of the adequacy of the chosen model implies the confirmation of initial presumptions of the model by using different tests. In the paper for every chosen model the importance was tested, by applying the method of analysis of the variance, i.e. by performing the *F*-test.

For data analysis, the statistical softwares Statistics 10 and Eviews 3.1. were used.

4. Results and discussions

4.1 Sensory quality analysis

The basic indicators of the sensory quality of food in restaurants are given in the Table II, where the average value, interval of variation, standard deviation and the coefficient of variation are calculated.

Indicators	Average value	Variation interval Minimum Maximum	Standard deviation	Variation coefficient (%)
Total number of employees	16	5 26	5.16	32.01
Age of employees	33.73	25.00 45.00	5.70	16.89
Number of other workers	2	0 11	3.17	141.93
Number of auxiliary workers	3	0 18	3.61	121.53
Qualification structure index	6.68	5.60 8.55	0.72	10.79

Table II.
The basic indicators of the sensory quality of food in restaurants

The total, average grade of food, obtained based on the five analysed properties, reflects the food quality in analysed restaurants and it equals 5,23, which, according to numerical descriptive scale indicates that it is of moderate quality. The lowest grade for the food quality was given to two restaurant facilities and it equals 3,2. The highest grade for the overall food quality, based on the five properties is 6,6.

4.2 Analysis of the structure of employees

As the indicator of the structure of employees in observed facilities, the total number of employees was analysed, the average age of employees, the number of other and auxiliary workers, and the level of education expressed by the index of qualification structure, and the established parameters of the descriptive statistics: average value, the interval of variation, standard deviation and the coefficient of variation (see Table III). Having in mind the fact that the researched facilities employed different number of people of different levels of education, the calculations of the index of qualification structure, for every researched restaurant, were done, which is shown in graph 1.

Based on the values in Table III, it can be perceived that the total number of employees in observed facilities varies from the minimum recorded 5 to maximum 26 employees. The variability of the number of employees confirms the value of the coefficient of variation, which is 32.01 per cent.

An average age of the employees in the facilities is 33.73 years, and it varies between 25 years, which is the minimum recorded age, to the maximum recorded age of 45 years.

The categories of other workers and auxiliary workers are not present in all observed facilities. Out of 30 facilities 13 employ other workers, and 20 of them have auxiliary workers. An average number of other employees is two, and maximum number is 11. On average, the number of auxiliary workers employed in facilities is three, and the most 18.

The level of education, expressed by the index of qualification structure, shows the least variation, the coefficient of which is 10,79 per cent. Minimal value of this indicator in the observed set is 5,6, while the maximum value is 8,55.

The index of qualification structure of 6,68 points to the low level of education of employees in researched restaurants. On average they have middle level of education.

4.3 Statistical research of the influence of structure of employees on the sensory quality of food in restaurants

In the course of realisation of the set goal to research and perceive the influence of the structure of employees on the sensory quality of food, the regression analysis was

Indicators	Average	Variation interval		Standard	Variation
	value	Minimum	Maximum		
Flavour	5.23	3.00	7.00	1.36	25.92
Juiciness	4.87	3.00	7.00	1.22	25.16
Softness	5.00	2.00	7.00	1.34	26.78
Taste	5.67	3.00	7.00	1.21	21.41
Residue of the chewing	5.10	2.00	7.00	1.37	26.93
Dish mark	5.23	3.20	6.60	0.99	19.01

Table III.
The basic indicators of
the structure of
employees in restaurants

conducted. In the scope of the first phase of application of this method, variables were defined which would be taken into account during the evaluation of adequate regression models.

The influence of the structure of employees as a factor (represented by an independent changeable variable (X)), which influenced the sensory quality of food was observed based on:

- number of employees (X_1).
- the level of education expressed by the index of qualification structure (X_2).
- age of employees (X_3).
- other employees (X_4).
- auxiliary workers (X_5).

As an indicator of the quality of food, which in regression analysis is represented by dependent variable (Y), the average sensory evaluation of the quality of food was observed.

In order to establish the level of accordance i.e. the relations between the observed variables, the values of simple coefficient of correlation between them were established (see Table IV).

Based on the matrix of correlation coefficient (see Table IV) it can be noticed that the greatest influence on the sensory quality of food, shown by the value of coefficient correlation, has the index of qualification structure ($r = 0,74$). Statistically important influence show the number of employees which is in the negative correlation to the food quality ($r = -0,52$). The correlation matrix also indicates that between the number of employees and the index of qualification structure, as well as between the number of other workers and auxiliary workers there is a great correlation. That indicates the presence of multicollinearity between these variables and for that reason these variables together are not included in the models.

In the examination of the sensory quality of food in the first place the regression model was perceived. It was obtained by the standard method, whereby it was started from the set of independent variables, which included: the index of qualification structure (X_2), the age of employees (X_3), other employees (X_4) and auxiliary workers (X_5).

Dependent variable \hat{Y} , i.e. the sensory quality of food, by using the standard methods, was defined by the following expression (model M1):

$$\hat{Y} = -2,982 + 1,064X_2 + 0,030X_3 + 0,096X_4 - 0,036X_5$$

Variables	Y_1	X_1	X_2	X_3	X_4	X_5
Y_1	1.0000	-0.52**	0.74**	0.19	0.01	0.02
X_1		1.0000	-0.59**	-0.01	0.08	-0.11
X_2			1.0000	0.16	-0.24	-0.08
X_3				1.0000	-0.24	0.25
X_4					1.0000	0.56**
X_5						1.0000

Table IV.
Correlation coefficient matrix of the set of variables

Notes: **Very considerable correlation in terms of statistics

The values of evaluated parameters of this model, their standard errors and the test of their importance are given in the Table V. Based on the values from the table, it can be perceived that in this model the important influence on the sensory quality of food has only the index of qualification structure, while other independent variables, although they do in a certain measure contribute to the quality of food, do not show statistical importance in this model. The model as a whole is statistically important, which is indicated by calculated F -ratio ($F = 9,40$). The set of independent variables, i.e. factors, that are included in the model, influence the food quality with 54 per cent, which is indicated by the value of the corrected coefficient of determination ($\bar{R}^2 = 0,537$).

Having in mind the fact that statistical theory suggests the evaluation of the simplest model, whenever possible, in every concrete case, in the following step the initial model (M1) was simplified by reducing the number of independent variables. At the same time the procedures of stepwise regression were used, i.e. the choice of variables in regression model by the method of excluding from the beginning (forward stepwise) and by elimination from the end (backward stepwise).

The choice of the variables in the regression model by the method of elimination from the end (backward stepwise) resulted in the evaluation of the following model (M2):

$$\hat{Y} = -1,558 + 1,016X_2$$

This model included only one independent variable and that is the index of the qualification structure, which even based on the matrix of coefficient of correlation has the greatest influence on the sensory quality of food. The evaluated model shows that the increase of the value of the index of qualification structure results in the improvement of the food quality by as much as one grade more. The fact that the quality of food is in great measure determined by the qualification structure of employees in the restaurant facilities of Belgrade, show even the graph of fluctuation of these two lines (see Figure 1).

It can be noticed in the graph that the line of fluctuation of the index of qualification structure follows the line of the sensory evaluation of food, i.e. that the peaks of these two lines coincide.

Values from the Table VI show that although the model as a whole is statistically important ($F = 33,27$), the values of other relevant indicators are slightly less favourable in relation to the model M1.

Forward stepwise (starting with no variables) is used to evaluate the following regression model (M3) for the research of the influence of the qualification structure on the quality of food:

$$\hat{Y} = -2,117 + 1,080X_2 + 0,61X_4$$

This model, in relation to the previous one, apart from the index of qualification structure as a factor, included the number of other workers. Both factors influence in a positive way the quality of food, i.e. they lead to improvement of food quality.

The evaluated model M3 is like both previous two models statistically important ($F = 18,56$), but in comparison to them has better values for other indicators of model adequacy. The values of standardised coefficient of regression b^* (see Table VII) show

Table V.
Management regression
on the dish quality –
Model M1

	b*	Std. Err. of b*	b	Std. Err. of b	t(25)	p-value
Intercept			-2.98166	1.442672	-2.06676	0.049261
Average level of education	0.771608	0.130799	1.06424	0.180404	5.89920	0.000004
Average age of employees	0.169259	0.148394	0.02953	0.025887	1.14061	0.264843
Other workers	0.304765	0.174694	0.09559	0.054792	1.74457	0.093344
Auxiliary workers	-0.129039	0.172616	-0.03558	0.047598	-0.74755	0.461704
<i>n</i> = 30						
Regression Summary for Dependent Variable: dish assessment						
R = 0.77499758 R ² = 0.60062125 Adjusted R ² = 0.53672065						
F(4,25) = 9.3993 <i>p</i> < 0.00009 Std. Error of estimate: 0.67668						

Notes: b* coefficient – standardized regression coefficient. () Freedom levels are given in brackets. *p*-probability achieved by the test

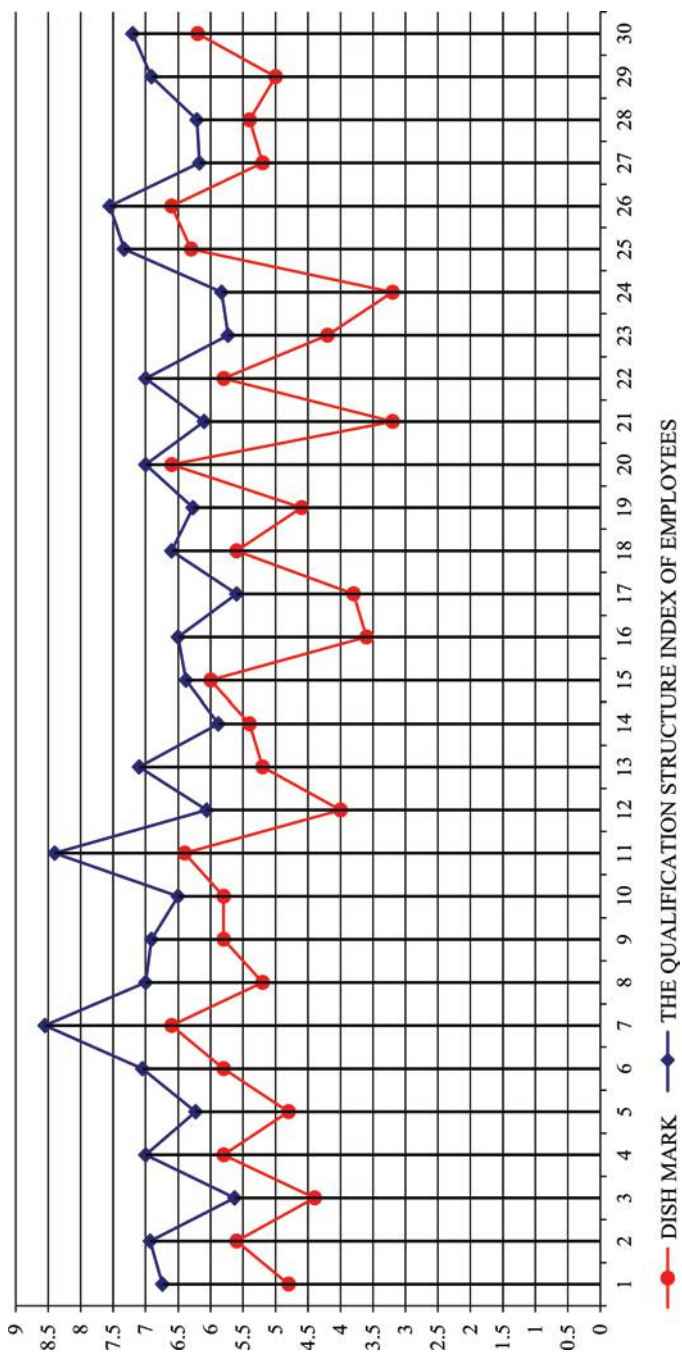


Figure 1.
Fluctuation of the overall
assessment of dishes and
the qualification structure
index

that the relative influence of the index of qualification structure to the quality of food is about 78 per cent, and the influence of the number of other workers, 19,5 per cent.

Having in mind the fact that all three evaluated models used for the analysis of the influence of structure of employees on the quality of food are statistically important and that each of them can be used for the planning of improvement of the sensory quality of gastronomic products, in the following step they were compared by executing the statistical tests of the first category, in order to recommend one of them as an adequate, i.e. as the one which would give the best results in the concrete application.

The evaluation of the parameters of the chosen models based on the statistical criteria, i.e. tests of the first category are given in the Table VIII.

By executing the *F*-test in the variance analysis, all the chosen models show statistical importance, which means that independent variables (the index of qualification structure, age of employees, number of other workers and number of auxiliary workers) show an important influence on the quality of food. Based on this criterion all the chosen models could be used in the sensory analysis of the quality of food.

	b*	Std. Err. of b*	b	Std. Err. of b	t(28)	p-value
Intercept			-1.55809	1.183381	-1.31664	0.198635
Average level of education n = 30	0.736911	0.127750	1.01638	0.176199	5.76838	0.000003
Regression Summary for Dependent Variable: dish assessment						
R = 0.73691111						
R ² = 0.54303798 Adjusted R ² = 0.52671791						
F(1,28) = 33.274 p < 0.00000 Std. Error of estimate: 0.68395						

Table VI.
Management regression
on the dish quality –
Model M2

Notes: b* coefficient – standardized regression coefficients. () Freedom levels are given in brackets. p-probability achieved by the test

	b*	Std. err. of b*	b	Std. err. of b	t(27)	p-value
Intercept			-2.11677	1.214030	-1.74359	0.092609
Average level of education	0.782741	0.128485	1.07959	0.177212	6.09209	0.000002
Other workers n = 30	0.194896	0.128485	0.06113	0.040299	1.51688	0.140919
Regression Summary for Dependent Variable: dish assessment						
R = 0.76086923 R ² = 0.57892199 Adjusted R ² = 0.54773103						
F(2,27) = 18.561 p < 0.00001 Std. Error of estimate: 0.66859						

Table VII.
Regression of the
employee structure on the
dish quality – Model M3

Notes: b* coefficient – standardized regression coefficients. () freedom levels are given in brackets. p-probability achieved by the test

Table VIII.
Assessment of statistical
models for investigation
of the impact of the
employee structure on the
dish quality

Models	F-relationship	First category tests R ²	\bar{R}^2	S _E
M1	9.34**	0.60	0.54	0.67
M2	33.27**	0.54	0.53	0.68
M3	18.56**	0.58	0.55	0.66

If, however, values of the coefficient of determination (R^2) are compared to adjusted coefficient of determination (\bar{R}), which show the part of variation of the food quality which derives from the influences of chosen independent variables in every model, differences between the chosen models appear. The greatest degree of explanation is given by the model M3.

The values of standard errors of the chosen models also point out that some of them are better adjusted to observed data and that they explain better the quality of food. The lowest value of the standard error has the model M3 ($Se = 0,66$). The values of the standard error of this model point out that its evaluation of parameters is more reliable in relation to the evaluation of parameters of models M1 and M2. After testing the adequacy of evaluated models it can be concluded that for the analysis of the influence of the structure of employees on the sensory quality of food the best model is M3.

5. Conclusion

By analyzing the influence of the structure of employees on the sensory quality of food in restaurants of Belgrade, by applying the described research methods, it was concluded that:

- The average sensory grade of food point out that the food in Belgrade restaurants is of moderate quality. Since the question is about a multi-million capital city and a representative sample, this grade represents the grade of the food of the local community and region. High coefficient of variation point out that Belgrade has restaurants with very high level of quality of food but also restaurants whose food quality is poor, which on average gives the result of moderate quality.
- Researched structure of employees, point out that the level of education of employees expressed by the index of qualification structure is medium. Employees in researched restaurants have on average high school. This result indicates that restaurant whose employees have higher level of education have a better grade of the sensory quality of food.
- The number of employees in restaurant varies from 5 to 26 or 16 employees on average per restaurant which indicates that there are facilities of different sizes and many small restaurants. An average age of employees is 33,73 years of age, which indicates that young people work in restaurants. All restaurants do not have auxiliary workers and other workers.
- By statistical research it was determined that there is an influence of the structure of employees on the sensory evaluation of quality of food. Correlation matrix indicates that there is a great correlation between the number of employees and the index of qualification of the structure of employees, as well as between the number of others workers and auxiliary workers.
- By perceiving the regression model, with the aim to establish in what degree the structure of employees, which is defined by the level of education, age, the number of other and auxiliary workers, influence the sensory quality of food, it is determined that the most favorable model is (M3). Evaluated model M3, is as well as the previous two statistically important ($F = 18,56$), but in relation to them it has better values than other indicators of the adequacy of model. The values of standardized coefficients of regression b^* (see Table VIII) show that the relative

influence of the index of qualification structure on the quality of food is about 78 per cent, and that the influence of the number of other workers is 19,5 per cent. In this way it was proved that the most important influence on the sensory quality of restaurant food has the level of education of employees.

References

- Aaslyng, M.D. and Hviid, M. (2004), "The secret behind tender pork", *FleischWirtschaft International*, Vol. 2, pp. 52-54.
- Aaslyng, M.D., Oksama, M., Olsen, V.E., Bejerholm, C., Baltzer, M., Andersen, G., Bredie, W.L.P., Byrne, V.D. and Gabrielsen, G. (2007), "The impact of sensory quality of pork on consumer preference", *Meat Science*, Vol. 76 No. 1, pp. 61-73.
- Ackerman, D. (1995), *A Natural History of the Senses*, Vintage Books, New York, NY.
- Auvray, M. and Spence, C. (2008), "The multisensory perception of flavour", *Consciousness and Cognition*, Vol. 17 No. 3, pp. 1016-1031.
- Barron, P. (2008), "Education and talent management: implications for the hospitality industry", *International Journal of Contemporary Hospitality Management*, Vol. 20 No. 7, pp. 730-742.
- Boccard, R. (1986), "From meat characteristics to integrated quality, position and function of the meat research workers", *Proceedings of the Meat Research Workers*, ICoMST, Ghent, pp. 419-423.
- Cardello, A.V. (1995), "Food quality: conceptual and sensory aspects", *Food Quality Preference*, Vol. 6 No. 2, pp. 163-168.
- Cho, S., Park, B., Ngapo, T., Kim, J., Dransfield, E., Hwang, I. and Lee, J. (2007), "Effect of meat appearance on South Korean consumers' choice of pork chops determined by image methodology", *Journal of Sensory Studies*, Vol. 22 No. 1, pp. 99-114.
- Connolly, P. and McGing, G. (2006), "Graduate education and hospitality management in Ireland", *International Journal of Contemporary Hospitality Management*, Vol. 18 No. 1, pp. 50-59.
- Costell, E. (2002), "A comparison of sensory methods in quality control", *Food Quality Preference*, Vol. 13 No. 6, pp. 341-353.
- Davis, B., Lockwood, A., Pantelidis, I. and Alcott, P. (2008), *Food and Beverage Management*, Linacre House, Jordan Hill, Oxford.
- Dransfield, E., Martin, J.F., Miramont, J. and Ngapo, T.M. (2001), *Meat Appearance: Pork Chops. A Tool for Surveying Consumer Preferences*, INRA, Paris.
- Early, R. (1995), *A Guide to Quality Management Systems for the Food Industry*, Blackie Academic and Professional, London.
- Foster, K.D., Grigor, J.M.V., Cheong, J.N., Yoo, M.J.Y., Bronlund, J.E. and Morgenstern, M.P. (2011), "The role of oral processing in dynamic sensory perception", *Journal of Food Science*, Vol. 76 No. 2, pp. 49-61.
- Furunes, T. and Mykletun, R.J. (2005), "Managers' perceptions of older workers in the hotel and restaurant industry", *International Congress Series*, Vol. 1280, pp. 275-280.
- ISO 4121:2003 (2008), "Sensory analysis – guidelines for the use of quantitative response scales".
- ISO 5492 (2000), "Sensory analysis – vocabulary".
- ISO 8586-1:1993 (2008), "Sensory analysis – General guidance for the selection, training and monitoring of assessors – Part 1: Selected assessors".
- ISO: 8587:2006 (E) (2008), *Sensory Analysis-Methodology-Ranking*.

- Jaworska, D., Przybylski, W., Kajak-Siemaszko, K. and Czarniecka-Skubina, E. (2009), "Sensory quality of culinary pork meat in relation to slaughter and technological value", *Food Science and Technology Research*, Vol. 15 No. 1, pp. 65-74.
- Jeong, M. and Oh, H. (1998), "Quality function deployment: an extended framework for service quality and customer satisfaction in the hospitality industry", *Hospitality Management*, Vol. 17 No. 4, pp. 375-390.
- Jonsäll, A. (2000), "Sensory quality of pork", Dissertation for the Degree of Doctor of Philosophy in Domestic Sciences presented at Uppsala University, Uppsala.
- Keating, M. and Harrington, D. (2003), "The challenges of implementing quality in the Irish hotel industry", *Journal of European Industrial Training*, Vol. 27 No. 9, pp. 441-453.
- Kilcast, D. (2010), *Sensory Analysis for Food and Beverage Quality Control: a Practical Guide*, Woodhead Publishing, Cambridge.
- Krasavčić, M. (2012), "The influence of management on the quality of service in the restaurants of Belgrade", Dissertation for the Degree of Doctor of Tourism presented at Novi Sad University, Novi Sad.
- Krasavčić, M., Tesanović, D. and Kalenjuk, B. (2012), "Research of management structures and qualification of personnel in the restaurant of Belgrade", *Holellink*, Vol. 12 Nos 17-18, pp. 66-79.
- Lawless, H.T. and Heymann, H. (1998), *Sensory Evaluation of Food: Principles and Practices*, Chapman and Hall, New York, NY.
- Leppard, P., Russell, C.G. and Cox, D.N. (2004), "Improving means-end-chain studies by using a ranking method to construct hierarchical value maps", *Food Quality and Preference*, Vol. 15 No. 5, pp. 489-497.
- Littlejohn, D. and Watson, S. (2004), "Developing graduate managers for hospitality and tourism", *International Journal of Contemporary Hospitality Management*, Vol. 16 No. 7, pp. 408-414.
- Lyon, B.G. and Lyon, C.E. (2001), "Meat quality: sensory and instrumental evaluations", in Sams, A.R. (Ed.), *Poultry Meat Processing*, CRC Press, Taylor & Francis Group, Boca Raton, FL, pp. 98-119.
- MacDougall, D.B. (1988), "Colour vision and appearance measurement", in Piggot, J.R. (Ed.), *Sensory Analysis of Food*, 2nd ed., Elsevier, London.
- Magd, H. (2003), "Management attitudes and perceptions of older employees in hospitality management", *International Journal of Contemporary Hospitality Management*, Vol. 15 No. 7, pp. 393-401.
- Maruniak, J.A. (1988), "The sense of smell", in Piggot, J.R. (Ed.), *Sensory Analysis of Foods*, 2nd ed., Elsevier, London.
- Maughan, C., Tansawat, R., Cornforth, D., Ward, R. and Martini, S. (2012), "Development of a beef flavor lexicon and its application to compare the flavor profile and consumer acceptance of rib steaks from grass- or grain-fed cattle", *Meat Science*, Vol. 90 No. 1, pp. 116-121.
- Meilgaard, M., Civille, G. and Carr, B.T. (1999), *Sensory Evaluation Techniques*, CRC Press, Boca Raton, FL and New York, NY.
- Meiselman, H.L. (2001), "Criteria of food quality in different contexts", *Food Service Technology*, Vol. 1 No. 2, pp. 67-77.
- Moskowitz, H.R., Beckley, J.H. and Resurreccion, A.V. (2006), *Applying Sensory and Consumer Research to Food Product Development*, Blackwell Publishing/IFT Press, Ames, IA, p. 368.

- Murphy, K.S. and Murrmann, S. (2009), "The research design used to develop a high performance management system construct for US restaurant managers", *International Journal of Hospitality Management*, Vol. 28 No. 4, pp. 547-555.
- Namkung, Y. and Jang, S. (2007), "Does food quality really matter in restaurants? Its impact on customer satisfaction and behavioral intentions", *Journal of Hospitality and Tourism Research*, Vol. 31 No. 3, pp. 387-410.
- Ngapo, T.M., Martin, J.F. and Dransfield, E. (2004), "Consumer choices of pork chops: results from three consumer panels in France", *Food Quality and Preference*, Vol. 15 No. 4, pp. 349-359.
- O'Mahony, R., Cowan, C. and Keane, M. (1995), "Dublin consumers and pork: attitudes to quality", *British Food Journal*, Vol. 97 No. 11, pp. 26-33.
- Opolski Medeiros, C., Barletto Cavalli, S. and Pacheco da Costa Proenca, R. (2011), "Human resources administration processes in commercial restaurants and food safety: the actions of administrators", *International Journal of Hospitality Management*, Vol. 31 No. 3, pp. 667-674.
- Popov-Raljić, J. and Radovanović, R. (2002), "Fundamentals of modern sensory analysis of food quality", *Uljarstvo*, Vol. 33 Nos 3-4, pp. 25-34.
- Popov-Raljić, J. and Radovanović, R. (2007), "Sensory analysis in the function of determining the safety and quality of food products", *Savremena poljoprivreda*, Vol. 56 No. 5, pp. 142-149.
- Popov-Raljić, J., Džinić, N., Kelemen-Mašić, Č., Mandić, A., Pavlović, A. and Sikimić, V. (2004), "Colour, texture and sensory characteristics of chicken breast influenced by citric acid addition to the feed", *Romanian Biotechnological Letters*, Vol. 9 No. 3, pp. 1661-1668.
- Pratten, J.D. (2003), "The importance of waiting staff in restaurant service", *British Food Journal*, Vol. 105 No. 11, pp. 826-834.
- Ristić, M. (2009), "The importance of sensory evaluation as criteria of meat quality – a comparison between different types of meat and meat products", *Tehnologija mesa*, Vol. 50 Nos 1-2, pp. 148-158.
- Sebranek, J.G. (1982), "Pork quality; a research review", *World Review of Animal Production*, Vol. 18 No. 3, pp. 7-24.
- Stojković, H.M. (2008), *Statistical Methods in Tourism*, Faculty of Science, Novi Sad.
- Tešanović, D. (2011), *Fundamentals of Gastronomy for Managers*, Faculty of Science, Novi Sad.
- Tešanović, D., Vikić, S. and Kalenjuck, B. (2010), "Structure and quality local cuisine in a recognizable Serbian regional hospitality facilities", *Proceedings of the International Conference: The Second International Scientific Expert Conference, Quality and Innovation in Tourism and Catering*, Vol. 2010, pp. 515-526.
- Tešanović, D., Kalenjuck, B., Tešanović, D., Psodorov, A., Ristić, Z. and Marković, V. (2011), "Changes of biochemical and sensory characteristics in the musculus longissimus dorsi of the fallow deer in the early phase post-mortem and during maturation", *African Journal of Biotechnology*, Vol. 10 No. 55, pp. 11668-11675.
- Tilgner, D. (1974), *Die Technologie der Garverfahren*, Sponholz Verl, Frankfurt.
- Walley, K., Parsons, S. and Bland, M. (1999), "Quality assurance and the consumer: a conjoint study", *British Food Journal*, Vol. 101 No. 2, pp. 148-162.

About the authors

Dragan Tešanović (PhD) is a Professor in the Department of Geography, Tourism and Hotel Management, in the Faculty of Science, at the University of Novi Sad and at the College for Hotel

Management, at the University of Belgrade where he is a Lecturer in the area of food and beverages in hospitality. Major in his research are hospitality and gastronomy.

Milovan Krasavčić (PhD) is a Professor at the College for Hotel Management, at the University of Belgrade, where he is a Lecturer in the area of restaurant service.

Bojana Miro Kalenjuk is a Research Associate in the Department of Geography, Tourism and Hotel Management, in the Faculty of Science, at the University of Novi Sad and a PhD student in the Tourism Science. She earned an MA in hospitality management from the University of Novi Sad and her major in the research is gastronomy. Bojana Miro Kalenjuk is the corresponding author and can be contacted at: bojanakalenjuk@yahoo.com

Milijanko Portić (PhD) is a Professor at the University of Novi Sad, in the Faculty of Science, in the Department of Geography, Tourism and Hotel Management; at the University of Belgrade, at the College for Hotel Management and Singidunum University, where he is a Lecturer in the area of gastronomy.

Snježana Gagić is an Assistant at the Alfa University, at the College of Professional Studies in Management and Business Communication, at the Department of Hospitality and a PhD student in Tourism Science in the Department of Geography, Tourism and Hotel Management, in the Faculty of Science, at the University of Novi Sad. She earned an MA in hospitality management from the University of Novi Sad and her major in the research is hospitality.