

## Food Safety Culture Among Food Handlers in Slovenia

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### Abstract

The study aimed to investigate the extent to which food handlers' perceptions of food safety culture differs based on their demographic characteristics. A cross-sectional paper-based survey was conducted among food handlers in catering establishments in Slovenia. Data were collected using validated questionnaires. Statistical analysis was performed using SPSS software. The factors of food safety culture with the highest assessed level of agreement were self-satisfaction and environment support, whereas work pressure and risk judgment exhibited the lowest level of agreement. There were statistically significant differences between food handlers' participation in food safety training courses entitled "Hygiene minimum" and food safety culture factors: management, communication and work pressure. An important statistically significant difference was observed between the number of years spent at the current workplace and the environment support. Those who attended the course entitled "Hygiene minimum" show a higher level of agreement for the management factor ( $M = 5.79$ ,  $SD = 0.81$ ) compared with those who did not attend this kind of training ( $M = 5.41$ ,  $SD = 0.72$ ). The study highlighted the weaknesses of food safety culture in catering establishments and propose improvements in order to enhance food safety culture. We established how demographic characteristics of the respondents affect the shaping of food safety culture. The questionnaire proved to be an effective tool in the assessment of food safety culture among food handlers in catering establishments in Slovenia. Our findings could assist food business operators in their efforts to develop strategies that will more effectively contribute to food safety culture.

**Keywords:** Food safety, Food safety culture, Food handler, Catering

### Резюме

Целта на настоящата работа е да се установи до каква степен се различава формирането на културата за спазване на безопасност при храните на служителите, работещи в заведения за обществено хранене в Словения, въз основа на техните демографски характеристики. Проучването е проведено с валидирани въпросници. Статистическият анализ е извършен със софтуера SPSS. Факторите с най-висока оценка и съгласие за влиянието върху поведението на служителите/респондентите и формирането на тяхната култура за спазване на безопасност при храните са личните работни качества и добрата работна среда, работният натиск и оценката за риска показват най-ниско ниво на съгласие. Наблюдават се статистически значими разлики между факторите при участие на служителите в курсове за обучение по безопасност на храните и факторите за формиране на култура за безопасност на храните при управление, комуникация и работен натиск. Наблюдава се статистически значима разлика в съотношението между броя години на настоящето работно място и добрата работна. Посетилите курса, показват по-високо ниво на съгласие за управленския фактор ( $M = 5.79$ ,  $SD = 0.81$ ) в сравнение с тези, които не са посещавали този вид обучение ( $M = 5.41$ ,  $SD = 0.72$ ). Изследването подчертава слабостите на формиране на културата за безопасност при храните в заведенията за обществено хранене, установява влиянието на демографските характеристики на служителите и предлага подобрения с цел нейното повишаване. Използваният въпросник е ефективен инструмент за оценка на степента на формиране на културата за безопасност на храните сред респондентите. Получените констатации могат за разработване на стратегии, които по-ефективно да допринесат за формиране на култура за безопасност при храните.

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## Introduction

Beyond traditional approaches based on training, food analysis and official inspections, there is a need to ensure a food safety culture (FSC) to improve food safety performance (Sarter and Sarter, 2012). As defined by Yiannas (2009), FSC is the way in which an organization or a group approaches food safety in thought and in behaviour. According to Powell *et al.* (2011), this means that operators: 1) know the risk associated with the food they produce; 2) know how it should be managed and effectively manage it; 3) promote a value system that focuses on preventing illness. Griffith *et al.* (2010a; 2017) describe FSC as an emerging risk factor; it has been defined as “the aggregation of the prevailing relatively constant, learned, shared attitudes, values and beliefs contributing to the hygiene behaviours used within a particular food handling environment”. As explained and summarized by De Boeck *et al.* (2017), the behaviour of all employees, regardless of their hierarchical position in the company, is believed to be influenced by the food safety climate prevailing in the company.

However, recent studies have also highlighted the importance of food safety behaviour (e.g., decision making and execution of procedures) of employees working in food-processing companies. It is also important to distinguish between two related concepts: between food safety climate and FSC. De Boeck *et al.* (2015) presented a distinction between these two concepts. Food safety climate was conceptualized as the perception of the individual employees regarding the food safety situation in their company, whereas FSC can be considered by all stakeholders in the business. FSC was then defined as the interplay of the food safety climate perceived by the employees and the managers of a company (so-called “human route”) and the context in which a company is operating, the currently implemented Food Safety Management System (FSMS), consisting of control and assurance activities (so-called “techno-managerial route”). These two routes can be considered to be mechanisms driven by different variables, both believed to influence the (microbiological) output (e.g., the safety and hygienic status of the final delivered or processed food products, production environment, and hands of the workers) (De Boeck *et al.*, 2017). Griffith *et al.* (2017) explained that the type of FSC existing within a business can explain why food handlers choose not to implement known food safety practices and why training, although important, may not change practices. Whilst studies on FSC remain in their relative

infancy, attempts have been made to identify its underlying structure (Griffith *et al.*, 2010b). Yiannas (2009) states that if the food safety performance in the food supply chain is to be improved, the way people do things must be changed. Or, even simpler, he states that food safety equals behaviour.

However, recent interest has led to the development of several tools (questionnaires, observational methods) to measure FSC in organizations (Griffith, 2006; Boeck *et al.*, 2015). Some of them are developed from the perspective of regulators or through their own measurement systems in food companies (De Boeck *et al.*, 2017), but commercial measurement systems also exist (e.g., Campden BRI/TSI). For example, Ungku Fatimah *et al.* (2014) present a model for determining the FSC with the help of a questionnaire, which includes nine areas: leadership, communication, self-commitment, management system and style, environment support, teamwork, accountability, work pressure, and risk perception. Nyarugwe *et al.* (2016) put forward a system-based model, in which the interdependence and relationships of all components are studied, and hierarchies of subsystems are indicated. In line with De Boeck *et al.* (2015), Nyarugwe *et al.* (2016), stress the importance of measuring both FCS elements and actual food safety performance to obtain a picture of the FSC in the organization as a whole.

De Boeck *et al.* (2017) extended the existing FSC model, introducing new variables and relationships which establish the individual human route. In their study, model safety behaviour is considered twofold: on the one hand “safety compliance” is considered, being the execution of the obligated safety related activities (e.g., following procedures and the use of protective clothing), on the other hand “safety participation” is proposed, being the execution of voluntary safety related activities (e.g., assisting colleagues to make sure they can work in a safe manner). In their research, Nayak and Waterson (2017) established that stakeholders valued the importance of FSC and were aware of the risks of degradation in FSC even in “mature” organizations. They understood the benefits of assessing FSC in food businesses and had various thoughts on the type of the factors that were to be measured and how to measure them. Assessing FSC in one guise or another can be useful as it provides valuable insights when used appropriately.

FSC is complex, with many interlinking factors at play. The analysis of FSC literature showed that FSC researchers emphasized the importance

of food handlers' knowledge and behaviour at all levels in the food supply chain and management system. The knowledge, attitude, and behaviour of food handlers are recognized as especially important in the application of knowledge and can greatly influence individuals' behaviour and practice (Griffith and Clayton, 2005). As reported by others, inappropriate handling practices can cause food contamination and foodborne diseases (FBD) consequently, impairing the health of consumers (Zanin *et al.*, 2017). Pichler *et al.* (2014) demonstrate a limited level of knowledge among food handlers in the catering industry concerning the optimal temperatures for cooking, holding, and storing foods. When performing catering activities, there is often a situation when people without proper education and training come into contact with food. In the past, Slovenia abandoned special educational conditions valid for performing food hygiene education ("hygiene minimum") for food handlers. The "hygiene minimum" education, which was mandatory for food handlers in Slovenia before their commencement of work and had to be renewed every five years for the workplaces where food handlers came into contact with food, was also abolished (Čebular *et al.*, 2014). European (EU) legislation in the field of food safety provides that the food business operator has to ensure food safety (Regulation (EC) No. 852/2004 and Regulation (EC) No. 178/2002). According to the requirements of the mentioned EU legislation, the food business operator or their responsible persons themselves should train their employees according to food hygiene principles. Čebular *et al.* (2014) found that fewer food business operators are concerned about education and training continually, as their main goal is to reduce costs. The level of knowledge depends on the formal education of food handlers (Čebular *et al.*, 2014), which was also confirmed by Ovca *et al.* (2018) and Jevšnik *et al.* (2008). In the last Slovenian research Jevšnik *et al.* (2018) estimated that 5.8% respondents who work in catering establishments have never attended food safety training courses. As established by Clayton *et al.* (2002) food handlers may attend food safety training, but knowledge does not necessarily lead to changes in food handlers' hygiene behaviour.

Nyarugwe *et al.* (2016) emphasize that major elements to be considered in a FSC research include organizational and administrative characteristics (i.e. food safety vision, communication, commitment, leadership, training), technical fa-

cilities/resources (i.e. food hygiene/safety tools, equipment, & facilities), employee characteristics (i.e. attitudes, knowledge, perceptions and risk awareness), group characteristics, crucial Food Safety Management System (FSMS) characteristics, and actual food safety performance. Yiannas (2008) argues that there should be a move away from traditional food safety management systems with a focus on process, food science and a simplistic view of food handler behaviour to the ones that incorporate people as well as processes, behavioural science and the belief that behavioural change is complex and not based on mere provision of factual information.

The current study used the Ungku Fatimah (2013) questionnaire, designed and validated specifically for on-site food services and captured the multidimensional aspect of FSC. The aim of the study was to determine the extent to which employees' perceptions of FSC differed based on demographic variables. We estimate that food handlers' gender, age and the number of years at the current workplace do not influence the way FSC is formed. We assume that food safety training called "Hygiene minimum", experiences and education of respondents influence the FSC formation.

## **Materials and Methods**

### *Study design*

The research study was conducted from November 2017 until June 2018. A cross-sectional study that was carried out included employees in catering establishments in Slovenian territory. To collect data, we used a translated validated survey questionnaire derived from the Ungku Fatimah (2013) study, with some updates. Results of this study provide additional piece of evidence for better understanding of the FSC elements related to demographical characteristic of food handlers in Slovenian catering facilities.

### *Study sample*

The respondent sample was formed according to the Slovenian catering establishments database, held by the Tourism and Catering Section within the Chamber of Craft and Small Business of Slovenia. We personally distributed survey questionnaires to heads of catering establishments or sent them to addresses of their owners in Slovenia. In the cover letter and in an advance telephone call the heads were asked to distribute questionnaires among the employees who handle food in their establishments. They were also asked to collect completed questionnaires and return them to us via postal service,

therefore an envelope with our address and a stamp were attached to our cover letter. The cover letter presented the purpose and goals of the study and the ways it could benefit catering establishments. We handed out or sent 608 questionnaires in total. Out of 202 returned questionnaires, 158 were fully completed and thus included into statistical data processing.

#### *Research instrument*

A standardized survey questionnaire was used (Ungku Fatimah, 2013), somewhat expanded, translated from English into Slovenian language and adapted to our environment by the authors of this research. A few statements typical of our environment that did not appear in the original questionnaire were added to individual FSC factors. The questionnaire was tested among the employees in catering and among experts in food sector. It consisted of 48 close-ended questions, distributed into six FSC factors, and of demographic questions. Respondents answered using a seven-point Likert scale (1: Strongly Disagree, 2: Disagree, 3: Somewhat Disagree, 4: Neither Agree nor Disagree, 5: Somewhat Agree, 6: Agree, 7: Strongly Agree).

The first part of the questionnaire included questions regarding an employee's perception of FSC elements (management and coworker support, communication, self-commitment, environment support, work pressure, risk judgment) in the catering establishment where they work. Its second part included demographic data of respondents (gender, age group, years of food-service experience, time worked at current operation and, participation in food safety training - Hygiene minimum), with the intention to determine their influence on FSC formation.

#### *Data analysis*

The data was evaluated and analysed using the Statistic Program for the Social Sciences (SPSS, Version 22.0, Chicago, IL, 2006). Descriptive statistics including mean, standard deviation, frequency, and percentage were used to summarize the data. Mean comparison analysis (i.e., independent t-tests and one-way ANOVA) were conducted to examine significant differences in perceptions of FSC based on respondents' demographic.

## **Results and Discussion**

#### *Respondents' demographic characteristics*

A total of 158 (3.84% response rate) completed questionnaires were returned from respondents in catering establishments (Table 1). Profiles of respondents are presented in Table 2.

The majority (68%) of the respondents were female. Most respondents' maternal language (89.2%) was Slovenian. More than half (53.2%) of respondents were between 30 and 49 years old, whereas less than 18.3% were between 18 and 29 years old. Respondents were considered experienced employees with 32.9% of them reporting having worked at least 10 years in the catering establishment and 64.5% indicating they had stayed at least 10 years in the current operation. Most respondents had received "Hygiene minimum" food hygiene training, which was obligatory in Slovenia until 2004. 44.9% of respondents had finished a secondary professional school, cook or waiter course, others a secondary or grammar school. A smaller share (26.6%) of respondents finished either primary school or university.

#### *Influence of food safety culture factors among food handlers*

Forty-eight items related to determining FSC were grouped into 6 factors: management and coworker support (18 items), communication (8 items), self-commitment (5 items), environment support (4 items), work pressure (5 items), risk judgment (8 items). Respondents answered using the seven-point Likert scale.

Factor management and coworker support refer to the impact of behaviour/attitude of management toward their employees, compliance with work rules and food safety procedures, the impact of trainings on employees, worker cooperation and the general impact of the management style on proper food handling in the establishment. It was established that on average respondents answered questions of the first set with scores between 5 and 6 (Table 1). In their view, participation in education courses, adherence to work rules and work processes are useful in food handling. Their managers act in accordance with rules, manage and lead towards food safety assurance. Respondents somewhat agree that workers cooperate and support each other, which ensures a higher FSC level. Most respondents were neutral regarding the statement: "My performance of food safety requirements is included in my annual assessment". In comparison to other results based on answered questions, the same question has a higher standard deviation, which indicates greater differences in respondents' answers. If an employee's better annual assessment is a precondition for a higher salary or some others benefits, managers could include the perceived proper food handling in the annual assessment. Employees would be motivated and consequently the

**Table 1.** Mean agreement scores for food safety culture factors as perceived by food handlers in catering establishments (n = 158)

Factor and items	M	SD	Variance
<b>Factor 1: Management and coworker support (18)</b>			
Employees remind each other about following food safety practices.	6.04	1.01	1.02
Education courses on food safety organized by our management, are useful for our work.	5.97	1.11	1.24
When lots of work needs to be done quickly, employees work together as a team to get the tasks completed safely.	5.90	1.19	1.42
My manager acts in compliance with food safety rules.	5.91	1.19	1.42
My manager always watches to see if employees are practising safe food handling.	5.72	1.28	1.63
My performance of food safety requirements is included in my annual assessment.	4.85	1.71	2.92
My manager kindly warns me against improper food handling.	5.61	1.32	1.76
New employees and experienced employees work together to ensure food safety practices are in place.	5.84	1.15	1.32
There is good cooperation among departments to ensure that customers receive safely prepared food.	5.77	1.08	1.17
My coworkers are always supportive of each other regarding food safety.	5.77	1.03	1.06
Managers' measures show that providing safe food to consumers is the main priority.	5.66	1.17	1.36
Management enforces food safety rules consistently with all employees.	5.85	1.09	1.20
Management inspires me to follow safe food handling practices.	5.59	1.22	1.50
Management applies all food safety rules.	5.88	1.11	1.24
Management provides adequate trainings to strengthen best practices regarding food safety.	5.65	1.27	1.60
Employees remind each other about following food safety practices.	5.87	1.03	1.06
Employees are disciplined or reprimanded when they fail to follow food safety practices.	5.72	1.09	1.18
Employees are rewarded if food safety best practices are followed.	4.35	1.74	3.05
<b>Factor 2: Communication (8)</b>			
When my coworkers remind me of a fault I have done at my work, I thank them.	5.85	1.07	1.14
I can freely speak up if I see something that may affect food safety.	6.22	0.95	0.91
My manager generally gives appropriate instructions on safe food handling.	5.71	1.22	1.49
I am encouraged to provide suggestions for improving food safety practices.	5.69	1.28	1.63
Management provides adequate and timely information about current food safety rules and regulation.	5.68	1.32	1.74
All of the necessary information for handling food safety is readily available to my area.	5.64	1.16	1.35
All managers give consistent information about food safety.	5.64	1.33	1.77
Customers expect employees to handle food in compliance with food safety best practices.	5.99	1.06	1.13
<b>Factor 3: Self-commitment (5)</b>			
I keep my work area clean because I do not like clutter.	6.40	0.91	0.83
I follow food safety rules because it is my responsibility to do so.	6.27	1.01	1.02
I follow food safety rules because I think they are important.	6.23	1.02	1.04
I am committed to following all food safety rules.	6.17	0.97	0.94
Food safety is a high priority to me.	6.05	1.14	1.31

Factor and items	M	SD	Variance
<b>Factor 4: Environment support (4)</b>			
Equipment items needed to prepare food safely are readily available and accessible.	6.02	0.99	0.97
Adequate supplies are readily available to perform safe food handling practices.	6.14	0.98	0.96
Facilities are of adequate quality to follow safe food handling practices.	6.10	1.09	1.20
I am provided with quality supplies that make it easy for me to follow safe food handling practices.	5.97	1.05	1.09
<b>Factor 5: Work pressure (5)</b>			
I can leave my workplace when necessary, without being punished for that.	4.65	1.74	3.02
My work load does not interfere with my ability to follow safe food handling practices.	5.02	1.46	2.15
Breaks and my bodily needs are normally taken care of during working hours.	5.37	1.53	2.35
The number of staff scheduled at each shift is adequate for me to get my work done and handle food safely.	4.84	1.67	2.77
I always have enough time to follow safe food handling procedures, even during rush hours.	5.11	1.54	2.36
<b>Factor 6: Risk judgment (8)</b>			
Inspections help manage the food safety system.	5.49	1.53	2.34
When there is a pressure to finish food production, managers sometimes tell us to work faster by taking shortcuts with food safety.	3.44	1.91	3.66
I believe that written food safety policies and procedures are nothing more than a cover-up in case there is a lawsuit.	3.56	2.07	4.27
I warn my manager of mistakes made by my coworker, for which I am rewarded.	3.85	1.93	3.72
Safety measures are carried out without compromises when they apply to safe food handling.	5.61	1.25	1.56
I am sometimes asked to cut corners with food safety so we can save costs when preparing food.	2.92	1.73	3.00
Management has a clear picture of risks connected to inadequate food handling.	5.68	1.18	1.39
Management refuses to accept the smallest risk regarding food safety.	5.32	1.67	2.78

Legend: M-mean; SD-standard deviation

level of food safety would be higher. Differences also appear in the reward system for respondents who follow good food safety practices. On average, respondents' view is neutral and standard deviation is higher. This means that only certain catering establishments in Slovenia have established a reward system for cases of adequate performance of food handling procedures to ensure food safety.

With communication factor we wanted to find out the extent and the way the communication takes place among workers, and its impact on adequate food safety. On average, as evident in Table 1, respondents somewhat agreed with statements, since average scores referred to communication in a catering facility were between 5 and 6 (average SD = 1.5). Minimum standard deviation and the highest agreement of respondents is shown in the statement: "I can freely speak up if I see something that may affect food safety". Considering the analysed results among workers in catering establishments, the communication between workers and the management is successful, thus ensuring a

higher FSC level.

Self-commitment is the factor, used to establish the impact of a worker on food safety in catering, based on the diligence and the application of food safety rules. It was established that respondents in their own view follow food safety rules, since they believe in their significance and are aware of the consequences if they are not respected. According to respondents, food safety is the main priority in a catering establishment. Self-satisfaction had the highest level of agreement ( $M > 6$ ,  $SD < 1$ ) if compared to other FSC factors.

Environment support is the factor for us to establish the correlation between the work environment where a food handler works and food safety. Factor environment support includes the provision of proper work equipment in a catering establishment and its calibration and maintenance. Survey results show little deviation in respondents' answers. In their opinion they mostly dispose with proper work equipment which is regularly maintained and calibrated.

Bigger differences among answers appeared in work pressure factor, where the mean values turn around 5. On average the respondents' opinion is neutral regarding instances of leaving their workplace when necessary, without being punished ( $M = 4.65$ ,  $SD = 1.74$ ). Our findings point at differences in the opinions of participants regarding penalties for justified abandoning the workplace among some catering establishments. Respondents were neutral regarding the statement: "The number of staff scheduled at each shift is adequate for me to get my work done and handle food safety" ( $M = 4.84$ ,  $SD = 1.66$ ), which means that respondents probably not always dispose with everything necessary for work. The FSC factors with the highest scored level of agreement were self-commitment and environment support, and the lowest levels of agreement were work pressure and risk judgment.

The largest deviations among respondents are observed in questions describing risk judgment factor. The largest dispersion in answers appeared at the statement: "I believe that written food safety policies and procedures are nothing more than a cover-up in case there is a lawsuit." ( $M = 3.56$ ,  $SD = 2.07$ ). On average, respondents disagree with the statement, however, SD indicates a higher dispersion among answers. The statement: "I am sometimes asked to cut corners with food safety so we can save costs when preparing food." ( $M = 2.92$ ,  $SD = 1.7$ ) reveals that employees may face this type of decisions which is not indicative of a high level of FSC.

#### *The influence of demographic characteristic on perceptions of food safety culture*

Table 2 exhibits results according to FSC factors in comparison to demographic characteristics of respondents (gender, age group, years of food-service experience, time worked at current operation, and participation in food safety training "Hygiene minimum"). Result analysis showed statistically significant differences between participation in "Hygiene minimum" training on the one hand, and management, communication and work pressure FSC factors on the other. Important statistically significant difference showed in the correlation between time worked at the current workplace and FSC factor environment support. Participants in "Hygiene minimum" training have a higher level of agreement in FSC factor – management ( $M = 5.79$ ,  $SD = 0.81$ ) in comparison with nonparticipants in these trainings ( $M = 5.41$ ,  $SD = 0.72$ ). This finding supports the importance of food safety training as promoting a higher FSC level. Respondents who

participated in "Hygiene minimum" training, show higher agreement regarding the communication in a catering establishment factor ( $M = 5.86$ ,  $SD = 0.89$ ), compared with nonparticipants in such a training ( $M = 5.57$ ,  $SD = 0.82$ ).

Management is a FSC factor, including an employee's personal perception of the relevance of training, control and commitment to the work of their managers (Singla et al., 2006). Results indicate that workers in catering establishments find food safety important; they wish to and must respect the rules and procedures they have shaped to prevent risks. Respondents' opinion is that their managers operate in compliance with food safety rules and carry out control over other workers. In their opinion, the managers consistently introduce new rules for proper work procedures which ensure food safety and inspire their employees to adopt them. In case of increased workload, workers support each other and cooperate, which indicates that a positive FSC is forming.

Relationships and beliefs within FSC depend above all on leadership and motivation, the way of communicating on food safety and on the building of trust towards the management staff (Neal et al., 2012). Workers are often reminded in case they neglect good food safety practices; however, they are not always rewarded when they follow them. This can present a risk to safe food handling, since the employees' motivation to carry out good hygiene practice (GHP) diminishes. Thus it can be recommended that catering establishments introduce a reward system for exemplary following GHP by an individual who would then be more motivated and ready to follow the rules of the managers. The reward system would also improve relationships and communication between employees and management. Unkgu Zainal Abidin et al. (2014) discovered employees' belief that their managers regularly introduce new rules and procedures aiming to improve food safety. Moreover, their results show that employees listen to each other, communicate and cooperate to ensure safe food for consumers.

Even bigger differences in the level of agreement appeared in work pressure factor in correlation with participation in "Hygiene minimum" training. A higher level of agreement was evident in those who attended "Hygiene minimum" ( $M = 5.17$ ,  $SD = 1.16$ ), if compared to those who did not attend it ( $M = 4.64$ ,  $SD = 1.13$ ). Differences also appeared between the environment support factor and the demographic variable the number of years at the current workplace. It was established that re-

**Table 2.** Results according to food safety culture factors in comparison to demographic characteristics of respondents

	Management and coworkers' support			Communication			Self-commitment			Environment support			Work pressure			Risk judgment				
	n	M	SD	p	n	AS	SD	p	n	AS	SD	p	n	AS	SD	p	n	AS	SD	p
Gender																				
Female	106	5.66	0.78	0.771	107	5.76	0.88	0.769	107	6.04	0.89	0.347	107	5.05	1.07	0.424	107	4.52	0.88	0.404
Male	51	5.71	0.87		51	5.80	0.90		51	6.18	0.84		51	4.89	1.38		51	4.40	0.71	
Age																				
18 - 29 years old	29	5.57	0.77		29	5.56	1.00		29	6.02	0.87		29	4.85	1.11		29	4.53	0.92	
30 - 49 years old	84	5.76	0.84	0.183	84	5.85	0.89	0.221	84	6.21	0.84	0.321	84	5.10	1.17	0.368	84	4.50	0.77	0.384
Over 50 years old	44	5.58	0.75		45	5.77	0.78		45	6.24	0.83		45	4.89	1.24		45	4.43	0.90	
Years of food-service experience																				
1-10 let	52	5.46	0.80		52	5.63	0.94		52	6.00	0.93		52	4.80	1.09		52	4.38	0.86	
11-20 years	42	6.01	0.77		42	6.02	0.83		42	6.31	0.83		42	5.17	1.28		42	4.60	0.88	
21-30 years	41	5.59	0.80	0.557	41	5.69	0.90	0.272	41	6.22	0.76	0.124	41	5.12	1.04	0.468	41	4.37	0.69	0.712
Over 30 years	22	5.68	0.74		23	5.80	0.77		23	6.30	0.77		23	4.90	1.39		23	4.71	0.87	
Food safety training: »Hygiene minimum«																				
Yes	105	5.79	0.81	0.005	105	5.86	0.89	0.045	105	6.25	0.83	0.14	105	5.17	1.16	0.008	105	4.49	0.80	0.939
No	51	5.41	0.72		52	5.57	0.82		52	6.04	0.86		52	4.64	1.13		52	4.48	0.90	
Education																				
Completed primary school	16	5.88	0.74		16	5.95	0.60		16	6.27	0.73		16	5.40	1.07		16	5.04	0.83	
Completed secondary professional school, cook course	58	5.67	0.78	0.424	59	5.82	0.81	0.516	59	6.15	0.81	0.575	59	4.90	1.20	0.891	59	4.38	0.85	0.144



spondents who agree the most in environment support factor, have worked from 6 to 10 years at the current workplace ( $M = 6.18$ ,  $SD = 0.83$ ), while the least agreement is in those who have worked from 10 to 20 years at the current workplace ( $M = 5.93$ ,  $SD = 0.83$ ).

Referring to result analysis, it was established that demographic variables competence in food safety and the number of years at the current workplace or time worked in current operation showed significant differences in the agreement level in relation to FSC elements (management and coworker support, communication, work pressure and environment support). Food safety training and time worked or respondents' experiences are the demographic characteristics that impact food safety. In our study, demographic variables gender and age have no impact on FSC formation.

## Discussion

Management and coworker support, communication, self- commitment, environment support, work pressure and risk judgment are six factors used to describe FSC in the catering establishments that were ready to participate in the first research of this type in Slovenia. Data analysis indicated that communication, environment support, management and coworker support, and self-commitment have a significant role in forming FSC (Table 2) in the analysed establishments. Management is a FSC element, involving an employee's personal perception of the relevance of training, control and commitment to the work of their managers (Singla *et al.*, 2006). Results indicate that workers in catering establishments find food safety important; they wish to and must respect the rules and procedures they have shaped to prevent risks. Respondents' opinion is that their managers operate in compliance with food safety rules and carry out control over other workers. In their opinion, the managers consistently introduce new rules for proper work procedures which ensure food safety and inspire their employees to adopt them. In case of increased workload, workers support each other and cooperate, which indicates that a positive FSC is forming. Workers are often reminded in case they neglect good food safety practices; however, they are not always rewarded when they follow them. This can present a risk to safe food handling, since the motivation to carry out proper food safety procedures among employees diminishes. We recommend that catering establishments establish a reward system for their employees in case of exemplary respect of these rules, since this would motivate food han-

dlers to comply with the rules of their managers. A reward system would improve relationships and communication between employees and the management. The study by Ungku Fatimah *et al.* (2014) reveals employees' opinions that managers consistently implement new rules and procedures aiming to improve food safety. Moreover, they established that employees listen to each other, communicate and cooperate to ensure safe food for consumers (Ungku Fatimah *et al.*, 2014). Relationships and beliefs within FSC depend above all on leadership and motivation, the way of communicating on the issue of food safety and on the building of trust towards the management staff (Neal *et al.*, 2012).

A lower level of agreement in comparison to other measured levels of agreement was established for the statement defining the management factor, namely the statement: "My performance of food safety requirements is a part of my annual assessment". If an employee's improved annual assessment in a catering establishment is a precondition for a higher salary or some other benefit, the managers could include the perceived proper food handling into their annual work assessment. Employees would be motivated and consequently the level of food safety would be higher. Recognition of the work well done satisfaction at work and remuneration are the best incentives for improving work performance (Denny, 1993).

FSC factors with the highest rated level of agreement were self-satisfaction and environment, while work and risks were the lowest in agreement. In the research by Ungku Fatimah (2013), it became evident that self-satisfaction and environment were also the elements with the highest level of agreement, while risk judgment and management, and coworker support scored the lowest.

In the study, it was discovered that sub-groups formed within FSC, as established also by Ungku Fatimah *et al.* (2014). In our case this signifies revealed differences in respondents' answers in reference to completed food safety training "Hygiene minimum" and the number of years at the current working place or the time worked in operation (Table 2). Results show that workers who attended "Hygiene minimum" training show a higher rate of agreement in management element in comparison to those who did not attend it. In Slovenia, "Hygiene minimum" training was mandatory until 2004; it consisted of food hygiene contents and ended with an exam in front of an expert commission (Čebular *et al.*, 2014). This training and employees' knowledge on food safety proved to be highly successful

(Jevšnik *et al.*, 2018). The same was confirmed in elements communication and work pressure, where a higher agreement rate was expressed by respondents with completed “Hygiene minimum” training. In daily practice, most of the critical points depend on a particular person at a particular place. If we do not perform adequate training and appropriate education within human resources, we cannot expect to have professionals with highly developed skills or high knowledge; this makes the control and documentation of food handlers by human resource management relevant (Jevšnik *et al.*, 2006; Jevšnik *et al.*, 2008c; Ovca *et al.*, 2018). The effectiveness of training depends on the food handlers’ tasks. Food handlers might be too busy or might not have the opportunity to wash their hands effectively enough. The current study results illustrate that knowledge alone is not sufficient to affect hand washing behaviour, and that food handlers need behaviour-based motivation (Yu *et al.*, 2017). The food establishments should consider alternative methods for increasing hygiene compliance, based on habitual motivation rather than traditional methods (Pellegrino *et al.*, 2015).

Those who have worked at the current workplace up to 5 years and from 6 to 10 years more often agree with statements forming the element Environment support than the older respondent groups (from 10 to 20 years, above 20 years). In terms of demographic characteristics of employees, the Ungku Fatimah (2013) research revealed differences in variables: participation in trainings, number of years at the current workplace, gender and age. Comparing the results of our and Ungku Fatimah (2013) studies, some common characteristics were discovered. In both researches the workers with trainings in food safety, scored the factors, such as management, communication and work pressure at a higher agreement level than those without such trainings. Both studies thus confirm the existence of subgroups within FSC based on the demographic characteristics of employees. Referring to the information obtained about FSC subgroups, the management can improve food safety in the catering establishment. In this way, a manager can for example recognize subgroups and adapt training methods to employees’ age, gender, language, literacy level, and consequently reduces the risk of foodborne infection outbreaks/poisonings (Ellis *et al.*, 2010).

## Conclusion

Our research highlighted elements indicative of positive FSC (self-commitment and environment support), and elements that present a food safety

risk (work pressure and risk judgment). The data analysis highlighted the existence of subgroups (respondents with completed “Hygiene minimum” training and respondents as to the number of years worked in a catering establishment in Slovenia), that had formed within FSC. Based on these subgroups, managers (heads of establishments) could carry out measures necessary to improve food safety and thus prevent potential risks. We established that food safety training and time worked or respondents’ experiences are demographic characteristics with an impact on food safety. In our study however, the demographic variables of gender and age had no impact on FSC formation.

Food safety training and individual awareness are the most important tools for food safety assurance; therefore, every food handler requires a complex and individual management. The human factor must be discussed equally amongst all the other risk factors. For food safety, it is essential that every person in the food supply chain understands and fulfils their responsibilities and relies upon the previous and the next step in the chain.

Heads of food handling facilities have to decide whether they wish to establish strong food safety culture. With this aim, they have to use various tools to increase competence, motivation, sense of belonging and awareness on the importance of food safety for the final consumer. It is important for the management to see food safety as a value, then it will become a value to all the other employees as well.

## Research limitation

We distributed 608 survey questionnaires across 12 statistical regions in Slovenia. Only 158 survey questionnaires from seven statistical regions could be used in the research. Others gave no response to our invitation to participate in the research. Our view is that Slovenian Chamber of Craft, Tourism and Catering Section should develop better approaches for both trainings and education of food handlers and for motivation of people employed in catering in order to respond when invited to participate in various studies that have a broader public health significance.

Even with anonymity assured, in a research with a survey there is a possibility that respondents’ answers are not totally realistic because of their fear of degradation or losing their workplace, since they know that in the end questionnaires are collected and forwarded by their managers. In spite of highlighted limitations of the research, our use of validated survey questionnaire authored by Ungku

Fatimah (2013) gave us an insight into the FSC that has formed within catering establishments in Slovenia.

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