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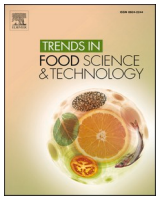

Institutional food safety risk communication – A self-evaluation tool and its interpretation

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ABSTRACT

Background: Food safety risk communication is part of the risk analysis methodology and plays an important role in the increasingly complex food system. Besides shaping consumer risk awareness, risk perception and risk behaviour, risk communication also affects the reputation of the food safety authorities, being especially important for securing operational stability and budget of the concerned organisations. A recent European study highlighted a high variance in risk communication preparedness of official institutions in EU member countries. *Scope and approach:* This paper presents a benchmarking instrument, the Self-evaluation Tool for Risk Communication (SET), designed for food safety authorities. SET helps decision-makers to receive a quick assessment of their preparedness level for risk communication by comparing it with international best practices. *Key findings and conclusions:* SET divides risk communication competencies into three domains: Human capacities, Organisational management, and Risk communication activities. Several elements are assessed in each domain, evaluated on a scale from 0 to 3. The results are delivered instantly, benchmarking the scores in terms of domains and the individual elements. The data wheel visualization highlights strengths and weaknesses and points out logical improvement options for the organisation.

1. Introduction

Nowadays, communicating food safety risks goes beyond simply informing the public during crises. It involves more than just providing information; it is about building a foundation for effective consumer protection and fostering trust in institutions responsible for assessing and managing risks (Frewer, 2021). Risk communication shapes consumer perceptions of food safety risks: it plays a vital role in reducing uncertainty, enhancing perceived controllability, and empowering consumers to take necessary measures to prevent foodborne illnesses. Consequently, risk communication holds immense importance in shaping consumers' perceptions of food safety risks (Scholderer & Veflen, 2019; Ueland et al., 2023). Successful preventive risk communication can also promote the benefits of food and technologies, advocating for sustainable food consumption (Kasza, Szabó-Bódi, et al., 2019) and production to ensure food security, and actively seeking feedback for broader development (Kaptan et al., 2018). Additionally, addressing the consequences of food safety issues beyond their impact on human health is essential, and extending the communication to economic and environmental effects is also needed (Frewer et al., 2016).

Risk communication has many roles: beyond the traditional responsibilities of preventing foodborne illnesses, managing crises, and reducing economic burdens caused by food scandals, there is a growing emphasis on organisational aspects (Kasza et al., 2022a). As risk communication serves as a trust-building mechanism, it can impact an organisation's reputation positively, bolstering its "brand" when

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executed effectively (Boholm, 2019). Engaging in dialogue with stakeholders, and encouraging public participation facilitates the information flow about food safety. But, risk communication can also target political decision-makers, aiming to gain governmental emphasis and financial support. Additionally, this might secure the stability of the risk communication functions of food chain safety organisations during significant political changes (Kasza et al., 2022b).

Food safety related risk communication belongs to the tasks of national-level food safety authorities. Unlike the well-established methods used in risk assessment, risk communication employs various approaches depending on the perspectives and capabilities of the organisations involved. Since 1970, transparency, public participation, and interactive and two-way communication have been recognized as fundamental risk communication principles (Lewenstein, 2003; Rowe & Frewer, 2000). Over the past 40 years, it has also become evident that consumer research, including surveys, observing food handling practices, and even experiments, is essential in this field (Frewer et al., 2005; Kuehnhanss, 2019; Verbeke et al., 2007). Effective risk communication, particularly when addressing both risks and benefits, considers the specific characteristics of its target audience(s) and the concerns and priorities of society. It goes beyond conveying dry facts and data alone. The organisers of such communication must possess a deep understanding of consumer habits and behaviour to influence their perception of risk and actual practices related to food safety (Halkier et al., 2011; Maia et al., 2019).

1.1. Current practices in food safety risk communication

The actors in the European food safety risk communication system employ different strategies and are at varying stages of development in terms of their interactions with consumers and collaborative efforts with other organisations. According to a survey by Kasza et al. (2019) European authorities have limited human resources dedicated to consumer risk communication. In cases where a team or department is specifically tasked with this responsibility, they encompass diverse areas of expertise that can be employed such as journalism, food engineering, veterinary and human medicine, microbiology, social sciences, and more (Kasza & Scholderer, 2020). Such diversity can be advantageous for employing targeted communication methods and messages. However, the survey findings also show that most organisations primarily rely on "passive" communication channels that require consumers' interest, initiative, and active search for information (Kasza et al., 2022c). Examples of such channels include the risk communicators' own websites and unpaid social media posts (EFSA, 2021a). Goal-directed strategies, on the other hand, are less common (Kasza & Scholderer, 2020). Goal-directed ("active") approaches include activities like hygiene education in schools, influencing attitudes and preferences, and planned behaviour modification based on consumer insight (Baba & Esfandiari, 2023).

Authorities possessing food safety specialists with first-hand, unique risk-related information should be at the forefront of risk communication endeavours and should provide support to other actors and stakeholders involved (Charlebois & Summan, 2015; Regan et al., 2016). Due to the growing necessity of efficiently exchanging scientific results, methodologies, and data, there is also an urge towards public bodies to extend their communication practices (Frewer et al., 2023) and work in coordination with professionals from other fields such as public health to ensure interdisciplinarity (Münter & Bojesen, 2019). Implementing more advanced risk communication models may necessitate organisational structural changes within the food safety authority to follow evidence-based strategies and use scientifically validated communication tools (Kasza et al., 2022a). Integrating these principles into the operational practices of the official entities responsible for food safety control is a gradual process, but it faces various challenges. The difficulties lie not only in the entities' capacity but also in their organisational functioning (Charlebois & Summan, 2015). Recognising these challenges, the aim of this study was to present a risk communication benchmarking instrument designed for food safety authorities.

1.2. Development of a scoring system

With the objective of assisting public food safety entities, the authors created a scoring system-based benchmarking instrument to evaluate and enhance risk communication approaches. The scoring system follows the same principles as the maturity models widely used in information systems and business process management (Becker et al., 2009; Hammer, 2007). Users, particularly decision-makers and risk communicators in national authorities, can assess their readiness level and preparedness for risk communication by comparing it with international best practices. Additionally, guidance on reasonable actions to implement changes is also indicated. Although the work focuses on national food safety authorities, the proposed system might be useful for other organisations with food safety risk communication tasks.

The scoring system was developed building on the results of the previously mentioned survey on the risk communication practices of European food safety related organisations (Kasza et al., 2019b, 2022c) and the experiences of a group of risk communication experts from food safety agencies, public health organisations, non-governmental organisations (NGOs)) and researchers of this field. The scoring system includes simple, closed-type questions in a checklist format inspired by the "EFSA Checklist for assessing incoming mandates" (Vrbos et al., 2023) and European Food Safety Authority's (EFSA) risk communication handbook (EFSA & Communications Expert Network, 2017). The questions and topics in the checklist were assembled and refined throughout several expert workshops between September 2021 and May 2022 via a consensus decision-making process (Michaelsen et al., 1989). In October 2022, the scoring system – hereafter referred to as the Self-evaluation Tool for Risk Communication (SET) was tested by the Communication Unit of EFSA during a live evaluation session, in which the members of the Unit scored the organisation's practices. The final form of SET was completed considering the insights and conclusions of the testing.

The paper is structured as follows: First, the content and use of the SET is described. Second, the domains comprising the SET and their contribution to risk communication practices are explained.

2. The Self-evaluation Tool for Risk Communication

Food safety authorities are mainly not academic institutions; therefore, they need practical and agile solutions for benchmarking. Benchmarking refers to the systematic process of searching and introducing international best practices (practices the competitor or leader institutions of the field use successfully) into an organisation's own (Gardner & Winder, 1999). The results of risk communication benchmarking should be easy to comprehend and convincing for decision-makers. The SET is designed for practical application to serve as a bridge from science to practice, providing prompt results with satisfactory accuracy to support decision-making about improving risk communication practices. The tool covers three key domains of organisational risk communication that are vital for evaluating current practices and pinpointing priorities for improvement.

1) Human capacities,
2) Organisational management, and
3) Risk communication activities.

The three domains and the elements in them were defined based on the authors' experiences and previous research and guidelines within the topic (Charlebois & Summan, 2015; EFSA, 2018; EFSA, 2021a; EFSA, 2021b; Feitsma, 2019; Frewer, 2021; Qiu et al., 2016; Rowe & Frewer, 2005; Slovic, 1986; World Health Organization, 2018). The role and importance of these domains and variables included in the tool are

discussed in Section 3.

Each domain of the scoring system included in the model are represented with the same weight. Their individual influence on overall effectiveness of risk communication would be rather difficult to be quantified, especially considering the amount of probable external factors, such as the type of the food scare or risk to be addressed, the citizens' preparedness and experience in regard to that, the development level and constitution of the communication mix a certain society supports or the general governmental approach for handling food safety situations. These components and the checklist questions are presented in Tables 1–3, respectively.

The self-evaluation process involves assigning scores on a categorical scale ranging from 0 to 3 to the different components, using the checklist questions listed in Tables 1–3 A score of 0 indicates the absence of a given risk communication practice ("not existing"). A score of 1 indicates that the component exists in the organisation but operates below the required and desired level ("not efficient"). A score of 2 indicates an acceptable level of performance ("acceptable"). A score of 3 indicates a perfectly functioning component ("great"). A spreadsheet with the variables and the corresponding questions is enclosed as Supplementary Material, with which the evaluation can be tried out.

Figs. 1 and 2 show a potential implementation of SET as a visual analytics platform, showing the domains, the elements and the questions raised during the evaluation. The structure is based on a wheel, which is divided into three colour-coded segments. The elements and the scores can be seen in the inner circle, while in the centre, the aggregated results are shown in percentage. Fig. 1 illustrates the questions and the related information section popping up, when selecting one element. In Fig. 2., the results of an imagined evaluation situation are presented as an example of how SET would display the elements, which might be developed further.

Table 1
Elements and related questions in the 'Human capacities' domain of the Self-evaluation Tool. In cases where more than one question per element is presented in the Table, they should not be scored individually on the scale. The function of the multiple sub-questions is to support the explanation of the content of the element as a whole. The scale consisted of the following scores: Not existing = 0, Not efficient = 1, Acceptable = 2, and Great = 3.

Elements	Questions	Scale
Dedicated persons for general communication	Does your organisation have responsible staff (at least part-time) for general communication? Is the number of staff adequate for the tasks?	Not existing/Not efficient/ Acceptable/Great
Dedicated persons for preventive risk communication	Does your organisation have responsible staff (at least part-time) for preventive risk communication? Is the number of staff adequate for the tasks?	Not existing/Not efficient/ Acceptable/Great
Responsible persons for crisis communication	Does your organisation have a crisis communication team (people in charge to communicate during crisis situations)? Is the present capacity sufficient for proper operation?	Not existing/Not efficient/ Acceptable/Great
Press office, communication or public relations department	Does your organisation have one or all the following: press office, communication department, public relations department with full-time employees? Please evaluate their efficiency.	Not existing/Not efficient/ Acceptable/Great
Dedicated unit/ department for risk communication	Does your organisation have a dedicated unit or department for risk communication with full-time employees? Please evaluate their efficiency.	Not existing/Not efficient/ Acceptable/Great
Technical staff (for making photos, videos etc.)	Does your organisation have technical staff supporting risk communication (e.g., for making infographics, illustrations, photos, videos, animations etc.)? If not, could you outsource these tasks easily?	Not existing/Not efficient/ Acceptable/Great
Capacity to organise events	Does your organisation have the capacity to organise events such as conferences, round tables etc.? Is this capacity sufficient for proper operation?	Not existing/Not efficient/ Acceptable/Great

Table 2
Elements and related questions in the 'Organisational management' domain of the Self-evaluation Tool. In cases where more than one question per element is presented in the Table, they should not be scored individually on the scale. The function of the multiple sub-questions is to support the explanation of the content of the element as a whole. The scale consisted of the following scores: Not existing = 0, Not efficient = 1, Acceptable = 2, and Great = 3.

Elements	Questions	Scale
Communication protocol	Does your organisation have any communication protocol? Do both general communication and crisis communication protocols exist? Are they followed? Are they regularly updated?	Not existing/Not efficient/ Acceptable/Great
Communication strategy	Does your organisation have a communication strategy? Is it implemented? Is it regularly updated?	Not existing/Not efficient/ Acceptable/Great
Communication plans for programmes and projects	Do you elaborate plans for risk communication programmes and projects? Are these implemented efficiently?	Not existing/Not efficient/ Acceptable/Great
Defining and addressing target groups	Do you define target groups for risk communication? Is it based on research data?	Not existing/Not efficient/ Acceptable/Great
Stakeholder engagement and cooperation	Does your organisation pay attention to stakeholder engagement and cooperation in risk communication? Is it efficient?	Not existing/Not efficient/ Acceptable/Great
Communication training for staff	Do you organise regular communication training for the staff? Is it efficient?	Not existing/Not efficient/ Acceptable/Great
International networking	Does your organisation take part in networking with international risk analysis networks such as WHO/FAO, INFOSAN, Codex Alimentarius, EFSA, RASFF? Is it efficient?	Not existing/Not efficient/ Acceptable/Great
Risk communication as the part of the organisational culture	Is risk communication part of the organisational culture? Does the organisation consider risk communication as an important task? Is it part of the organisational culture? Do this area receive ethical support from the leaders?	Not existing/Not efficient/ Acceptable/Great
Internal workshops about risk communication	Does your organisation implement internal workshops about risk communication or maintain other direct connections between risk communicators, risk managers and risk assessors? Is this efficient?	Not existing/Not efficient/ Acceptable/Great
Designated budget for risk communication	Does your organisation allocate a budget for risk communication? Is it satisfactory to implement proper risk communication?	Not existing/Not efficient/ Acceptable/Great

Table 3
Elements and related questions in the 'Risk communication activities' domain of the Self-evaluation Tool. In cases where more than one question per element is presented in the Table, they should not be scored individually on the scale. The function of the multiple sub-questions is to support the explanation of the content of the element as a whole. The scale consisted of the following scores: Not existing = 0, Not efficient = 1, Acceptable = 2, and Great = 3.

Elements	Questions	Scale
Answering questions and responding to issues raised by stakeholders	Does your organisation maintain a continuous relationship with stakeholders? Are there any ready-to-use risk communication materials (e.g., flyers, presentations, templates, report summaries) made for stakeholder exploitation?	Not existing/Not efficient/ Acceptable/Great
Proactive communication	Does your organisation have a communication plan? Is it based on the evaluation of different subjects? Is it based on risk ranking?	Not existing/Not efficient/ Acceptable/Great
Press releases	Does your organisation issue press releases? Is it a regular activity? Are the press releases used by journalists? Do they reach the audience?	Not existing/Not efficient/ Acceptable/Great
Webpage with risk communication information	Does your organisation have a webpage with risk communication-related section(s)? Is the information on the page regularly updated? Is it mobile-friendly? Does it have a satisfactory consumer reach?	Not existing/Not efficient/ Acceptable/Great
Printed and digital materials, games, podcast	Does your organisation publish printed and/or digital materials with informative or educational purposes, such as leaflets, newsletter, magazine, and games? Is it regular? Do they reach the target audience?	Not existing/Not efficient/ Acceptable/Great
Social media activities	Does your organisation conduct social media activities? Do you have sufficient capacity to manage online discussions and requests? Do you have a satisfactory consumer reach with these platforms?	Not existing/Not efficient/ Acceptable/Great
Conferences, fairs, exhibitions, public events	Does your organisation participate actively at or organise conferences, fairs, and public events? Is it efficient?	Not existing/Not efficient/ Acceptable/Great
Mass media communications	Does your organisation perform mass media communications such as paid advertisements? Is it efficient?	Not existing/Not efficient/ Acceptable/Great
Educational and awareness programmes	Does your organisation implement food safety educational programmes for children? Do you have awareness raising programmes for adults? Are they efficient?	Not existing/Not efficient/ Acceptable/Great
Using tools for bilateral direct communication	Does your organisation use one or all the following tools for direct communication with consumers: phone number, email, webform? How efficiently these channels are managed?	Not existing/Not efficient/ Acceptable/Great
Defining and measuring risk communication indicators	Has your organisation defined indicators for risk communication? Do these indicators get regularly measured? Does the feedback of the monitoring have an impact on activities?	Not existing/Not efficient/ Acceptable/Great
Consumer research	Does your organisation conduct consumer research? Is it an annual activity? Do the organisation use the research results for planning?	Not existing/Not efficient/ Acceptable/Great

2.1. Results of the self-evaluation

After the evaluation of the components with scores ranging from 0 to 3 using the questions in Tables 1–3, SET compiles the outcomes for each domain. The results of each domain show the performance of the given domain in percentage form, of which those below 30% are marked as areas for improvement (Fig. 2). Results between 30% and 70% can be considered acceptable, while above 70% the domain's performance is great.

The tool offers a rapid overview of preventive risk communication practices based on the reached scores. This can help risk managers to plan the enhancement of communication techniques and resources, highlighting feasible directions for progression. Alongside the recommended directions of improvement, the risk communication of an authority should be tailored to align with the organisation's financial capabilities and human resources, the specific cultural and societal context of the country, as well as the characteristics of the prevailing risks. It is important to note that achieving 100% during the evaluation by SET is an unrealistic goal; even the most forward-looking risk communication policies have room for enhancement, while in other cases legal barriers may block further development in one or more fields.

3. Importance of the three domains in SET

3.1. Human capacities

The first SET domain is concerned with the resources a food safety authority can utilise in the planning and execution of its risk communication activities. Preventive consumer risk communication is usually a secondary task, one among other responsibilities of food safety authorities (Rohrmann, 2008), and risk communication importance in reducing health burdens is often neglected by officers. Human capacities, more precisely the lack of human resources can be a bottleneck of risk communication, therefore this segment of SET can be regarded as the most critical domain.

Public bodies must implement various types of communicational activities. Food safety authorities engage in external communication to ensure the transparency of their operational processes, and to shape their organisational image (Palenchar & Heath, 2007). Involving general communication specialists enhances efficiency, but dedicated risk communicators could play a crucial role. Preventive risk communication towards consumers demands an understanding of the population's risk perception, the scientific background of the risks, and the translation of risk assessment results for the public (Rohrmann, 2008). In the meantime, crisis situations (such as food safety-related outbreaks, product recalls due to contaminants, food scandals etc.), thus crisis communications require different sets of skills and approaches to be effective in risk mitigation (Zeng et al., 2018). Hence, for crisis communication, it is beneficial to designate prepared professionals, who are able to take timely and firm actions to reduce the effects of a food safety emergency. This could be also relevant for other actors such as civil organisations

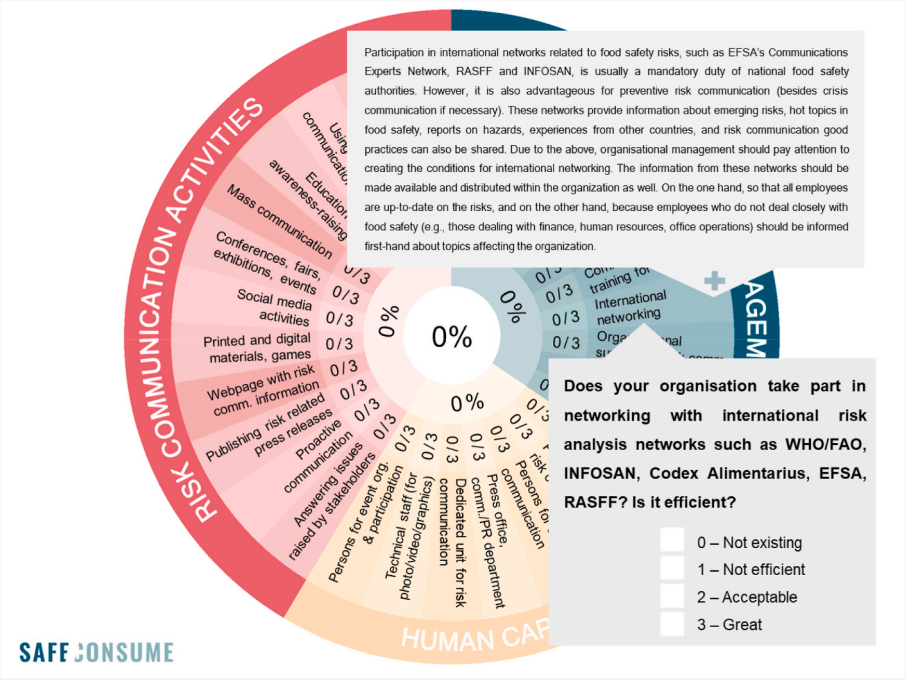

Fig. 1. Question to be answered concerning the "International networking" element and the related information window.

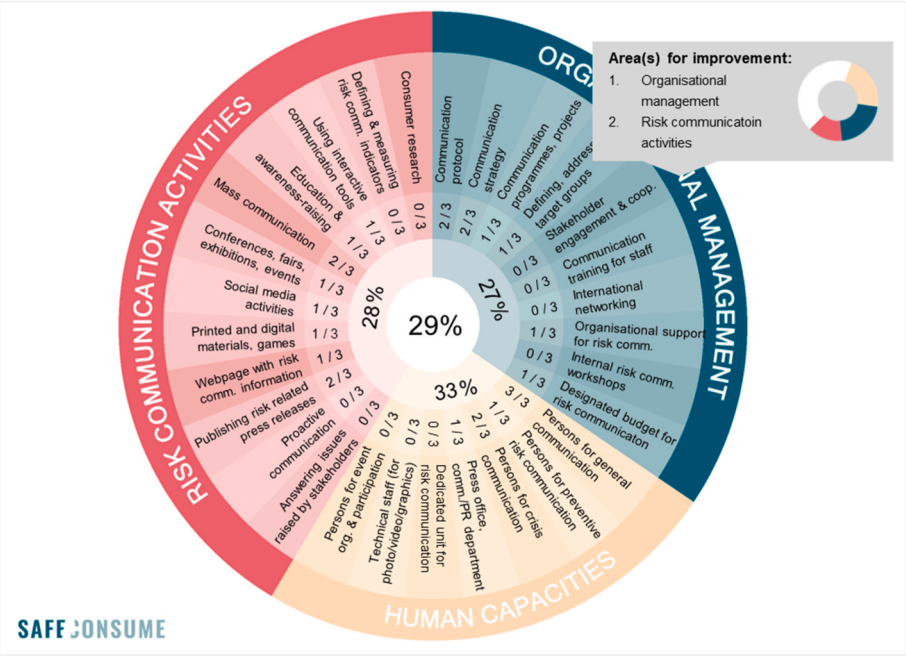

Fig. 2. Interpretation of the sample results as an example in the SET wheel.

and maybe for industry stakeholders, however commercial entities less likely to deal with preventive risk communication, and crisis communication is also usually pursued by them only when they are directly affected by an emerging situation.

In all communication types (general external, preventive risk communication, crisis communication), the presence in media is vital for disseminating reliable information and hindering the spread of misinformation (Baba & Esfandiari, 2023). Maintaining a dedicated unit of public relations and media experts or press officers ensures immediate response to inquiries and efficient, coherent, and structured publication of press releases. Such a unit can also monitor and evolve with changing media habits and relevant consumer interests. Besides that, the establishment of a multi-disciplinary team comprising experts from various fields such as food safety, human and veterinary medicine, sociology and consumer behaviour, communication and journalism can be considered the best practice for fulfilling the diverse (risk) communication needs of an authority. Support from technical staff (e.g. photographer, graphic designer) is also efficiency-enhancing as using photos, videos and infographics in food safety risk communication helps the overall understanding of the risks (Lee et al., 2022). The harmonic appearance, the look of the materials issued by the risk communicator, the colours used, the logo, etc. are all part of the organisation's brand and help it to be

recognisable. Own technical staff is probably one of the least present elements at authorities (Kasza & Scholderer, 2020), but external contractors could efficiently fill these gaps as long as own staff and skills were not available.

Some consumer groups can be difficult to be targeted by authorities due to several reasons (e.g. lack of trust in governmental bodies, not particularly interested in food safety, etc.) (EFSA, 2018), but other stakeholders of the food safety chain, for example, independent research institutions, NGOs (often civil society organisations), or citizen panels might reach them with risk related messages more successfully (Renn, 2010) – however, most NGOs in Europe have limited capacity to support such efforts (Kasza et al., 2022c). Additionally, for the uninterrupted information exchange about food safety risks, and providing consistent communication, keeping (personal) contact with national and international NGOs, universities and research institutions, industry, and other food business operators is a must (Heath & O'Hair, 2010). This can be implemented by being present at conferences, and organising workshops, professional round tables, and forums, which all require not only human resources but also competence.

3.2. Organisational management

The second SET domain is concerned with the processes a food safety authority uses in the management of its risk communication activities. Human capacities are only the starting point in developing effective consumer risk communication practices, the organisational structures and management of the communicating organisation should also be suitable for ensuring a well-functioning framework. Approving organisational management involves the willingness to devote resources such as personnel and financial support, incentives, and training (Ng & Hamby, 1997). The basis for this could be the definition of communication protocols specifying the procedures and identifying communication strategies for setting up the goals. In addition, risk communication plans, programmes and projects are needed as a roadmap for the actions that should be taken to implement a particular strategy. Together with the designation of the goals, strategies and plans, target groups of consumer risk communication are essential to be determined, since tailored methods and messages are more efficient (Langsrud et al., 2023). Specific food-related behavioural patterns and attitudinal characteristics also could be explored more deeply when the consumer segments are narrowed down (Jacob et al., 2010).

Stakeholder engagement and cooperation with the food safety authorities are significant in enhancing the effectiveness of risk communication. Keeping contact with stakeholders and searching for new ones, gathering, and sharing information is a continuous task that requires time and energy, thus planning and leading processes for maintaining stakeholder connections must be a part of organisational management (Timotijevic et al., 2010). In terms of collaborations, participation in international food safety risk-related networks (e.g. Rapid Alert System for Food and Feed – RASFF) is usually mandatory for governmental food safety organisations (European Commission, 2018), however, it is also beneficial for preventive risk communication activities. Attendance in the information flow of these networks provides data on emerging risks, hot topics in food safety, reports on hazards, and experiences from other countries (Farkas et al., 2023). Sharing this information within the organisation and to the public should be considered as a best practice in organisational management.

The purpose of conducting organisational management training and workshops for the staff is twofold: on the one hand, linking risk assessors, managers and communicators is necessary to create accurate but easy-to-understand messages that balance between controversies. On the other hand, anyone involved in risk communication programs should be informed/knowledgeable about consumer risk communication methodologies, and how to convert their knowledge to be more interpretable for lay people, as well as for media appearances, giving speeches and answering surprising questions on sensitive topics etc. (Kasza et al., 2022b). Even though not all employees actively and visibly participate in risk communication, communication with the public is to some extent included in all staff members' tasks, as everyone represents the organisation, even in their private lives. In addition, to ensure transparency, which is essential in the case of public bodies, all authorities' management must be committed to informing and involving the public as a justified activity.

A motivating internal environment, which encourages dialogue with the public, is however not enough, a dedicated budget is also needed (Covello et al., 1989). Governmental food safety agencies usually have only limited resources to allocate to consumer risk communication. Thus, a special commitment of the management to support preventive risk communication beyond more stressing of crisis communication is crucial and might need extra effort from both the management and the staff. This can include securing additional governmental funding by convincing political decision makers, applying for external project funding, networking, etc. Fortunately, there are several good sources of freely available food safety risk communication materials that are based on scientific research and behaviourally tested methods (Kasza et al., 2022c).

3.3. Risk communication activities

The third SET domain is concerned with the risk communication activities themselves. Effectiveness and efficiency of preventive consumer risk communication depend on the selection of suitable activities, the quality of their execution, and the usage of appropriate communication methods and channels, much like the accessibility of resources or the establishment of other organisational prerequisites.

Proactive risk communication, and in parallel, management, aims to prevent foodborne illnesses or food safety incidents in contrast to reactive risk communication, which tries to handle an already established problematic situation. Besides the more efficient mitigation of illnesses, consumers prefer proactive risk prevention methods (Cope et al., 2010), such as thematic campaigns related to seasons or holidays. These proactively communicated subjects/topics should also target stakeholders with pre-made, ready-to-use materials to help them in the propagation of the authorities' campaign messages. The designated topics can also react to consumer needs, as interactive, multilateral communication activities are part of the more advanced risk communication policies. These practices enable the organisation to gather information from the public, and to consider risk perception of the consumers, or the food safety problems that concern the society (Kasza et al., 2022a). Awareness-raising programs are valuable activities for expanding the knowledge of adults, however, they mainly reach those segments of the population who have already become more aware of food safety (Süth et al., 2018). This can originate from different risk perception levels of the consumer segments, and since that food safety information is only relevant for those interested in the topic (Verbeke et al., 2007). Additionally, there is usually a gap between food safety knowledge and observed behaviours or routines (Kasza & Izsó, 2023; Tóth et al., 2017). Therefore, childhood education is an even more important risk communication activity to influence behaviour since at young ages habits are less likely to be ingrained (Young et al., 2019). By learning the correct food safety practices and looking at good examples, children will more likely to adopt efficient risk avoiding behaviour in their adult lives (Lakner et al., 2021; Syeda et al., 2021). As a result of school education on food chain safety and food hygiene, the future population will be more conscious and less vulnerable regarding food safety, which will/can lead to a reduction of foodborne illnesses. Hence, authorities should invest in such activities and expand their target audience towards young children and teenagers. In this risk communication initiative, existing free and credible educational materials (Hann et al., 2022, 2023) also play a key role, as education is a very resource-intensive task.

Different tools and channels suitable for various target groups serve

the risk communication purposes of the organisations depending on the financial possibilities. Press releases are crucial in authorities' risk communication practices to provide accurate information to the public, including the media, to minimize the spreading of fake news and myths (Soon, 2020; Maxim et al., 2021c). In addition, having a dedicated webpage is essential for preventive risk communication, crisis management, and sharing general information, as it is easily updatable and ensures dissemination. Various materials, such as leaflets, newsletters, and educational resources, also can be disseminated in a printed format or digitally to diverse target groups through appropriate channels. Online food safety interactions, such as games are more advanced (Ueland, 2019), but unfortunately also more expensive tools for reaching out to all generations (Koch et al., 2022). Using social media platforms effectively complements traditional media, allowing direct communication with consumers, being especially important for keeping contact with younger age groups (Borda et al., 2021; Tiozzo et al., 2019), allowing a real-time monitoring of outreach and audience characteristics. Participation in conferences and public events also facilitates direct interaction with other professionals and consumers, contributing to building trust and maintain the reputation of the risk communicator. These events also provide opportunity for gaining a unique insight into other stakeholders' understanding of risks. In contrast, mass communication reaches a large audience but lacks specificity and direct feedback. Nevertheless, it is also a useful risk communication activity, especially for building the organisation's brand.

To balance between the methodologies and resource planning, authorities must evaluate the effectiveness of their communication activities by monitoring indicators such as audience reach, and number of clicks on posts, collecting feedback, and measuring the changes in behaviour, leading to a more optimised communications mix. This should be done not only for performance monitoring purposes, but also for exploring new food safety concerns, myths, and problems emerging in the society. Consumer research, conducted through surveys and focus groups, or observational studies, helps to understand consumer behaviours, attitudes, and risk perceptions related to food safety. Even if organisations lack the capacity to conduct their own studies, using the results of international multidisciplinary research can provide valuable insights for public agencies (Møretrø et al., 2021).

4. Conclusions

Food safety authorities conduct preventive risk communication towards consumers to provide guidance in making more informed decisions about food safety risks and to consequently reduce foodborne illnesses. Modern era risk communication, however, also holds the function of building trust and forming the food safety agency's brand and reputation, while other organisational aspects also become important (e.g. securing funding from political decision-makers). Actors within the European food safety system adopt diverse risk communication approaches, each operating at varying stages of evolution regarding engaging consumers and stakeholders: these organisations, especially including national food safety authorities, generally show potential for development in their food safety risk communication practices. To help public bodies dedicated to the improvement of their food safety risk communication performance, a self-evaluation tool (SET) has been developed for the assessment of their risk communication readiness level. The SET facilitates the evaluation of actual competencies by scoring several elements across three key domains of risk communication: Human capacities, Organisational management, and Risk communication activities.

SET is designed to be a user-friendly application that requires no specific training for immediate utilization but provides easily interpretable results. The goal is to generate quick conclusions for both risk communication experts and decision-makers, outlining logical development options for the organisation. While some organisations are limited in their action radius by legal barriers, and others by financial or human resource constraints, the results are still well interpretable for most of the cases. The actual feasibility of the progression path also hinges on cultural, social, and political contexts, and are ultimately influenced by the specific risk environment in the certain country. Achieving a 100% score for the discussed aspects in the SET tool may not be a realistic expectation for most risk communication actors (even for EFSA) due to legal barriers, institutional strategy, funding constraints, or other limitations in covering certain elements. Nevertheless, if there are areas allowing for development, the SET is likely to indicate available options which can be considered by the authority for improving their practices.

Declarations of interest

None.

Data availability

No data was used for the research described in the article.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.tifs.2024.104594.

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