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The assessment of food safety culture: An investigation of current challenges, barriers and future opportunities within the food industry

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3 **The Assessment of Food Safety Culture: An investigation of current**
4 **challenges, barriers and future opportunities within the food industry**

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The Assessment of Food Safety Culture: An investigation of current challenges and, barriers, and future opportunities within the food industry

Abstract

Following the 2005 *E.coli* O157 outbreak in the UK and the recommendations in the subsequent Public Enquiry Report in 2009, the topic of food safety culture became more prominent. In 2012, the United Kingdom's Food Standards Agency (FSA) commissioned a tool that enforcement officers could use to assess 'softer aspects' of risk such as safety culture, attitudes and behaviours. In the present study, we assessed the awareness of and views on safety culture in the food industry among a group of industry stakeholders (Environmental Health Officers, Food and Beverage Managers, Academics). The study also examines their attitudes towards the toolkit and ways in which it could be improved (e.g., its usability). The conclusions of the paper are that whilst there is broad support for implementing safety culture in the food industry, there are also some outstanding challenges (e.g., defining food safety culture, senior management commitment and the role played by 'micro-cultures' within food organisations). Assessing safety culture in the food industry is a realistic possibility, but needs to take account of some of the lessons which could be learnt from other industries (e.g., healthcare, rail, oil and gas) and their experiences with safety culture.

Key words: Food safety culture; Food safety culture assessment; Food safety culture toolkit

Highlights

- The food industry aims to achieve food safety by solely focusing on traditional methods.
- The food industry needs to move on from reactive methods to achieve success in a changing environment.
- Assessing safety culture in food businesses is vital and beneficial for the food industry.
- Most stakeholders are ready to adopt a proactive approach towards achieving food safety.

1. Introduction – safety culture

It has been 30 years since the Chernobyl accident occurred in the former Soviet Union. There is a general agreement in the literature (e.g., Antonsen, 2009; Edwards, Davey, and Armstrong, 2013; Griffith, Livesey, and Clayton, 2010) that this disaster transformed the landscape of industrial safety and gave birth to the concept of 'safety culture'. The 2002 International Nuclear Safety Group (INSAG) report concluded that poor safety culture was the leading factor that led to the accident. There are multiple definitions for safety culture. Safety culture is often used to refer to human and organisational behaviour (what people do and the way a company operates). In the context of organisational safety culture, it is defined as 'the combination of those (safety related) behaviours which either increase or decrease the risk of harm, with safe denoting protected from harm, and unsafe at high risk of harm' (Edwards *et al.*, 2013). This subsequently became a common concern in high-risk industries (e.g., aviation – Branford, 2011; nuclear – International Atomic Energy Agency, 2002; oil and gas - Antonsen, 2009; healthcare - Waterson, 2014; transportation – Salmon *et al.*, 2012). A group of people's behaviours (based on their beliefs, perceptions and values of safety) defines the safety culture in a workplace (Cooper, 2000; Gadd and Collins, 2002). In the last few years, safety culture has been applied within the food industry as the food industry is a complex sociotechnical system and a systems approach would be required to help adopt a proactive approach (Cassano-Piche *et al.*, 2009; Nayak and Waterson, 2016; Vicente and Christoffersen, 2006). There is limited research in the area of food safety culture, however, the available literature suggests that it continues to grow in popularity and is being assessed within organisations (Griffith *et al.*, 2010; Institute for Employment Studies & Cardiff Work Environment Research Centre, 2010; Taylor, 2011).

1.1. Safety culture in the food industry

A good food safety culture is sometimes characterised as one in which employees share a sense of purpose in maintaining food safety standards (Stanwell-Smith, 2013). The evidence for this can be found in a series of recent studies carried out by a range of researchers (e.g., Bona *et al.*, 2012; Griffith, 2010; Da Cunha *et al.*, 2014; Jespersen and Huffman 2014; MacKay *et al.*, 2016; Samapundo *et al.*, 2016; Taylor, 2011). All of these publications emphasise the relationship between food safety

behaviours, employee training and food safety. The study carried out by Griffith *et al.* (2010) in the UK also highlighted the presence of multiple cultures within highly regulated environments (e.g., management and shop floor plants) within a business. While the management characterized themselves as committed and responsible, this did not appear to be communicated to the different sets of workers in each plant. One of the two sites had positive attitudes towards management's commitment to safety and had greater risk awareness, whilst the other shop floor was more negative towards management. Studies carried out in other parts of the world (e.g., Sarter and Sarter, 2012; Sani and Siow, 2014; Jespersen and Huffman, 2014) show that food safety culture can be specific to each country, as each country has its own traditions and regulations. A study carried out by Griffith (2000) showed that the extent of non-compliance can also make a difference in terms of the level of associated-risk – not only does it affect quality but also has major impacts on food safety. If overlooked or ignored, it can also lead to food poisoning, bankruptcy and damage to brand identity (Griffith, 2000).

1.1.1 The UK Food Standards Agency (FSA) toolkit

In January 2012, the Food Standards Agency (FSA) commissioned a toolkit which was designed to help Environmental Health Officers assess the 'softer' aspects of risk (e.g., safety culture, management attitudes and behaviours, compliance with hygiene regulations). Development of the toolkit was undertaken by the human factors consultants 'Greenstreet Berman' who carried out a review of existing food safety culture research and tools. As there was no tool dedicated to assessing safety culture in the food industry, Greenstreet Berman developed a new toolkit after reviewing other safety culture tools that were available in the public domain (e.g., from the Rail and Health Care industries) (Food Standards Agency, 2013; Greenstreet Berman, 2012). Tables 1 and 2 show the core components from the toolkit. Figure 1 highlights the titles of the 'elements' section of the toolkit.

Figure 1, Tables 1 and 2 about here

1.2. Study aims and objectives

The primary aim of this paper was to provide a better understanding of the views of a group of food safety stakeholders (Environmental Health Officers, Food and Beverage Managers, Academics) towards the construct of food safety culture. In order to probe deeper into these views and attitudes we also carried out an evaluation of the FSA approved toolkit. The specific objectives of the paper were twofold:

1. To analyse the views towards and the challenges, barriers and opportunities in adopting safety culture in the food industry;
2. To evaluate attitudes towards a specific toolkit that assesses food safety culture.

2. Methods

2.1. Participants

A total of 30 semi-structured interviews (n=30) were carried out between January and May 2016. Fifteen participants were Environmental Health Officers (EHOs) (from the East Midlands region in the UK); twelve were employed as Food and Beverage managers (from the East Midlands region in the UK and Europe); three were academics (from the West Midlands and East Midlands regions in the UK). Two of the academics also worked as part-time consultant food inspectors. Table 3 shows details of participants' background and experience in the food safety industry.

Table 3 about here

Environmental Health Officers (EHOs) were recruited by contacting councils across England; Food and Beverage Managers were recruited by contacting Universities and a food business located in the Midlands of the UK. A final set of participants worked as University-based Academics and also worked as either part-time EHOs or consultant food safety professionals. Participants were selected on the basis that they were from varying employment backgrounds (i.e. public and private sector employees and Universities) in order to get diverse opinions about assessing safety

culture in food businesses. We recruited EHOs and food inspectors employed by food businesses (e.g., Food and Beverage managers) in order to get an insight into the problems of assessing food safety culture and to assess the possibility of evaluating safety culture in food businesses. Academics (all of whom were either ex-EHOs or current consultant food inspectors) were recruited in order to get an alternative (scientific) perspective of the need for safety culture in food businesses. Being full-time academics, the authors found a difference in their response compared to those of EHO and food inspectors. A purposive sampling strategy was employed in order to ensure that there was a representative and qualified sample in the various categories. Purposive sampling relies on the researcher's judgement in terms of setting the criteria for selecting participants who possess specific characteristics (Morse, 2004). Interviews lasted between 25 - 40 minutes and were digitally recorded and transcribed.

2.2. Interview schedule

A semi-structured interview schedule was developed and reviewed by both the authors. It consisted of three sections: section 1 included questions about participant's experience and their area of work in the food industry; section 2 included questions on the current systems used to assess food safety (e.g., Food Hygiene Rating Scheme, Food Safety Management System, Hazard Analysis and Critical Control Points - HACCP). The final part of the interview schedule consisted of questions regarding perception of food safety culture among participants. In this section, questions mainly focussed on three elements: (1) safety culture; (2) food safety culture; and, (3) the government approved toolkit developed to assess food safety culture. Questions covering safety culture and food safety culture aimed to provide a better understanding of the participants' grasp of the terms. Questions on the toolkit were designed to probe further into food safety practitioner's views on the practicality of using the FSA toolkit. The lead author who has had extensive training on how to perform qualitative studies and conduct interviews carried out the interviews.

2.3. Data analysis procedure

Before content analysis can begin, they need to be stored in a format that can be easily analysed. In order to do this, interviews are transcribed and coded. Coding involves summarizing transcriptions into groups in order to make comparisons easier (Braun and Clarke, 2006). Each group is as similar to each other as possible and as different in concepts from other groups as possible. All interviews were manually transcribed into Microsoft Word documents. They were then broken down into sections according to the interview schedule in the NVivo (version 10) qualitative data analysis software package. Themes were identified from the data collected instead of trying to fit the themes into a pre-existing coding frame. This form of coding is called inductive thematic coding (Braun and Clarke, 2006) and was used to organize and describe the data set in rich detail and to identify, analyse and report patterns within the data (Flick, 2014). Table 4 highlights the coding framework that was developed by this method of coding and analysis.

Table 4 about here

3. Findings

3.1. Awareness and attitudes towards safety culture

Most participants were aware of the concept of safety culture and had some idea about what it meant. Twenty-five out of the 30 participants felt that it was important to establish and assess the culture of a food business in order to achieve the objectives of producing safe food. One of the participants also mentioned reading about it during a “Level 4 food safety” training course (provided by the UK Chartered Institute of Environmental Health) and a set of case studies that helped further understand the importance of a positive safety culture:

“I think it is coming to fruition and is something that you can’t ignore. It is something you have to really take on board like for example the health and safety culture side of things.” (Environmental Health Officer)

In the UK, although the health and safety department encompasses food industries, only the Food Standards Agency (FSA) deals with food hygiene. The health and

214 safety departments ensure appropriate design of food machinery and health and
215 safety of the employees. Food safety is treated as separate to other aspects of
216 safety and this is an artificial separation. In order to assure optimum levels of safety,
217 the two should be combined:

218 *“... we include the health and safety team as well as the food safety technical team*
219 *to get the best opinion on bettering safety and hence the safety culture on the factory*
220 *floor.”* (Director of Food Safety and Health and Safety)

221 *“[Safety culture was] always something that was mentioned more in Health and*
222 *Safety circles than it was in food but it seems obvious now that there is no reason*
223 *why it shouldn’t apply equally to food safety.”* (Environmental Health Officer)

224 3.1.1. Safety culture as a core and an implicit part of the business

225 All food businesses have pre-set attitudes (either positive or negative) towards food
226 safety and hygiene which they try to instil into their employees. Participants identified
227 two types of food business operators: (1) ones that prioritised profits over hygiene
228 and safety; and, (2) ones that prioritised hygiene and good practices over profits.
229 They felt that there could be a relationship between the size of the business, safety
230 culture policy and the likelihood of compliance with safety culture:

231 *“It depends on the way that the business is organized. ... national businesses ...*
232 *have guidance from above and a culture more or less imposed on them. ... the micro*
233 *owner managed businesses do not have the money to spend on food safety*
234 *expertise and hence the culture is quite individual to those particular premises.”*
235 (Consultant food inspector)

236 Most Environmental Health Officers and Food and Beverage managers felt
237 assessing safety culture in a food business was something they already did during
238 routine inspections. The novel aspect of the FSC tool was that it was formalised and
239 made explicit:

240 *“It is natural for EHOs to judge food businesses based on their observations, even if*
241 *FSC is not made mandatory. EHOs usually judge confidence in management and*
242 *attitudes of food businesses towards safety.”* (Academic)

243 They claimed that it was their instincts and perceptions that helped them evaluate
244 safety culture ‘accurately’ and hence were already aware about the concept of safety
245 culture:

246 *“To me it’s obvious as I can judge the culture as soon as I enter the premises...
247 people with that attitude to food safety would have the same attitude to, for example,
248 using their phone while they’re driving.”* (Health and Safety Advisor, ex-EHO)

249

250 3.1.2. Challenges

251 3.1.2.1. Interpretation of the meaning of ‘safety culture’

252 Although most participants knew what safety culture meant, not all of them could
253 define it. There was also confusion between safety culture and safety climate. The
254 former refers to behavioural aspects (i.e. what people do) and the situational aspects
255 of the company (i.e. what the company has) and the latter refers to psychological
256 characteristics of employees (i.e. how people feel) with regard to safety within an
257 organization (Health and Safety Executive, 2005; Mearns *et al.*, 2003):

258

259 *“... Food safety culture to me is usually the manager’s or the food business
260 operator’s focus of interest in the business and employees’ perceptions (of safety
261 practices) shared within a business ...”* (Environmental Health Officer)

262

263 *“There is this confusion between safety culture and safety climate which I feel needs
264 to be cleared out. ... culture is more to do with behaviour, whereas climate is more to
265 do with how the people feel ...”* (Director of Food Safety and Health and Safety)

266

267 Not only is safety culture poorly defined, but it also has multiple dimensions linked to
268 it, one of the dimensions being national culture. One of the participants related safety
269 culture to employees belonging to different cultural backgrounds and having different
270 traditional food safety practices:

271

272 *“I think safety culture has to do with where employees are from. We have some
273 people with various traditional backgrounds and hence each one has their own
274 safety practices based on their culture”* (Head of Catering)

275

276 3.1.2.2. Effect of business culture on employee behaviour

277 There was concern that although employees received regular training, they would
278 'slip back' and revert to the existing culture of the business. This was seen as a
279 challenge as training might provide an employee with more knowledge, but this
280 might not be translated into action or result in safer or risk conscious behaviour. In
281 order to achieve 'continuous improvement', there would have to be encouragement
282 and support from colleagues and the work environment:

283 *"I think that you can send people on training courses all you like ... but within a*
284 *couple of days of doing a course even if they do change what they do I think they*
285 *slip back in to whatever that culture is."* (Environmental Health Officer)

286 There were also a few self-motivated employees who irrespective of the positive or
287 negative safety culture within the business, carried out good hygiene practices:

288 *"Some people are motivated enough that they would do their work well, but an awful*
289 *lot of people sort of slide into whatever the culture is."* (Environmental Health Officer)

290 3.1.3. Senior management commitment and the role played by national culture

291 If senior management and food business operators were too focussed on profit
292 generation and were too distanced from employees, they would not set an example
293 of a positive safety culture. In such a scenario, even the employees would follow suit:

294 *"... whether they are interested in the business because of their interest in food*
295 *safety or whether they are interested in the business because it's going to make*
296 *them a lot of money. This sets the safety culture of a business, which the employees*
297 *follow."* (Environmental Health Officer)

298 Participants felt that the workers in a business would be as committed to good
299 hygiene practices as their senior management:

300 *"I think it all comes down to the [commitment of the] local management, you can get*
301 *businesses that are awful and businesses that are very good. Sometimes when the*
302 *owners of the businesses have a strong link to the business, they care more."*
303 (Environmental Health Officer)

304 Food businesses are often owned by, and employ people from various ethnic
305 backgrounds. According to The Federation of Specialist Restaurants' market
306 research in 2015, there were 9500 Indian restaurants and 8000 Chinese take-
307 aways as of 2015 in the UK. If food businesses failed to instil their safety culture
308 values in their employees, due to the differences in traditional practices, employees
309 belonging to various nationalities would carry out food safety practices according to
310 their traditions. The stakeholders were worried that this could have a negative
311 impact on food safety and hygiene:

312 *"[I once visited a] bakery owned by a [anonymised nationality] person ... who had*
313 *kept car tyres inside the bakery. He did not see any flaw with that as they did it all*
314 *the time [in their home country]. ... if you go to a bakery [owned by an anonymised*
315 *nationality], this won't be the case as ... their culture dictates cleanliness."*
316 (Academic)

317 3.2. Attitudes towards the Food Safety Culture toolkit

318 3.2.1. Positive responses to the toolkit

319 Twenty-one participants out of the thirty preferred only certain aspects of the toolkit
320 (e.g., use of matrices to segregate businesses, use of different colours to separate
321 various categories, level 1 in the toolkit and culture definitions). Four of the
322 stakeholders felt that Level 1 of the toolkit was very precise and detailed and would
323 help accurately categorize food businesses:

324 *"... with level 1 I think it's fairly good at describing different situations. So if you go to*
325 *a place it doesn't take too long to determine which category it's going to fall into."*
326 (Environmental Health Officer)

327

328 They also felt that the culture definitions that were provided helped them understand
329 the concept of safety culture better which in-turn would help them better assess the
330 safety culture of a food business:

331

332 *"I found this was quite useful because it does enable you to categorize the culture*
333 *based on the attitude in the food business. I was impressed. I thought the culture*
334 *definitions were very useful."* (Environmental Health Officer)

335 3.2.1.1. The value of a proactive approach to safety culture

336 Participants felt that an advantage of using the toolkit was that it would help address
337 the root cause behind an issue instead of waiting for the issue to escalate leading to
338 closures or a low hygiene rating score. They preferred a proactive approach to the
339 reactive approach that is currently used. A proactive approach would help in the long
340 run as if an issue was dealt with at a much earlier stage, not only would the time
341 taken to carry out future inspections reduce, but also there would be a reduction in
342 the number of legal notices served:

343 *“It’s trying to seek out the root, the underlying potential to cause...which is important*
344 *because ... a lot of our work is quite reactive and as a consequence it deals with the*
345 *issue at hand but not the underlying cause of that issue ...”* (Environmental Health
346 Officer)

347 3.2.2. Negative responses to the toolkit

348 Three consistent problems or weaknesses were identified in terms of using the
349 toolkit: (1) length of the document; (2) repetitive nature of Level 2 in the document;
350 and, (3) complicated titles used in the categorization section.

351 3.2.2.1. Length of the document and time constraints

352 Quite a few of the participants had concerns with the document being too ‘wordy’.
353 The problem was interpreted within the context of wider changes within the UK - (1)
354 there have been provincial budget cuts in the UK due to which the number of
355 Environmental Health Officers (EHOs) have been reduced; (2) there is an increase in
356 the number of food businesses which EHOs have to inspect; and, (3) EHOs deal
357 with other departments too such as Health and Safety, housing, environment and
358 noise pollution. Due to this, EHOs were under time constraints. Hence, they felt that
359 in addition to current food hygiene inspection tools (e.g., HACCP, Food Hygiene
360 Rating Scheme, Food Safety Management System), if they were made to use a
361 thirty-two-page long document, they would not be able to do an efficient job and
362 complete inspection targets that had been set by their managers:

363 *"I think a 32-page document would take quite a long time to do as an add-on to the*
364 *inspection... it breaks it down into so many different categories and then you look at*
365 *each one quite specifically..."* (Environmental Health Officer)

366 *"There's quite a lot to it...it looks quite complicated when we are already very*
367 *stretched on food inspections. We are also under pressure to do them as quick as*
368 *possible ..."* (Environmental Health Officer)

369 Most of them suggested that they would prefer to use a toolkit that could be merged
370 with existing food safety evaluation systems such as the Food Safety Management
371 System (FSMS) or the UK Food Hygiene Rating Scheme:

372

373 *"I would like the toolkit to be effectively combined with the Food Hygiene Rating*
374 *Scheme or FSMS to make it less intense. This document (the toolkit) would be*
375 *easier if it could be integrated into annex 5 [of EC Regulation 852/2004]."*
376 (Environmental Health Officer)

377

378 3.2.2.2. Repetitive nature of the toolkit and over-classification

379 Participants felt that the toolkit was quite repetitive and since they already had limited
380 time to inspect premises, they would not have the time to go through a repetitive
381 document. Six of the participants felt that Level 2 of the document could be merged
382 with Level 1 in order to make the toolkit non-repetitive:

383

384 *"You need a certain amount of time to go through it. Considering inspections these*
385 *days, many would not have the time to go into Level 2 especially as Level 2 is pretty*
386 *much a repetition of Level 1."* (Environmental Health Officer)

387

388 The categorization section has five different categories. This was a cause for worry
389 among the participants as they felt that most food businesses could only be
390 categorized into one of three categories: (1) non-compliers, (2) pro-active compliers
391 and (3) leaders. They felt that the other titles were unnecessary and made
392 classifying businesses more complicated. Another reason for worry was that if there
393 were more options to classify a business, each food inspector would have his/her
394 own classification for a business based on their judgement and this could lead to the
395 toolkit not being reliable:

396

397 *"It would be the middle categories ... one would err one way while one would err*
398 *another depending on experience and the type of people they're used to dealing with*
399 *as well."* (Health and Safety advisor, ex-EHO)

400

401 *"Five is too many, you are either non-compliant, half-and-half or fully compliant. I*
402 *think you only need three... giving it more grading loses the fact that you're either*
403 *compliant or you're not."* (Food service and environment safety manager)

404

405 3.2.2.3. Small versus large businesses and 'micro-cultures'

406 There are small food businesses that want to improve the safety culture in their
407 businesses but are unable to do so either due to financial constraints or due to
408 having employed temporary staff, thereby making it difficult to instil the business'
409 safety culture in them:

410 *"The smaller businesses, I'm not sure if they're calculative because a lot of them...*
411 *don't have the money to comply and their attitude is driven by that rather than*
412 *anything else."* (Environmental Health Officer)

413 The 'diversity' factor would have a telling effect on small food businesses such as
414 take-away restaurants, which in addition to employing ethnically diverse personnel
415 also employ part-time staff. Hence, it would be tougher for such businesses to set a
416 pre-defined culture and individual cultures depending on ethnic backgrounds would
417 set in:

418 *"... What I call the small business owners, which employ less than ten (full time)*
419 *people and are owner managed, they have not got the money to spend on food*
420 *safety expertise and then the culture is quite individual to that particular premise."*
421 (Consultant food inspector)

422 Medium and large-scale food businesses consist of many departments, each dealing
423 with various aspects of the food business (e.g., production, packaging, cleaning and
424 transport). During routine inspections, enforcement officers evaluated these various
425 departments in a business and found each section to have a different food hygiene
426 result:

427

428 *"I think my first impression was a little bit of a worry and a concern that we were*
429 *trying to pigeon-hole businesses into one category and that might lead you down the*
430 *wrong route by trying to categorise them into the compliers they are."* (Environmental
431 Health Officer)

432
433 Participants were concerned about categorizing businesses as a whole as they felt
434 that a business comprised of many smaller units and sections, each of which had its
435 own culture:

436
437 *"Being able to state what category they belong to is quite difficult because in some*
438 *areas they might be brilliant, others, they might not be so good ... you can have*
439 *certain aspects of a business that are much better than other aspects of a business."*
440 (Academic)

441 442 3.3. Other considerations

443 Participants felt that experience would help food inspectors judge the food safety
444 culture in a food business. When experienced food safety inspectors visit a premise,
445 they are able to make instinctive judgements (as mentioned in 3.1.1.) due to the
446 years of experience they have in inspecting businesses. However, some participants
447 felt that years of experience could make food inspectors overlook certain aspects of
448 culture while new food inspectors would bring in new techniques and new 'angles' in
449 assessing the safety culture of a business. Hence, there should be a combination of
450 new as well as experienced food inspectors while evaluating the safety culture of a
451 food business in order to get a holistic view:

452 *"A fresh EHO could bring something new; an old one could miss something as well.*
453 *So it could be that a mixture of both could be beneficial as this could help get the*
454 *best out of the service provided, thereby making food businesses safe."* (Head of
455 Catering)

456 457 3.4. Improvement suggestions

458 The encouraging aspect of this study was that although participants had issues with
459 the current version of the toolkit, they understood the importance of a positive safety

culture in a food business and the link between positive safety culture and food safety. In addition to the points mentioned in section 3.2.2., participants also suggested the following improvements to the toolkit to make it practical to use.

3.4.1. Complexity of the language in the toolkit

Stakeholders suggested that a practical toolkit would be only a page long reference tool. They also suggested pictorial representations or simple English for food business owners and food inspectors who were not eloquent in English:

“You could have a text document or you could have it pictorial, depends. Depends which market you are aiming at. ... I would have text but if English isn’t your first language, [then I would like it to be] pictorial.” (Head of Catering)

Participants felt that the toolkit in its current state was too wordy:

“... I would try to plain English it a bit more. I do sometimes find that official documents can get a bit wordy ...” (Environmental Health Officer)

3.4.2. Inclusion of an anonymous section for employees’ opinions

Participants felt that it was essential to get employees’ views on the culture within a food business and how they perceived the management’s attitudes and behaviours towards them. However, the drawback here is that only businesses with full-time staff would be able to get their employees to participate, as it would be impossible to inculcate a business’ culture in part-time employees:

“It is extremely important to get the employees’ views on what they perceive the company wants them to follow with regards to safety. They tend to fill these questionnaires out honestly in order to voice themselves.” (Director of Food Safety and Health and Safety)

3.4.3. Paper versus electronic versions of the toolkit

Although a few participants expressed their preference for an online document over a text document, one of the participants highlighted the fact that in some food businesses, technology was not allowed on site, even for food inspectors. In such a scenario, it would not be practical for food inspectors to use an online toolkit. Even

food inspectors who chose to use an online toolkit wanted a text document that they could use in the office. Hence, it might be ideal to develop a text as well as an online version of the document:

“... if you go to certain business walk around with your mobile phone, they give you a red card. If you’re caught doing it multiple times, you can be in quite a lot of trouble. So I am not sure whether an app would work ...” (Academic)

“... I would prefer a text document or like an online site where you can fix different bits. It would be ideal if there was a version where I had an option to choose from either ...” (Food and Beverage manager)

4. Discussion

4.1. Summary of findings

The findings from interviewing Environmental Health Officers (EHOs), Food and Beverage Managers and Academics are summarized in Table 5 in terms of challenges, barriers and future opportunities of safety culture in the food industry. Table 6 summarized the strengths and weaknesses of the toolkit.

Tables 5 and 6 about here

4.2 The value of food safety culture

Most of the stakeholders interviewed felt that culture had an important role to play with regard to food safety and hygiene and felt that there was a complex interaction between the two – having a positive safety culture would lead to food safety and hygiene. With frequent budget cuts by the government and the number of food businesses constantly on the rise, the already under-pressure EHOs felt that they would not be able to do justice to additional evaluation. Due to the length of the toolkit, they feared that there would be a lack in efficiency and this would lead to an increase in the number of food-borne illnesses and deaths. This is also a view

shared by the report of a recent investigation (Tombs, 2016). The study showed that the number of inspections carried out by food inspectors in the UK had decreased significantly over the last ten years and this could lead to potential public health concerns due to an increased risk of food-borne illnesses and outbreaks. Although Food and Beverage managers were more open towards using a toolkit to evaluate safety culture, they only wanted to assess these evaluations either once a year or quarterly, in the form of audits, and then design a plan accordingly.

4.3 Integrating food safety culture with other ways of working

Food and Beverage managers preferred using a condensed toolkit. EHOs were not as welcoming to the idea of assessing safety culture in every business they inspected and preferred the toolkit to be merged with existing evaluation tools such as the Food Safety Management System or the Food Hygiene Rating Scheme. The positive here was that all stakeholders appreciated the importance of adopting a proactive approach towards safety culture in food businesses. They felt that adopting such an approach would reduce the number of legal notices and the time taken to carry out inspections as changing the safety culture would improve the approach towards food safety as well as health and safety. The effectiveness of a condensed tool can also be seen from the case where one of the participants had used a similar tool to assess occupational safety culture and felt that the one-page tool that they used was quite effective, time saving and reliable.

4.4 The diversity of food safety cultures

Food industries being complex organisations comprising of multiple units, each with its own culture (Antonsen, 2009), it would be challenging to develop a tool/toolkit that could effectively evaluate all the diverse cultures across the business. In addition to this, it would also be challenging to develop a 'one-size-fits-all' toolkit that could effectively assess takeaways, small and medium-large scale businesses. Another challenge would be to evaluate safety culture in businesses that employ casual/temporary workers as these workers do not work in one business/site for long, and would hence fail to understand the culture of the food business. A comprehensive yet effective toolkit with softer user-friendly language would be paramount in the new toolkit. The toolkit was easy to comprehend and use until Level 1 however, when they crossed over to the next level of the toolkit, they found it

to be repetitive and time consuming as the presence of many ‘unwanted levels’ made the document overly complicated.

EHOs and Food and Beverage managers felt that assessing safety culture was an implicit part of their routine inspections. As inspectors’ experience and instincts aid in evaluating safety culture, it is essential to include this element in the toolkit. However, since new or relatively new food inspectors would also use the toolkit, it would have to cater to their needs too. Since they (new food inspectors) have no practical experience, it would be advisable to include a guidance section to aid them in evaluating safety culture in the food business.

4.5 Food safety culture is a ‘moving target’

The safety culture of any business changes over time. Hence, in order to assess it accurately, it is important to examine the changes in safety culture regularly (Health and Safety Executive, 2005; Jespersen *and* Huffman, 2014; Waterson and Kolose, 2010). Sustainability of safety culture in businesses is essential for a positive change in human and organizational behaviour to take place. According to the UK Chartered Institute of Occupational Safety and Health (IOSH) (2015), a positive safety culture has three key elements: (1) rules for effectively controlling hazards; (2) a positive attitude towards risk management; and, (3) the capacity to learn from accidents, near misses and safety performance indicators. All these guidelines and indicators are set out at the management level in an organization. It is the role of the senior managers to motivate employees to adhere to these guidelines and promote a positive safety culture (IOSH, 2015).

5. Conclusions, limitations and future work

As seen from this study, stakeholders valued the importance of ‘food safety culture’ and were aware of the risks of degradation in safety culture even in ‘mature’ organisations. They understood the benefits of assessing safety culture in food businesses and had various thoughts on what the factors were that were to be measured and how to measure them. Assessing safety culture in some guise or other can prove to be useful as it provides valuable insights when used appropriately (Ackroyd, 2008). However, there are also a few challenges with attempting to measure error and safety culture due to the various characteristics of food

businesses. Food businesses are complex sociotechnical systems as seen from the study by Nayak and Waterson (2016). Although processes may appear to be simple (e.g., beef production), they go through many steps (e.g., health screening of cows, cleaning, processing, packaging and transportation) and involve a large range of care-processes (e.g., prevention of cross-contamination, working under sterile conditions, temperature control, regular change of clothing, using gloves) (Pennington, 2014). Food safety culture would vary based on the “characteristics of the work tasks, locations, people involved, etc.” (Waterson, 2014, p.372). Different roles and types of food businesses will call for different attitudes towards safety, making the measurement of food safety culture more exclusive and difficult. Quite often, safety culture and safety climate are used interchangeably as the latter is a distinct yet related concept (Edwards *et al.*, 2013 and Gadd and Collins, 2002). It is essential that a safety culture tool assess safety culture and not the safety climate of a food business.

The current FSA toolkit limits its set of participants to managers and food business operators. It does not involve communication with or feedback from employees working on the factory floor. In order to carry out a detailed analysis of the safety culture in the food business, it is important to make sure that none of the business stakeholders is under-represented. The new toolkit should be able to get the employees’ understanding of safety culture and their views on the food business’ views on safety culture. This could either be done by personnel using the toolkit speaking to the employees or by employees filling out a questionnaire. It is also important to keep in mind that food businesses are very different from each other. Their operational functioning may vary a great deal across businesses (e.g., small and large-scale businesses); also, “staff may have different attitudes towards safety” (Waterson, 2014, p.374) based on their roles (e.g., permanent and temporary staff). Hence, surveys and toolkits would need to be tailored and modified in line with the type of business.

Although the intentions of toolkits (online or text-documents) and questionnaires are to aid process industries to assess key aspects of their safety culture to identify improvements, there are quite a few potential limitations (e.g., internal anchoring and not having an action plan in place due to using the toolkit or questionnaire just as a measurement tool). The challenge facing safety culture assessment tools is to make

sure that they aid improvement and not unwittingly lead organisations astray (Ackroyd, 2008). If not designed and used properly, they can be positively misleading and the dangers of this could be even more harmful than not using these tools, as food businesses would unwittingly have a false sense of self-belief in their safety cultures. Questionnaires, surveys and other tools evaluating attitudes should not solely be used on acceptable/unacceptable basis as responses could be based on issues affecting staff within the food business (e.g., pay, work conditions, attitude of line-managers). This would limit their ability to be used as an absolute measure of performance. Results from these tools must be used to complement insights gained from other safety performance measures such as the Food Safety Management Systems or the Food Hygiene Rating Scheme. If used in combination, they can reveal hidden issues which otherwise may be missed.

The biggest limitation of Food and Beverage managers assessing safety culture in the food businesses they work in is 'internal anchoring'. In the nuclear industry, such form of evaluation has shown that although internal staff judge things to be acceptable, peers from outside the organisation had different judgement standards. (Ackroyd, 2008). Internal anchoring is high in industries that are relatively insular and for such businesses, getting an external perspective would be useful. In the food industry, this could be the case with small-scale food businesses or businesses where food safety and health and safety are not given much importance.

In addition to using toolkits and questionnaires, other concepts such as 'safety intelligence' also offer potential to better food safety culture analysis. This concept is built on the foundation that senior managers have an influence on organisational safety, which in-turn impacts the safety culture of a business. Safety intelligence relates to the ability of senior managers to develop and enact safety policies (Fruhen, *et al.*, 2014). As not much work has been done in food safety culture, much needs to be learnt from past work within safety-critical industries as there is potential which is yet unrealised.

There is a vast sea of opportunities in developing a safety culture analysis tool in the food industry as can be seen from this study. The challenge would be to make this tool a small addition to existing evaluation tools such as the Food Hygiene Rating Scheme (FHRS) or the confidence management systems. Another system that was

recommended was the Kaizen tool as it covers all areas that needed to be evaluated in order to assess culture. Any tool/toolkit developed would have to be comprehensive, effective and easy to use for the benefit of the food businesses as well as food inspectors.

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796 **Figure 1: Titles of the elements in the toolkit**

Business priorities and attitudes towards food hygiene

Business's perception and knowledge of food safety hazards

Business's confidence in food hygiene requirements

Business ownership of food safety and hygiene

Competence, learning and training in food safety and hygiene systems

Leadership provided on food safety and hygiene

Employee engagement in review & development of food hygiene practices

Communications & trust to engage in food safety and hygiene & report issues

797

Table 1: Titles of the categories in the toolkit

Title	Description
Calculative non-compliers	Businesses that intentionally breach regulations for financial gain, without taking into account the potential impact on consumers.
Doubting compliers	Businesses that have the ability to understand the requirements for food safety and hygiene but fail to understand its importance as they doubt the risk
Dependant compliers	Businesses that rely on third parties to make improvements. They wait for advice or instructions from third parties and do not act on their own.
Proactive compliers	Businesses that understand the hazards posed by poor food hygiene and wish to ensure effective food safety controls by positively debating on how best to manage food safety hazards.
Leaders	View food safety and hygiene as critical business issues.

Table 2: An outline of the Food Standards Agency toolkit developed to assess safety culture in food businesses

Section title	Section contents	Elucidation of contents	Number of pages
Introduction	Application	An introduction to the general intent of the toolkit and where it can be used	2
	Purpose of tool	Uses of the toolkit for inspectors to assess behaviours and attitudes of businesses towards food safety and hygiene	
	Understanding of food safety culture	An outline of the of the toolkit and a general outline on how to use the toolkit	
	Improving food safety culture	Relationship between understanding food safety culture and culture betterment in food businesses	
Step 1: Categorize food safety culture	Overview	Explanation of Level 1 and Level 2 of the toolkit and factors to consider in order to categorize a food business and use various sections of the toolkit	3
	Level 1 understanding (Table 1)	Names of the eight categories and meanings of various category titles	
	Level 2 understanding (Table 2)	A more detailed analysis: the option of rating each category based on eight elements and an explanation of how the table is to be used	
Step 2: Guidance on enabling food safety culture improvement	Table 3	This section contains 'high level' advice that can be given to food businesses once they are categorized. Table 3 contains the 'theme of advice' that 'may be' given to Level 1 categorized businesses.	8
	Table 4	Table 4 provides 'high level' advice for Level 2 categorized businesses. This table has the 'theme of advice' for each element within the various categories.	
Appendix A: Food safety culture matrix: Element specific descriptions	Table 5	This section contains Table 5 which explains what characteristics food inspectors could look for while assessing various elements within a category. This is also an advice section that food inspectors can look at for guidance. There are pointers for each element per category.	8
Appendix B: Supporting exploration and categorization	Overview	This section once again provides an overview of the toolkit and its purpose. It also explains in short, how to use the various sections of the toolkit.	4

Table 2: An outline of the Food Standards Agency toolkit developed to assess safety culture in food businesses

Section title	Section contents	Elucidation of contents	Number of pages
	<p>Areas to explore</p> <p>Priorities and attitudes Food hygiene, risk perception and knowledge</p> <p>Confidence in food hygiene and safety requirements Business ownership of food hygiene Competence, learning, training, knowledge, etc. Leadership on food hygiene Employee engagement in review and development of food hygiene practices Communication and trust to engage in food hygiene and report issues</p> <p>Observations to undertake Documents to review</p>	<p>This section contains possible issues food inspectors could focus on with regard to each and every element. These are questions food inspectors could ask themselves (as well as businesses) when they visit food businesses in order to assess the safety culture.</p>	
Appendix C: Background, purpose and application of the tool	<p>Background What is food safety culture? Purpose of the tool Application: Understanding food safety culture Improving food safety culture</p>	<p>This section describes why the Food Standards Agency commissioned a project with the objective of being able to analyse safety cultures in food businesses. It then further elucidates the meaning of food safety culture, its importance and methods of improving safety culture in food businesses.</p>	7

Table 3: Study participants and experience

Sector	Role [number of participants]	Experience in current role (years)
		<i>Range of experience (years)</i>
Government	Environmental Health Officers (General) [13]	7 – 36.5
	Health and safety advisor [1]	10
	Consultant food inspector [1]	11
Food industry	Food service and environment safety manager [5]	3 - 16
	Food safety expert [1]	0.5
	Food and Beverage manager [2]	10.5 - 16
	Head of catering [2]	3 - 25
	Director of Food Safety and Health and Safety [2]	9 - 20
Academia	Lecturer in Food Science and Technology [1]	4
	Teaching fellow [2]	9 - 15

Table 4: Coding framework

Awareness and attitudes towards safety culture	Safety culture as a core and an implicit part of the business Challenges	Interpretation of the meaning of 'safety culture' Effect of business culture on employee behaviour
Attitudes towards the Food Safety Culture toolkit	Senior management commitment and the role played by national culture Positive responses to the toolkit Negative responses to the toolkit	The value of a proactive approach to safety culture Length of the document and time constraints Repetitive nature of the toolkit and over-classification Small versus large businesses and 'micro-cultures'
Other considerations Improvement suggestions	Complexity of the language of the toolkit Inclusion of an anonymous section for employees' opinions Simplifying Level 2 (rating categories based on the elements) of the document Paper versus electronic versions of the toolkit	

Table 5: Opportunities, barriers and challenges of safety culture in the food industry

Opportunities and positives	Barriers and challenges
Participants were aware of the importance of safety culture. Safety culture is already a core part of food businesses, although it might be without their knowledge. Stakeholders felt that assessing food safety culture was an implicit part of inspections and it was important to adopt a proactive approach towards addressing it.	Clearly defining safety culture for stakeholders' as well as food business operators' understanding of the term. Limiting the effect of negative business culture on employees so as to not change their attitudes for the worse. Limiting the role of national and micro-cultures. Designing a toolkit which is comprehensive, reliable and valid and yet easy and practical to use. Addressing different types of food businesses (e.g., small, medium and large-scale businesses; businesses that employ temporary and permanent staff).

Table 6: Strengths and weaknesses of the FSA toolkit

Strengths	Weaknesses
<p>Detailed overall analysis of food safety culture in the business. Makes understanding new concepts (e.g., food safety culture) easier as they are clearly defined in Appendix C of the toolkit.</p> <p>Helps in adopting a proactive approach to safety culture.</p> <p>Makes local authority personnel think about the importance of a positive safety culture in food businesses (once they have read the document completely).</p> <p>Involves communication with management in food businesses, thereby, helping to understand their commitment to safety and developing a positive safety culture.</p>	<p>Repetitive nature of Level 2 and length of the toolkit.</p> <p>Use of complicated titles in the categorization section and complex language: this would be an even bigger problem for food inspectors and food business operators whose native language is not English.</p> <p>As it is not merged with other existing schemes such as the Food Hygiene Rating Scheme or the Food Safety Management Systems, it becomes an additional document Environmental Health Officers have to use during inspections.</p> <p>Inability to assess micro-cultures and differentiate food safety cultures in food businesses with temporary and permanent staff.</p> <p>Inability to assess small and large-scale food businesses differently</p> <p>No fixed sample size required for carrying out assessments, especially in large-scale food businesses.</p> <p>The toolkit is designed primarily for use by local authority personnel and not for food safety managers.</p>