

# Analysis of dimensionality of food safety culture: An empirical examination of a Slovenian food processing company

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## ABSTRACT

An emerging research field called “food safety culture” is still largely unexplored. According to the identified gap in the literature, this study aims to develop and empirically validate the conceptual model of food safety culture, especially from the perspective of the employees. The research was carried out in a medium-sized food enterprise (220 employees) which has well-developed food safety management systems in order to ensure compliance with the legislation and the corresponding standards. Exploratory factor analysis was used to uncover the dimensions of food safety culture as well as to assess convergent validity. Furthermore, a multiple regression analysis was applied to assess the contribution of food safety culture dimensions to training efficiency and risk judgement. The demographical features of the employees (gender, age, education, and professional experience) revealed to have no influence on employees’ food safety culture. Moreover, we empirically tested the reliability and validity of food safety measurement scales (leadership and co-worker support, communication, self-commitment of the employees, environment support, work pressure, risk awareness and training efficiency), which can all affect the employees’ attitude towards food safety. Drawing upon theoretical foundations and empirical results, one can conclude that the ongoing employee training and development regarding food safety leads to the development of food safety culture and enhancement of employees’ commitment to the organization.

**Key words:** food safety, employees, training, food safety culture, food safety management system

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## INTRODUCTION

Food is essential to life and is a human right but if contaminated, it can be the cause of illness and even death. As summarized before [1], food is necessary to the life of humans and all human beings must either work to provide the food for living or obtain their food from another person (or an organization) that may specialize in the provision of food.

Today's food industry and its sophisticated processing as well as distribution technology produce a variety of foodstuffs available to the consumer in the form of various articles on shelves of fast-growing commercial centers. The knowledge of health risks is more complete with the development of food science and technology, but the new interventions in technology and distribution cause new risks. The high level of public health is one of the fundamental objectives of food legislation [2]. Strategy papers on EU food policy emphasize the importance of ensuring food safety along the food supply chain, taking into account the principles of traceability. Ensuring food safety defines various system tools and approaches, and many good practices that determine the guidelines of safe food handling.

Today, we master food safety with different good practices that are the result of human culture, history, and lifestyle [3, 4].

Tradition, practice, and vast technical and scientific knowledge helped shape the principles and techniques of how to achieve acceptable food safety in a given environment. Heterogeneous environmental conditions, an abundance of different materials, diversity of cultures and ways of practical work helped shape the principles, among which some were later involved in the legislation. Nowadays, we manage food safety through the good practices at different levels of food production, distribution, and consumption. Present maintenance of food safety in a food supply chain can be easily broken down because of different kinds of barriers or simple misunderstandings among stakeholders, including consumers [4, 5]. HACCP represents the clearest example of this development [6]. The previous quality control system was based on the finished product. A new food safety philosophy is based on the appropriateness of the technological process in the chain through which the food passes, and the indicated significantly reduces reduces the risk for safety of the final product [7, 8, 9].

Factors that have a significant impact on employers' behaviour correlate with the organizational climate in the company, the level of job satisfaction and labour conditions and with the relations between employees. Marolt and Gomišček [10] describe a new management approach towards employees, which stimulates them to be initiative, to learn, to devote themselves to the company, to be self-confident, to be more efficient and to be better at team-work. This all contributes to higher successfulness and effectiveness of the organization. The authors emphasize the function of leadership, which plays a key role in the realization of the new principles into practical work and thus can

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significantly contribute to a better usage of the existent resources. A leader with a leadership function should persuade the employees to fulfill their needs and desires by working effectively, and should enable them to use their potentials, and by doing so contribute to the achievement of the goals of a team and an organization. It would be ideal if people were motivated to such level so that they would not work only out of obligation, but would work with eagerness and trust. The following skills of a successful leader are also mentioned: motivation, communication, improvement, and introduction of modifications [10, 11]. In the review on history of motivational research and theory, Latham and Ernst [12] summarize that psychologists now know the importance of (1) taking into account a person's needs (Maslow's need hierarchy theory, Hackman and Oldham's job characteristics theory), (2) creating a job environment that is likely to facilitate self-motivation (Herzberg's job enrichment theory, Hackman and Oldham's job characteristics theory) and (3) ways to directly modify, that is, to directly increase or decrease another person's behaviour by administering environmental reinforces and punishers contingent upon a person's response (Skinner's contingency theory). They also stress the importance of attaining employees' goals, as they do not only feel satisfied, but they generalize their positive affect towards a task [13]. Jannadi [14] emphasizes that workers are the ones who carry out the work in a company and they can be an important factor in making the company profitable or bankrupt. Human behaviour is very important and difficult to control, so handling people requires situational leadership. Hazards cannot be solved and eliminated just through engineering control. They also need to be recognized by employees who will minimize their effects [14].

Ungku Fatimah et al. [15] summarize the results of several studies, which have investigated the role of knowledge and attitudes towards employees' safe food handling practices in the foodservice industry. The knowledge about and the attitudes towards food safety are important, yet factors affecting employees' practices are multidimensional and extend beyond these two constructs. Jevšnik et al. [9] studied barriers that affect safe food handling practices in foodservice operations, that is, knowledge, time constraints, availability of resources, and behavioral issues (e.g., management and coworkers' attitudes), which have been reported also in some other studies well incorporated in Ungku Fatimah et al.'s [15] study. Human behavior (e.g. the actual execution of procedures) and decision making is influenced by the perceived food safety climate in an organization [16]. Yiannas [17] defines food safety culture as "the way we do things [food safety] around here". Poor food safety culture is increasingly recognized as a risk for foodborne illness outbreaks in the food industry. It is still a question which training type will prove to be more effective in the future. Irrespective of that, the most important fact according to Seaman and Eves [18] is that training will only lead to an improvement in food safety if the knowledge imparted leads to desired changes in the behaviour in the workplace. For conscientious

hygiene, it is not important in which enterprise people work, but depends upon hygiene awareness and education of an individual person [19]. Jevšnik et al. [9] states that the human factor in organizational and execution levels is the reason for intolerable deviations in HACCP system, which are expressed in critical situations. A more effective system of primary education and a lifelong learning of food-related topics are needed. Work environment and the individual in the food supply chain need to be discussed equally as all the other hazards. To achieve total quality and safe life, a multi-disciplinary and an innovative approach that would be capable of quick and effective responding in the food supply chain is needed.

In accordance with the reviewed literature in the field of food safety culture, it has been established that the culture in organizations is still very poorly understood. However, recent interest has led to the development of several tools to measure the food safety culture/climate in organizations [16]. Several tools for measuring the food safety culture and climate in companies with regard to food safety have already been developed. For example, the consultancy agency Greenstreet Berman, commissioned by the Food Standards Agency in the UK, has developed some sort of questionnaire to be completed by inspectors of the local authorities [16]. Jespersen and Bedard [20] present the observational methods that focus on the behavior of employees, and through those methods they want to show the maturity of the organization with regard to food safety.

Ungku Fatimah et al. [15] present a model for determining the food safety culture with the help of a questionnaire, which included nine areas: leadership, communication, self-commitment, management system and style, environment support, teamwork, accountability, work pressure and risk perception.

Yiannas [17] states that if you want to improve the food safety performance in the food supply chain, you must change the way people do things or you must change their behavior. Or even simpler – he states that food safety equals behavior [17].

However, limited studies have explored food safety culture in food industry using perceptual measures.

This study adds to this emerging dialogue in at least two important ways. Firstly, this paper attempts to empirically validate food safety culture dimensions. Secondly, it provides new insights into the relationship between food safety dimensions and employee training efficiency.

## METHODS

### Sample and data collection

The following research was carried out in a Slovenian food processing company with 220 employees. In total, 169 usable responses (out of 220) were collected during the given time window, yielding a response rate of 76.8 %. The profile of the respondents is provided in Table 1.

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**Table 1:** Profile of the respondents in our sample (N = 169)

	Sample distribution	Percentage
Respondent profile	Middle management	4.1
	Group leader	11.2
	Production worker	84.6
Gender	Female	50.3
	Male	49.7
Working experience	Less than 1 year	10.1
	1-2 years	10.7
	3-7 years	18.9
	8-12 years	7.1
	13-20 years	10.1
	More than 20 years	43.2

In terms of the gender, 50.3 % of the respondents were female, while 49.7 % of the respondents were male. Furthermore, the majority of the respondents – 43.2 % have more than 20 years of working experience, while 18.9 % have 3 to 7 years of experience, 10.7 % have 1 to 2 years, 10.1 % have less than one year of experience, and 7.1 % have 8 to 12 years of working experience.

### Measures

Recognizing the multidimensional nature of food safety culture, the rapidly growing literature [e.g. 21, 22] documents a wide range of specific practices being implemented by organizations. Based on the previous studies in this area [15, 16], we developed scales for measuring the food safety culture. A resulting ten-item scale captures the extent to which leadership is devoted and committed to food hygiene and continuous improvement of food hygiene. A six-item scale measures communication. Furthermore, a seven-item scale measures the extent to which employees are engaged and self-committed towards ensuring a food safety. A five-item scale captures the extent to which top management ensures the resources needed to achieve the required level of food safety. A three-item scale was used to measure work pressure, and a four-item scale was applied to measure the perception of employees regarding the risk judgement. Additionally, a four-item scale was used to measure employee training efficiency. Drawing upon Ungku Fatimah et al. [15], several general questions were added such as gender, years of work/professional experience etc.

Validity was assessed in terms of content and convergent validity. Content validity refers to the adequacy of items in accurately addressing all dimensions of the particular construct of food safety culture. Content validity was qualitatively evaluated in the early stage of the questionnaire development process by examining the measurement items by several independent expert reviewers. Additionally, pilot testing was performed on a random sample of ten employees. We used a structured questionnaire with a seven-point Likert scales to capture the de-

gree to which respondents agree with the particular statements within food safety culture dimensions.

## ANALYSIS AND RESULTS

### Measurement and validation of constructs

The scales for measuring food safety culture were subjected to validity and reliability tests. The construct validity was assessed by merely using exploratory factor analysis (EFA) based on Varimax rotation. The scale reliability was tested by calculating its Cronbach's alpha. Additionally, we performed corrected item-total correlations (CITCs) in order to strengthen validity and reliability results. The results of the validity and reliability tests are presented in the following section. The result of factor analysis supports the validity of the food safety culture as indicated by the amount of variance which exceeded 50 % (for each sub-construct), and the loading factors of all items within each scale exceeded 0.5 [23].

As shown in Table 2, the results display three factors with eigenvalues greater than one, accounting for 63.414 % of the variance (Kaiser-Meyer-Olkin statistic 0.819; Bartlett statistic 496.713;  $p = 0.000$ ). Thus, a model with three factors may be adequate to represent the data. To ensure a convergent validity, a cut-off value of 0.5 is considered in this study. The first factor shows the variables having a common underlying dimension of "top management commitment". The main variables, which load heavily on this factor, are related to the establishment of clear objectives regarding food hygiene and continuous improvement of food hygiene. The second factor named 'Employee collaboration' includes the variables related to teamwork, especially in relation to the work quality and food hygiene consideration. The third factor is related to the management control and rules (requirements) for food safety assurance.

The alpha coefficients have the acceptable value ranging from 0.64 to 0.77, with the lowest value for the variable "Management control" and the highest value for the variable "Top management commitment". Therefore, the alpha value for each subconstruct was considered as acceptable. The values are close to 0.70, which is considered satisfactory for the exploratory research [23]. As shown in Table 2, the corrected item-total correlation scores range from 0.45 to 0.62. The rules of thumb suggest that the item-to-total correlations should exceed 0.5 [23]. All items were kept in the model due to the content validity.

Regarding the dimension "Communication", the results reveal one factor with eigenvalues greater than one, accounting for 45.73 % of the variance (K-M-O statistic 0.747; Bartlett statistic 238.844;  $p = 0.000$ ). As shown by the results presented in Table 3, all factor loadings are well above the recommended value of 0.5. Cronbach's alpha value shows the acceptable value of 0.973. In addition, the corrected item-total correlation scores support the reliability estimates with values ranging from 0.41 to 0.55.

**Table 2:** Scale validity and reliability for “leadership and employee support”

<b>Construct: leadership and employee support</b>	<b>Factor loading</b>	<b>CITC</b>
<b>Factor 1: Top management commitment</b> <b>Cronbach's alpha = 0.771</b>		
V11. a) The company management has clearly defined the goals regarding food hygiene (wishes to market safe product).	0.824	0.607
V11. d) The company management struggles constantly to improve food hygiene in the company.	0.783	0.615
V11. b) The company management motivates employees to consider food hygiene.	0.736	0.620
V11. c) The company management listens if we have remarks regarding food hygiene (e.g. unclean rooms, inadequate protective clothing, sterilizers not working, if someone does not wash hands ...).	0.657	0.542
<b>Factor 2: Employee collaboration</b> <b>Cronbach's alpha = 0.721</b>		
V11. h) When a lot of work has to be done quickly, employees collaborate so that it is done quickly and with quality.	0.807	0.546
V11. g) Skilled employees provide help to harness food hygiene maintained by newly employed workers	0.751	0.536
V11. i) Among employees, we alert each other to consider food hygiene.	0.743	0.547
<b>Factor 3: Management control</b> <b>Cronbach's alpha = 0.642</b>		
V11. f) We are always monitored by superiors to see food hygiene rules are respected.	0.795	0.466
V11. j) We are warned by the superior in case food hygiene is not respected.	0.702	0.458
V11. e) Superiors consistently acquaint employees about food hygiene rules.	0.627	0.491

**Note:** Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. CITC: corrected item-total correlations

**Table 3:** Scale validity and reliability for “communication”

<b>Construct: Communication</b> <b>Cronbach's alpha = 0.710</b>	<b>Factor loading</b>	<b>CITC</b>
V12. a) The company management discusses food hygiene with employees.	0.768	0.548
V12. d) All pieces of information on how to keep food hygiene are available or written in the job area (e.g. figure, posters how to use protective clothing, wash hands...).	0.707	0.546
V12. b) Superiors give directions on how to provide food hygiene.	0.662	0.423
V12. f) We can always discuss with co-workers about food hygiene problems.	0.654	0.509
V12. e) Superiors encourage us to give suggestions for food hygiene rule improvement.	0.641	0.492
V12. c) Employees can freely discuss everything we notice that could influence food hygiene.	0.614	0.406

**Note:** Extraction Method: Principal Component Analysis. CITC: corrected item-total correlations

Regarding the dimension “Employee engagement and self-commitment”, the results provide the solution in terms of two factors with eigenvalues greater than one, accounting for 59.49 % of the variance (K-M-O statistic 0.731; Bartlett statistic 325.174;  $p = 0.000$ ). As shown by the results presented in Table 4, all factor loadings exceed the value of 0.5, thus providing empirical justification for the convergent validity. Moreover, reliability tests show acceptable internal consistency with Cronbach's alpha value of 0.728 for the subconstruct named as “Compliance with rules” and 0.601 for the subconstruct “Hygiene and food safety”. Additionally, the corrected item-total correlation scores range from 0.40 to 0.58, thus showing the acceptable values.

Regarding the dimension “Support”, the results suggest one factor with eigenvalues greater than one, accounting for 59.21 % of the variance

(K-M-O statistic 0.809; Bartlett statistic 299.603;  $p = 0.000$ ). The convergent validity assessment confirmed the convergent validity for the items of this dimension, with factor loading ranging from 0.67 to 0.83 (Table 5). A high Cronbach's alpha score of 0.815 confirmed the overall reliability of the measurement scales. Additionally, the corrected item-total correlation scores support the internal reliability. All values are above the recommended value of 0.5.

Regarding the construct "Work pressure", the results show one factor with eigenvalues greater than one, accounting for 50.83 % of the variance (K-M-O statistic 0.588; Bartlett statistic 33.639;  $p = 0.000$ ). It appears to be that factor loadings are above the recommended value 0.5 [23] (Table 6). However, as given in Table 5, the reliability and consistency estimates are not above the recommended values. For instance, a Cronbach's alpha for this construct is below the recommended value of 0.7. However, one should take into account that if the number of items in a scale increases, it is more likely that the Cronbach's alpha will be high and vice versa. Additionally, one item (V15.a) is reverse coded, which could affect the correlation between the scores of this item and the combined score of the other two (i.e. low CITC).

**Table 4:** Scale validity and reliability for "employee engagement and self-commitment"

Construct: Employee engagement and self-commitment	Factor loading	CITC
<b>Factor 1: Compliance with rules</b> Cronbach's alpha = 0.728		
V13. e) I consider food hygiene because I think it is important.	0.791	0.578
V13. d) Food safety is very important.	0.788	0.515
V13. f) I strive to follow food hygiene rules.	0.610	0.464
V13. c) I follow food hygiene rules because it is my responsibility.	0.587	0.538
<b>Factor 2: Hygiene and food safety</b> Cronbach's alpha = 0.601		
V13. b) When there are problems influencing food hygiene, the head officer reacts quickly and effectively.	0.817	0.383
V13. a) The company management emphasizes hygiene and food safety.	0.735	0.542
V13. g) I maintain my work area clean because I do not like disorder.	0.613	0.403

**Note:** Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. CITC: corrected item-total correlations

**Table 5:** Scale validity and reliability for "support"

Construct: Support	Factor loading	CITC
<b>Cronbach's alpha = 0.815</b>		
V14. d) The company management is concerned about food hygiene training and education of employees.	0.831	0.699
V14. c) The company management provides necessary financial needs to support food hygiene and food safety.	0.821	0.689
V14. e) The guidelines to provide food hygiene are good.	0.781	0.633
V14. a) Food hygiene equipment and food safety is available (e.g. wash bins, sterilizers, protective gloves and headdress...).	0.735	0.563
V14. b) Work area is hygiene-technically appropriate to maintain food hygiene.	0.668	0.527

**Note:** Extraction Method: Principal Component Analysis. CITC: corrected item-total correlations



Regarding the dimension “Risk judgement”, the results suggest one factor with eigenvalues greater than one, accounting for 53.82 % of the variance (K-M-O statistic 0.721; Bartlett statistic 131.831;  $p = 0.000$ ). As shown in Table 7, the factor loadings range from 0.52 to 0.81, therefore showing the acceptable values. In combination with the reliability estimates, EFA provide empirical evidence regarding the unidimensionality of the scale.

Regarding the dimension “Training efficiency”, the results reveal one factor with eigenvalues greater than one, accounting for 59.94 % of the variance (K-M-O statistic 0.698; Bartlett statistic 196,007;  $p = 0.000$ ). As shown by the results presented in Table 8, all factor loadings are well above the recommended value of 0.5. Cronbach’s alpha was above the recommended level of 0.7. In addition, the corrected item-total correlation scores support the reliability estimates with values ranging from 0.48 to 0.66.

**Table 6:** Scale validity and reliability “work pressure”

<b>Construct: Work pressure</b> <b>Cronbach’s alpha = 0,490</b>	<b>Factor loading</b>	<b>CITC</b>
V15. b) I always have enough time to follow food hygiene rules even when I have a lot of work to do.	0.778	0.391
V15. c) The number of workers at work is sufficient to provide food hygiene.	0.722	0.347
V15. a) If I am loaded with work, I do not follow food hygiene rules. <sup>r</sup>	0.632	0.261

**Note:** Extraction Method: Principal Component Analysis. CITC: corrected item-total correlations. <sup>r</sup>Item was reverse coded

**Table 7:** Scale validity and reliability for “risk judgement”

<b>Construct: Risk judgment</b> <b>Cronbach’s alpha = 0.705</b>	<b>Factor loading</b>	<b>CITC</b>
V16. b) Hygiene hazards are under control.	0.819	0.586
V16. a) We are aware of hygiene hazards in the company.	0.786	0.545
V16. c) In case hygiene rules are not respected, we are warned by superiors.	0.770	0.535
V16. d) When work has to be done quickly, superiors say we have to do it without taking care of food hygiene. <sup>r</sup>	0.521	0.311

**Note:** Extraction Method: Principal Component Analysis. CITC: corrected item-total correlations. <sup>r</sup>Item was reverse coded

**Table 8:** Scale validity and reliability for “training efficiency”

<b>Construct: Training efficiency</b> <b>Cronbach’s alpha = 0.769</b>	<b>Factor loading</b>	<b>CITC</b>
V17. a) The food hygiene training gives me all the required knowledge I need at work.	0.825	0.644
V17. b) The knowledge obtained at the food hygiene training can be used to provide food hygiene.	0.819	0.658
V17. c) The food hygiene training in my company is often enough.	0.766	0.560
V17. d) The food hygiene training is understandable.	0.677	0.477

**Note:** Extraction Method: Principal Component Analysis. CITC: corrected item-total correlations

### Descriptive statistics

Prior to further statistical analysis, we first investigated the descriptive statistics for study variables. Means, standard deviations, and bivariate correlations are presented in Table 9. Observing the overall subconstructs, we can see that the highest mean value corresponds to the employee engagement and self-commitment (6.84), while the lowest value corresponds to the work pressure (6.35). As shown by the results, it can be argued that respondents perceive food safety culture dimensions as highly relevant (e.g. all mean values are above 6).

As expected, the results revealed positive and significant correlations between food safety culture dimensions with correlations' coefficients ranging from 0.40 to 0.67 ( $p < 0.01$ ). Furthermore, training efficiency shows the strongest correlation with the employee engagement and self-commitment ( $r = 0.665$ ,  $p < 0.01$ ) and risk judgement ( $r = 0.664$ ,  $p < 0.01$ ). It appears that the leadership and employee support has the strongest correlation with the communication ( $r = 0.637$ ,  $p < 0.01$ ). Regarding the support, the strongest correlation was observed in the case of training efficiency ( $r = 0.582$ ,  $p < 0.01$ ).

**Table 9:** Means, standard deviations, and correlations

	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)
(1) leadership and employee support	6.59	0.47						
(2) communication	6.56	0.57	0.637**					
(3) employee engagement and self-commitment	6.84	0.27	0.543**	0.582**				
(4) support	6.73	0.45	0.463**	0.488**	0.576**			
(5) work pressure	6.35	0.71	0.463**	0.404**	0.459**	0.515**		
(6) risk judgement	6.75	0.42	0.444**	0.499**	0.591**	0.495**	0.510**	
(7) training efficiency	6.73	0.46	0.446**	0.555**	0.665**	0.582**	0.476**	0.664**

**Note:** \*\*Correlation is significant at the 0.01 level (2-tailed).

**Table 10:** Mean values for studied variables from the perspective of the working experience

Experience / Dimension	Leadership and employee support	Communication	Employee engagement and self-commitment	Support	Work pressure	Risk judgement	Training efficiency
Less than 1 year	6.66	6.49	6.90	6.95	6.55	6.79	6.74
1-2 years	6.54	6.49	6.79	6.63	6.20	6.68	6.60
3-7 years	6.57	6.61	6.84	6.62	6.33	6.83	6.73
8-12 years	6.53	6.35	6.80	6.80	6.33	6.73	6.77
13-20 years	6.55	6.60	6.81	6.72	6.35	6.74	6.85
More than 20 years	6.61	6.60	6.86	6.73	6.34	6.72	6.72
F-ratio	0.245 ( $p > 0.05$ )	0.566 ( $p > 0.05$ )	0.489 ( $p > 0.05$ )	1.464 ( $p > 0.05$ )	0.424 ( $p > 0.05$ )	0.414 ( $p > 0.05$ )	0.555 ( $p > 0.05$ )

**Note:** F-ratio = Mean squares within Groups/Mean squares between groups

Table 10 shows the results of the analysis of variance (ANOVA) for the studied variables in the context of the groups that represent working experience (in years). As can be seen in Table 9, the differences between the means in each particular dimension are not statistically significant ( $p > 0.05$ ). One can reveal that the highest mean values correspond to the dimension “employee engagement and self-commitment”, while the lowest mean values correspond to the dimension “communication”. However, as already mentioned, there are no statistically significant differences between different groups of working experience.

### Regression analysis

The results in Table 11 show that the overall regression model is significant with an F value of 48.205 ( $p = 0.000$ ) and R<sup>2</sup> value of 0.467. Furthermore, to examine multicollinearity, we calculated variance inflation factors (VIF) for the regression equation. The VIF values for the regression model were below 2, which is well below the rule-of-thumb cut-off of 10 [24].

**Table 11:** Results of regression analysis: employee engagement and self-commitment as dependent variables

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.920	0.254		15.453	0.000
leadership and employee support	0.100	0.044	0.174	2.256	0.025
communication	0.142	0.035	0.307	4.032	0.000
support	0.199	0.040	0.337	4.933	0.000

**Note:** B = Unstandardized coefficient, Beta = Standardized coefficient

**Table 12:** Results of regression analysis: training efficiency as a dependent variable

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.008	0.454		4,424	0.000
leadership and employee support	0.018	0.079	0.018	0.225	0.822
communication	0.278	0.063	0.346	4.419	0.000
support	0.413	0.072	0.404	5.740	0.000

**Note:** B = Unstandardized coefficient, Beta = Standardized coefficient

**Table 13:** Results of regression analysis: risk judgement as a dependent variable

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.431	0.348		6.995	0.000
training efficiency	0.500	0.058	0.545	8.635	0.000
work pressure	0.150	0.038	0.251	3.973	0.000

**Note:** B = Unstandardized coefficient, Beta = Standardized coefficient

As shown in Table 10, the results of the regression analysis suggest that the leadership and employee support, communication as well as support have a significant relationship with employee engagement and self-commitment ( $\beta = 0.174$ ,  $p < 0.05$ ;  $\beta = 0.307$ ,  $p = 0.000$ ,  $\beta = 0.337$ ,  $p = 0.000$ , respectively).

Furthermore, regression analysis was performed concerning the influence of the independent variables above on training efficiency (Table 12). The results suggest that the model is significant with an F value of 42.295 ( $p = 0.000$ ) and R<sup>2</sup> value of 0.435. It appears that the support is the strongest predictor of the training efficiency ( $\beta = 0.404$ ,  $p = 0.000$ ). Communication is also positively and significantly related to the training efficiency ( $\beta = 0.346$ ,  $p = 0.000$ ), while leadership and employee support are not significantly related to the training efficiency ( $\beta = 0.018$ ,  $p > 0.05$ ).

Moreover, we were interested whether training efficiency and work pressure significantly influence risk judgement (Table 13). The results suggest that the model is significant with an F value of 79.523 ( $p = 0.000$ ) and R<sup>2</sup> value of 0.489. According to the results, both training efficiency and work pressure are significant predictors of risk judgement ( $\beta = 0.545$ ,  $p = 0.000$ ;  $\beta = 0.251$ ,  $p = 0.000$ , respectively).

## DISCUSSION AND CONCLUSIONS

Notwithstanding valuable contributions pointed out in previous studies [15, 16], both researchers and managers still struggle to understand how to measure food safety culture as well as what constitutes food safety culture. This study contributes to the current literature and management practice by conceptually and empirically increasing validated understanding about how to measure food safety culture. In this regard, we developed an empirically based and testable framework deriving from theoretical insights gained in previous studies.

Food safety culture is considered an emerging topic and is also concerned with quantification of risks associated with the given product and process [25]. Prior researches have outlined the important elements of food safety culture, namely leadership, employee support, communication, employee engagement, risk perception and work environment [15, 16].

How to measure and how to estimate food safety culture was the focal point of this study as well. In particular, the research was carried out among employees in a medium-sized Slovenian food processing company. Drawing upon literature reviews, one can notice that the questionnaire and the observation methods are the most common approaches in studying food safety culture [15, 16, 20]. This study has used the questionnaire as a primary investigation method.

Regarding the interrelationship between particular dimensions of food safety culture, our study contributes to prior literature suggesting that leadership and employee support, communication as well as the overall support are important predictors of employee engagement and self-

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commitment. Several prior studies [15, 16, 26] have highlighted the aforementioned food safety culture as the key success factors and the integral elements of building food safety culture. Furthermore, our study revealed that communication and support have a significant impact on training efficiency as well. According to prior literature, management commitment, organizational support and communication are some of the organizational factors that have been found as influential factors of food safety practices among individual employees and at the organization level [15, 21, 22]. One cannot neglect the training efficiency that is essential in building food safety culture. As argued by Stedefeldt et al. [27], it is necessary to establish the goals of employee training as well as to communicate with employees regarding the purpose and objectives of training. By doing so, an organization can improve the employees' commitment towards training [27].

Based on the results of the descriptive statistics and ANOVA, we can argue that all dimensions of food safety culture were perceived to a reasonably high extent. Employee engagement and self-commitment achieved the highest mean value from the perspective of employees. The results can be substantiated by research work of Ungku Fatimah et al. [15] who also found that self-commitment is the food safety culture dimension, which is highly ranked by respondents regardless of the gender, age, working experience, etc.

Our results have therefore confirmed that employees have a positive attitude towards food safety culture. Overall, the results of this study offer several guidelines to help organizations develop and successfully deploy food safety practices. By distinguishing different fundamental dimensions of food safety culture, this study provides a basis of guidance for practitioners to adapt food safety practices. Among others, it sheds light on decisions regarding the relationship between food safety dimensions and risk judgement. In particular, managers should put the focus on employee training and search for mechanisms to lower work pressure in order to enhance the awareness among employees regarding the perception of risk associated with food hygiene.

We have entered the level of integrated food safety management based on mankind with food safety culture. Understanding all the threads and gaps on the way to establish food safety culture, it requires a systematic approach and time allocated by the management to the new rule of food safety. The one who is responsible for ensuring food safety in a food company is the key player in identifying opportunities to raise food safety culture and to identify weakness in the food safety system, changing traditions and introducing innovative approaches which are able to effectively and rapidly respond to changes in the environment [28].

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