DETERMINANTS FOR CONDUCTING FOOD SAFETY CULTURE RESEARCH

Ionuț - Dumitru VELEȘCU[1], Alina Narcisa POSTOLACHE[2]

e-mail: i.velescu@yahoo.com

Abstract

Despite scientific discoveries, continual improvement in food safety management systems, and increased academic discussion on food safety, food safety remains an issue around the world. Organizational and administrative characteristics (i.e. food safety vision, communication, commitment, leadership, training), technical facilities/resources (i.e. food hygiene/safety tools, equipment, facilities), employee characteristics (i.e. attitudes, knowledge, perceptions, and risk awareness), group characteristics, and crucible characteristics are all important factors to consider in food safety culture research. The use of a systems approach, quantitative indicators, categorization systems for differentiated assessment, and the use of numerous techniques to improve study validity are among the methodological needs for food safety culture research. The identified food safety culture research determinants provide a solid and transparent foundation for a common understanding and research of the topic. The purpose of this study is to identify determinants for undertaking food safety culture research, with the systems approach serving as the underpinning philosophy to lead an organized rethinking of national, organizational, and safety culture literature in the context of food safety.

Key words: safety culture, food safety culture, food safety management system, food safety performance.

Introduction. Recurring foodborne outbreaks have shown that existing efforts to ensure perfect production of safe food products are insufficient. As a result, the food industry has adopted a common global goal and initiative to implement Food Safety Management Systems (FSMS), which have been widely and clearly recognized as measures to ensure food safety (Alvesson M., 2012).

Food safety culture (FS-culture) may be contributing to food safety performance, based on the above observations. When an organization's FS-culture is inadequate, evidence offered from a variety of industries suggests that it is a "emerging risk factor," and that there is a link between food safety and the current FS-culture (Crim S.M. *et al*, 2015).

Organizations must have a well-developed FSMS and a strong FS-culture in place to achieve good food safety performance. As a result, the food industry has taken a keen interest in the concept of FS-culture in order to lower the risk of food safety breaches.

Recent research has developed tools to assess FS-culture (Ungku Fatimah *et al*, 2014; De Boeck E. *et al*, 2015), maturity models (Jespersen L. *et al*, 2016), and FS-culture concepts (Taylor J., 2011). The research, on the other hand, utilised a variety of methodologies and concepts from many fields.

The goal of this research is to determine the determinants for conducting food safety culture research, utilizing the systems approach as the underlying philosophy to drive an organized reassessment of national, organizational, and safety culture literature.

The literature on national culture is initially discussed to provide context and to elaborate on its significance in organizational, safety and FS-culture (Jespersen L. *et al*, 2016).

MATERIAL AND METHOD

❖ Approach and literature search.

The systems approach was utilized to position food safety culture (*figure1*) and to drive literature reappraisal in various 'culture' study disciplines in order to discover "determinants" for performing FS-culture research. The systems method recognizes the synergy of elements in systems and the hierarchy of systems, where subsystems participate in a larger hierarchy of systems, and is a structured manner to investigate the interconnectedness and interactions of system components (Arnold R. and Wade J., 2015).

Figure1 depicts the proposed positioning of FS-culture, as well as the potential interaction between the broad national level (national culture)

[1] "Ion Ionescu de la Brad" University of Life Sciences, Iași, România
[2] Research and Development Station for Cattle Breeding Dancu, Iași, România

and the corporate level (organizational culture, FSMS, food production system, food-safety-related output), in the context of food-safety. The food quality functions model defines functions that contribute to the realization of a desired product output and provides insight into components we

suggest to be interconnected when exploring FS-culture and the relationship between it and food safety (Luning P. A., Marcelis W. J., 2009).
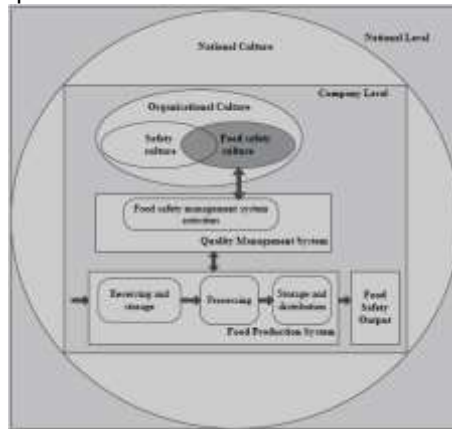

Figure 1 **Proposed positioning of food safety culture from a systems perspective**

It is crucial to note that the picture is a simplified representation to aid in the understanding of the planned FS culture placement.

The following keywords were used to conduct a literature search in the EBSCOhost and Thomson ReutersWeb of Science platforms, Google Scholar, and the Elsevier-Scopus database: national culture, organizational culture, performance, safety culture, safety performance, food safety culture, food safety culture, and food safety management system (s). The following inclusion criteria were used in the search approach (*figure 2*): i) publications published in English, with a preference for peer-reviewed articles, (ii) research scope, (iii) national, organizational, and safety culture articles from 2000 onwards to obtain relatively current articles, and FS-culture articles spanning all years due to a lack of studies.

The titles and abstracts of retrieved publications were assessed for relevance based

on whether they met the study purpose and inclusion criteria. If the abstracts were insufficient, the entire article was scanned, and cross-referenced papers were manually searched for in some cases. In other cases, specific keywords revealed broader, irrelevant publications, like as those only focusing on microbiology for FS-culture. Quote marks were utilized to search for phrases and Boolean operators AND, OR were used to gather pertinent information after thorough consideration of the keywords and their implications. The following criteria were used to screen full versions of the selected articles in order to find useful articles: The definitions, scope, classification levels, elements, and measurable indicators for national culture articles required to focus on cultural dimensions in organizations, organizational, safety, and food safety culture on definitions, scope, classification levels, elements, and quantifiable indicators (Luning P. and Marcelis W., 2007).
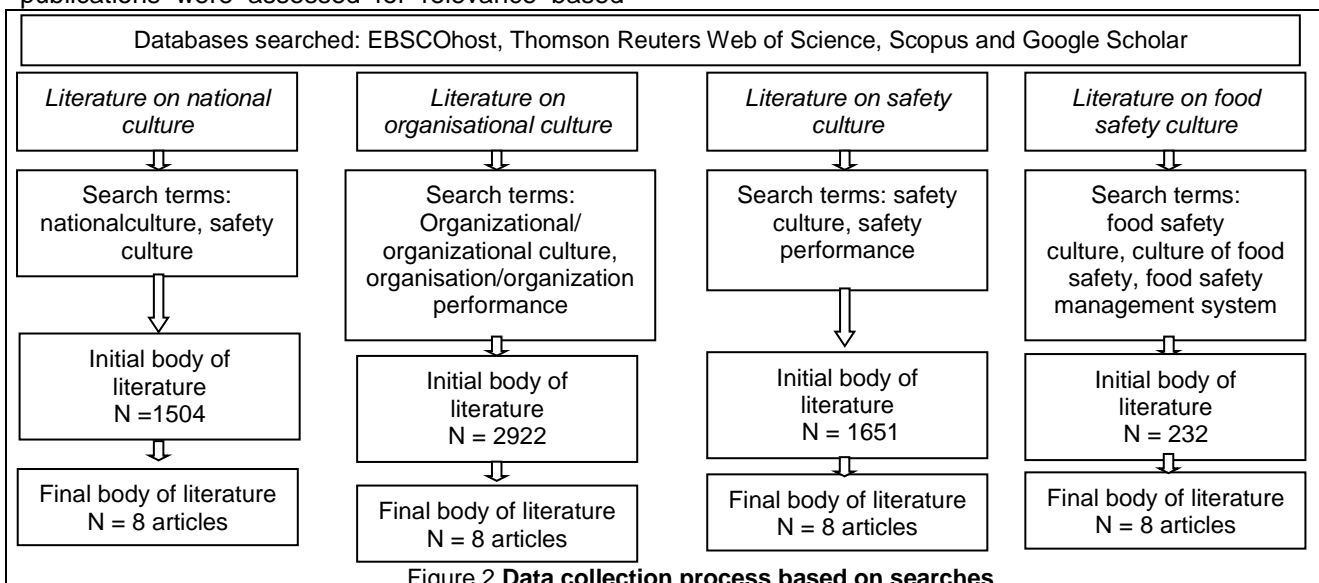
Databases searched: EBSCOhost, Thomson Reuters Web of Science, Scopus and Google Scholar			
Literature on national culture	*Literature on organisational culture*	*Literature on safety culture*	*Literature on food safety culture*
Search terms: nationalculture, safety culture	Search terms: Organizational/ organizational culture, organisation/organization performance	Search terms: safety culture, safety performance	Search terms: food safety culture, culture of food safety, food safety management system
Initial body of literature N =1504	Initial body of literature N = 2922	Initial body of literature N = 1651	Initial body of literature N = 232
Final body of literature N = 8 articles	Final body of literature N = 8 articles	Final body of literature N = 8 articles	Final body of literature N = 8 articles

Figure 2 **Data collection process based on searches**

- National culture and its relationship with organisational culture

In general, culture refers to how a group of people is characterized and how one group differs from another. Culture is defined at the national level as "that which separates individuals of one group (nation/society) from those of another". The following are major definitions of national culture, as well as key elements obtained from national cultural studies that can be used in FS culture research:

✓ Crucial elements in Food Safety culture: - employee characteristics, which include attitudes, perceptions, knowledge, risk awareness; group characteristics, which include analysis of shared perceptions; organisational and administrative characteristics, which include food safety vision, leadership, commitment, communication style, food safety/hygiene procedures; training, work pressure; technical/technological facilities/resources, which include personal hygiene facilities, zoning, food safety and hygiene tools, equipment and facilities, sanitation, and maintenance; food safety management system characteristics; design and assurance of crucial controls.

✓ Methodologically assess FS-culture: using a systems approach; acknowledging the various sub-systems and the interlinks; using indicators that focus on crucial aspects to be measured; developing a classification system to enable differentiated assessment of the prevailing FS culture; using multiple methods (triangulated methodology) to enhance assessment validity.

✓ Cultural dimensions influence: - risk and safety perceptions; values and attitudes of personnel in organizations; management commitment and employees' participation; risk taking behavior; safety management systems; organisational safety performance.

✓ FS culture influences food handler behavior: - which in turn influences the food safety performance of the organisation; focus on understanding the mechanisms; recognise that FS culture assessments should be adapted to the company's food risks and context.

Existing research recognizes national culture as a component of an organization's context that determines how it operates and performs. This is because employees bring values from their home cultures to the workplace, which impact the workplace culture through socialization. The amount to which individual values are influenced by national culture and how well these values align with workplace culture may have an impact on how effectively organizations perform in different countries (Kussaga J. B. *et al*, 2014).

Hofstede established six cultural characteristics to examine national differences in values (Hofstede G. *et al*, 2010). When examining the influence of national culture in organizational/safety culture and safety performance, these dimensions have been widely employed because they are broad, relevant, acceptable, and convenient.

The first dimension, *power distance*, distinguishes between high power distance cultures (where decision-making is centralized and employees are expected to do "what the boss says should be done") and low power distance cultures (where decision-making is decentralized and employees expect to be consulted).

The second dimension focuses on *individualism vs collectivism* and distinguishes individualistic cultures where people are expected to look after their self-interests and achievement is based on personal merit rather than on group effort, and collectivistic cultures where group interests prevail over individuals'.

The third component is *masculinity vs femininity*, where people in masculine cultures are forceful and hesitant to help others unless they are given credit, but in feminine cultures, people help others and place a higher importance on relationships and other people than on material accomplishment.

Individuals in a society with a high level of *uncertainty avoidance* are expressive and avoid ambiguous circumstances, whereas those in a culture with a low level of uncertainty avoidance are less expressive and feel secure.

Long-term vs. short-term orientation is the fifth dimension, with long-term oriented cultures characterized by patience, long-term aims, and future rewards, whereas short-term oriented cultures focus on current difficulties.

Indulgence vs. restraint is the sixth dimension, with indulgent civilizations characterized by unfettered gratification and restraint cultures characterized by suppressed gratification (selfcontrol) regulated by societal standards.

Wallace C. (2009) and Taylor (2011) stated that the dimensions could influence the success of FSMS and the organization's FS culture from a food safety standpoint. Both studies found that employees seek individual acknowledgment for their efforts in individualistic cultures, while employees in collectivistic cultures aspire to achieve food safety goals by working together as a team.

National cultural distinctions are seen in a country's food safety governance philosophy, methods, and practices (e.g. legislation, public and private standards, and enforcement techniques), in addition to the cultural components. Food safety governance is to ensure that organizations adhere to food regulations and standards, and it has an impact on the organization's FSMS and FS-culture, depending on where the country ranks on the cultural dimensions (Rouviere E and Caswell J., 2012).

Furthermore, as a result of globalisation, organizations are becoming increasingly

transnational, adding to the complexity of an organization's culture. In their daily operations, these businesses are presented with a variety of national cultures. In order to apply the right research approach to the persons in the firm and the cultural framework in which the organization operates, an awareness of the culture in which the company operates as well as the differences in culture of the members of the organization is required (Rogoz M.. 2005). Because of differences in risk and safety perceptions, management / leadership style, beliefs and attitudes, to name a few, understanding these cultural differences allows researchers to choose the best research approach (Kirezieva K. et al, 2015).

- Key aspects of organisational culture useful in FS-culture research

In organizations, culture is what distinguishes and shapes them into the entities that they are. Organizational culture is defined by *Schein E. (2010)*, one of the foremost experts in the field, as "a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, thus, to be taught to new members as the correct way you perceive, think, and feel in relation to those problems."

Organizational culture is shaped by national culture, as seen in *figure 1*, and so varies within an organization (multinationals), within a country, and from country to country. Table 1 lists major organizational culture definitions and elements that are found in the literature on organizational culture and could be beneficial in FS-culture research. Two separate methods (functionalist and interpretive) are commonly employed to describe organizational culture. The functionalist perspective considers organizational culture to be the ideal that a company should strive for, and it describes what a company "has" (tangible) (e.g. Policies, procedures and structures) (Ghemawat P. and Reiche S., 2011).

Table 1

Important components of organizational culture literature that must be considered while determining food safety culture research determinants

Definitions/Key aspects
• "An outcome of how people relate and interact with one another"   • "The sum total of the values, beliefs, and ideologies of the people who make up an organisation"   • "Product of both group dynamics and internalised norms"   • "The result of the interaction between the individual and organisational processes" □   • "An emergent property of that organisation's constituent parts"   • "The emergent result of the continuing negotiations about values, meanings and properties between the members of that organisation and its environment"   • "Collective programming of the mind that distinguishes the members of one organization from another"   • "Expression of the values or social ideals and shared beliefs, which are manifest in the specialised language unique to each organisation and which are a product of the history and operational experience within the organisation"   • "Deeply seated (often subconscious) values and beliefs shared by personnel in an organisation"   • "Shared perceptions of organisational work practices within organisational units that may differ from other organisational units"
Key aspects Organisational culture

• is developed through socialization;
 • includes multiple levels:
    - visible symbols and artefacts;
    - underlying assumptions and values.
 • can have multiple subcultures;
 • evolves over time;
 • operates at different hierarchical levels (e.g. senior management, middle management, operational level);
 • contributes to an organisation's overall performance;
 • influences employee behavior;
 • encompasses:
    - shared values, attitudes, knowledge and perceptions;
    - vision, leadership and management style, and communication system;
    - availability of facilities and resources,
    - organisation's context factors (e.g. national culture).
 • needs both top-down and bottom-up approaches to change
 • necessitates a system approach and use of a triangulated methodology

Both perspectives should be synthesised to understand organizational culture, since what an organization "is" aids in understanding the organization and aids in providing appropriate and precise interventions in positively changing what an organization "has." additionally, both techniques aid in the comprehension of organizational culture and its subcomponents.

Values, assumptions, beliefs, artefacts, and symbols are significant aspects found in

literature when discussing an organization's culture (Popescu M., 1996**)**.

Values, assumptions, and beliefs can help you comprehend an organization's culture in theory, but because they are ethereal, they are difficult to analyze empirically and are of limited use for assessing an organization's current culture. However, concrete and observable manifestations (artefacts and symbols) such as an organization's layout and protective apparel can be used to infer these values, assumptions, and beliefs.

Different subcultures occur between and within organizations, according to organizational culture studies. However, there may be a dominant culture, and how this culture is expressed differs between organizational levels, departments, and personnel cultural diversity. Production may take precedence over safety in one department, profit over safety in another, and vice versa. Similarly, high management and middle management may have distinct agendas and cultures than the operational level (Griffith C. et al, 2010).

As a result, the dominant culture should be visible so that employees can identify with, accept, and embrace it. It's important to acknowledge the non-homogeneity and complexity of an organization's culture. As a result, a systemic approach is required to grasp the prevalent culture. Furthermore, when evaluating an organization's culture and conducting meaningful FS-culture research, it is necessary to identify critical

elements, use a triangulated methodology, acknowledge the organization's context, and establish the mechanisms through which an organization's culture influences personnel behavior and the organization's performance.

❖ Safety culture and its relationship with safety performance

Safety culture is a subset of organizational culture that focuses on and influences an organization's safety performance. Individuals', organization's (characteristics of an organization's arrangement, e.g. Procedures aimed at supporting personnel to appropriately execute work tasks) and work characteristics that influence safety and provide "contextual cues" that affect how employees behave are all referred to as "contextual cues." These "contextual" indicators could include whether or not management "walks the talk," whether or not a positive culture exists, and whether or not safety is prioritized (Jacxsens L. et al, 2010).

Table 2 lists important definitions and characteristics of safety culture study that may be used in FS-culture research. Safety culture is typically defined as a social phenomenon that focuses on human issues, whereas technical parts of safety culture are treated separately.

Table 2

Proposed determinants of food safety culture research

Determining factors
• acknowledge the national culture that an organisation operates in and the national cultures of the members in the organisations
• acknowledge that FS-culture influences food handler behaviour, which in turn influences the food safety performance of the organisation; focus on understanding the
• recognise that FS-culture assessments should be adapted to the company's food risks and context
• recognise the hierarchical levels and FS-culture scopes that exist in organisations; food safety tasks and responsibilities differ at strategic, tactical and operational level
• include crucial elements in FS-culture assessments: - employee characteristics, which include attitudes, perceptions, knowledge, risk awareness - group characteristics, which include analysis of shared perceptions - organisational and administrative characteristics, which include food safety vision, leadership, commitment, communication style, food safety/hygiene procedures, training, work pressure - technical/technological facilities/resources, which include personal hygiene facilities, zoning, food safety and hygiene tools, equipment and facilities, sanitation, and maintenance - food safety management system characteristics; design and assurance of crucial controls.
• methodologically assess FS-culture by: - using a systems approach; acknowledging the various sub-systems and the interlinks - using indicators that focus on crucial aspects to be measured - developing a classification system to enable differentiated assessment of the prevailing FS-culture - using multiple methods (triangulated methodology) to enhance assessment validity
• measure the prevailing FS-culture since FS-culture evolves over time.
• measure FS-culture elements and actual food safety performance concurrently
• include evaluation of demographic variables

However, a system approach should be used, which takes into account human elements, technical features, processing activities, and the context in which an organization functions.

Various studies have created degrees of safety culture classification, ranging from simple (e.g. Good/bad, negative/positive) to comprehensive (e.g. A five-stage classification: pathological, reactive, calculative, proactive, and

generative). Organizations can use the levels to assess their current safety culture and adopt relevant interventions. However, different sectors of an organization may have varying levels of culture at the same time, posing challenges in establishing an overall safety culture and implementing generic solutions (Morrow S. et al, 2014).

To assess the current safety culture, it is vital to understand the critical safety culture features and define quantitative indicators. Despite differences in terminology, common safety culture aspects have been identified. However, existing indicators have substantial differences, making it difficult to synthesize indicators that are most appropriate for measuring safety culture.

Furthermore, most indicators do not clearly explain what is being measured or how their assessment might depict safety culture, necessitating the development of indicators that accurately reflect the current safety culture.

As a result, if a link between safety culture and safety performance is to be drawn, the mechanisms by which safety culture links to safety performance must be understood. Because safety culture has been well studied in other high-risk fields such as occupational health and safety (Halligan M. and Zecevic A., 2011) and used as a foundation for studying FS-culture, key safety culture aspects (Table 2) are extremely useful in determining determinants for FS-culture research.

❖ Food safety management systems and food safety culture

According to the report, Food Safety Management Systems are "that element of a company's quality management system that is primarily geared at managing and guaranteeing that food safety criteria are satisfied." These systems, which are based on a variety of governmental and private standards, are a crucial instrument for ensuring the safety and reliability of food products. A FSMS can range from basic to comprehensive (FAO, 2007; Luning et al, 2009), and from "end-of-pipeline" (reactive) measures (as seen in many developing countries) to "prevention-oriented" (proactive) approaches (e.g. The food safety enhancement program) as seen in the EU and Canada. Food safety concerns, for example, are insufficiently addressed and enforced in certain transitioning nations, numerous food safety management systems exist, and proper scientific risk evaluations are lacking (Kussaga et al, 2014). In comparison, FSMS in the EU, Canada, and the United States are extensive and mandated by law.

However, according to De Boeck E. et al (2015), a "well-developed and fit-for-purpose FSMS does not necessarily ensure the highest degree of food safety and a consistent food safety output." This is because other FS-culture elements (for example, enabling conditions such as technology innovation and legal frameworks), real employee behavior, and other technological and managerial conditions within the establishment could all have an impact on the system's safety output.

❖ Current understanding of food safety culture

FS-culture is a subcomponent of organisational culture that focuses on food safety and should be the dominating culture in food establishments. FS-culture studies identified common elements, which permeate FS-culture research. These elements include leadership, commitment, knowledge, training/competence, risk awareness, perceptions, employee confidence, management systems, employee involvement, accountability, communication, work pressure, environmental factors (e.g. infrastructure, equipment, tools), values and behavior). These elements are interdependent (De Boeck E. et al, 2015; De Boeck E. et al, 2016).

An analysis of existing FS-culture literature revealed the need to define key determinants required for conducting FS-culture research, if FS-culture research is to realise its potential.

❖ The food safety – the romanian perspective

In Romania, the Ministry of Agriculture and Rural Development (MARD), the Ministry of Public Health (MPH), the National Authority for Consumer Protection (NACP), and the National Sanitary Veterinary and Food Safety Authority collaborate to manage food safety issues (NSVFSA).

Since 2002, the EU has pushed Romania to modernize and restructure its food industry. The monitoring of food units, as well as the implementation of modernization and restructuring projects to conform with european regulations, began with the start of eu membership negotiations in 2003 and escalated in 2004 (Dima D. et al, 2001).

In terms of food safety, the agency's current powers include: i) coordinating the development and implementation of food safety policy and legislation; ii) developing food safety standards for areas of competence required of all individuals and businesses; iii) promoting and coordinating the implementation methodologies of risk assessment; iiii) assessing risk and recommending to authorities the necessary measures when there is a major problem (Gavrilescu D., Giurcă D., 2001; Mirela M., & Ioan D., 2011).

RESULTS AND DISCUSSIONS

The extant literature demonstrated that FS-culture research is still fragmented and unsystematic, indicating that a systematic approach to FS-culture research is required. We presented FS-culture research determinants, listed in Table 2, after synthesizing the findings from the literature reappraisal in order to offer a platform upon which FS-culture research might be built (Halligan M. and Zecevic A., 2011).

The national culture is not yet taken into account in current FS-culture studies. As a result, FS-culture research must look at the impact of national culture on the current FS-culture, as well as identify relevant national culture aspects and their processes of effect on the current FS-culture. Furthermore, in order to generalize about what makes a good FS-culture, it's necessary to consider how well FS-culture research strategies fit into different national cultures, because different cultures require different approaches, and different research tools are effective in different cultures/environments. We recognize that national culture is not the only context factor; other external drivers such as sector values, customer/market requirements, economic climate, and shareholder risks all have an impact on an organization's FS-culture, and more research on how these drivers affect an organization's FS-culture is needed.

Furthermore, because individuals operating at these levels are faced with varied food safety/hygiene tasks, responsibilities, and decisions, FS-culture study must recognize and be specific to the hierarchical level(s) being evaluated (e.g., strategic, tactical, and operational). Top management, for example, is in charge of defining the food safety vision, policy, and strategies, as well as deciding on resource investments; quality assurance managers are in charge of designing, implementing, and maintaining the FSMS; and on the shop floor, operators must follow food safety and hygiene procedures and rules. Actual decisions and behaviors at all levels contribute to actual product safety in diverse ways. Furthermore, depending on the hierarchical level, the evaluation (what and how should be measured?) of FSculture and the type of interventions used would differ.

FS-culture study, as in safety culture studies, should take into account the company's food production background. This is due to the fact that different goods place varied demands on an organization's FS-culture, depending on the manufacturing processes, company environment features, and product contamination vulnerability. As a result, rather than making broad generalizations about all food outlets, FS-culture study should be tailored to the organization's food risks and context features. Despite the fact that current FS-culture research addresses numerous FS-culture elements and recognizes their interrelation, the possible causal links between the elements are still unknown.

Furthermore, it is unclear how FS-culture influences personnel behavior and food safety performance, as well as whether and how FSMS reflect/influence the organization's FS-culture. On current indicators, there was a lot of variation in the research. The indicators should clearly illustrate how they describe the FS-culture of an organization. Furthermore, the indicators must be reviewed (validated) based on how well they provide a measure of the prevailing FS-culture and food safety performance of the organization, taking into account the organizational hierarchical level being evaluated.

CONCLUSIONS

This study derived key aspects from national, organisational and safety culture, and FSMS needed to identify the "determinants" for conducting FS-culture research by drawing lessons from existing literature.

Major elements to consider in FS-culture research include organizational and administrative characteristics, technical facilities/resources, employee characteristics, group characteristics, crucial FSMS characteristics, and actual food safety performance (*Table 2*), with a focus on understanding the underlying relationships and mechanisms. Furthermore, the impact of national culture, the influence of a company's food risks and other context characteristics, and the hierarchical level(s) should be considered. Methodological requirements for FS-culture research should encompass the use of a systems approach, definition of measurable indicators, development of classification systems, and the use of a triangulated methodology. Further research will focus on developing a comprehensive diagnostic tool, including indicators and assessment grids to enable differentiated assessment of the prevailing FS culture.

We acknowledge that the list of FS-culture research determinants is not complete and further research could build up on these determinants. Further research also needs to identify internal and external drivers/triggers, which influence the prevailing FS culture.

However, the complexity of FS-culture and its context specificity is acknowledged and makes it a challenging task to capture pertinent aspects with a "manageable assessment instrument". Moreover, reaching a consensus on the definition, elements, indicators, classifications, methodology and on what implies FS-culture is still a challenge.

However, having the established FS-culture research determinants could bring clarity in FS-culture research and provide a useful starting point to the common understanding and research of FS culture.

Outside of the responsibilities of food business operators, the role of the consumer (considered the end point of the food chain) in

food safety practices remains highly relevant and can only be effectively exercised through awareness of rights and interests, as well as education and adequate information on the requirements in the fields of purchase, transportation, storage, and food preparation.

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