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

31 **Abstract**

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

48 **Key words:** Food safety culture; Food safety culture assessment; Food safety
49 culture toolkit

50 **Highlights**

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

59

60

61 1. Introduction – safety culture

62 It has been 30 years since the Chernobyl accident occurred in the former Soviet
63 Union. There is a general agreement in the literature (e.g., Antonsen, 2009; Edwards,
64 Davey, *and* Armstrong, 2013; Griffith, Livesey, *and* Clayton, 2010) that this disaster
65 transformed the landscape of industrial safety and gave birth to the concept of
66 ‘safety culture’. The 2002 International Nuclear Safety Group (INSAG) report
67 concluded that poor safety culture was the leading factor that led to the accident.
68 There are multiple definitions for safety culture. Safety culture is often used to refer
69 to human and organisational behaviour (what people do and the way a company
70 operates). In the context of organisational safety culture, it is defined as ‘the
71 combination of those (safety related) behaviours which either increase or decrease
72 the risk of harm, with safe denoting protected from harm, and unsafe at high risk of
73 harm’ (Edwards *et al.*, 2013). This subsequently became a common concern in high-
74 risk industries (e.g., aviation – Branford, 2011; nuclear – International Atomic Energy
75 Agency, 2002; oil and gas - Antonsen, 2009; healthcare - Waterson, 2014;
76 transportation – Salmon *et al.*, 2012). A group of people’s behaviours (based on their
77 beliefs, perceptions and values of safety) defines the safety culture in a workplace
78 (Cooper, 2000; Gadd and Collins, 2002). In the last few years, safety culture has
79 been applied within the food industry as the food industry is a complex
80 sociotechnical system and a systems approach would be required to help adopt a
81 proactive approach (Cassano-Piche *et al.*, 2009; Nayak and Waterson, 2016;
82 Vicente and Christoffersen, 2006). There is limited research in the area of food
83 safety culture, however, the available literature suggests that it continues to grow in
84 popularity and is being assessed within organisations (Griffith *et al.*, 2010; Institute
85 for Employment Studies & Cardiff Work Environment Research Centre, 2010; Taylor,
86 2011).

87 1.1. Safety culture in the food industry

88 A good food safety culture is sometimes characterised as one in which employees
89 share a sense of purpose in maintaining food safety standards (Stanwell-Smith,
90 2013). The evidence for this can be found in a series of recent studies carried out by
91 a range of researchers (e.g., Bona *et al.*, 2012; Griffith, 2010; Da Cunha *et al.*, 2014;
92 Jespersen and Huffman 2014; MacKay *et al.*, 2016; Samapundo *et al.*, 2016; Taylor,
93 2011). All of these publications emphasise the relationship between food safety

94 behaviours, employee training and food safety. The study carried out by Griffith *et al.*
95 (2010) in the UK also highlighted the presence of multiple cultures within highly
96 regulated environments (e.g., management and shop floor plants) within a business.
97 While the management characterized themselves as committed and responsible, this
98 did not appear to be communicated to the different sets of workers in each plant.
99 One of the two sites had positive attitudes towards management's commitment to
100 safety and had greater risk awareness, whilst the other shop floor was more negative
101 towards management. Studies carried out in other parts of the world (e.g., Sarter and
102 Sarter, 2012; Sani and Siow, 2014; Jespersen and Huffman, 2014) show that food
103 safety culture can be specific to each country, as each country has its own traditions
104 and regulations. A study carried out by Griffith (2000) showed that the extent of non-
105 compliance can also make a difference in terms of the level of associated-risk – not
106 only does it affect quality but also has major impacts on food safety. If overlooked or
107 ignored, it can also lead to food poisoning, bankruptcy and damage to brand identity
108 (Griffith, 2000).

109

110 1.1.1 The UK Food Standards Agency (FSA) toolkit

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

122

123

Figure 1, Tables 1 and 2 about here

124

125 1.2. Study aims and objectives

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

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

135 **2. Methods**

136 2.1. Participants

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

144

145 Table 3 about here

146

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

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

167

168 2.2. Interview schedule

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

184 2.3. Data analysis procedure

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

198

199 Table 4 about here

200 **3. Findings**

201 3.1. Awareness and attitudes towards safety culture

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

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

212 In the UK, although the health and safety department encompasses food industries,
213 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

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

463

464 3.4.1. Complexity of the language in the toolkit

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

468

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

472

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

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

476

477 3.4.2. Inclusion of an anonymous section for employees’ opinions

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

483

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

488

489 3.4.3. Paper versus electronic versions of the toolkit

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

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

497

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

501

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

505

506 **4. Discussion**

507 4.1. Summary of findings

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

512

513 Tables 5 and 6 about here

514

515 4.2 The value of food safety culture

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

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

531 4.3 Integrating food safety culture with other ways of working

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

544 4.4 The diversity of food safety cultures

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

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

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

565 4.5 Food safety culture is a ‘moving target’

566 The safety culture of any business changes over time. Hence, in order to assess it
567 accurately, it is important to examine the changes in safety culture regularly (Health
568 and Safety Executive, 2005; Jespersen *and* Huffman, 2014; Waterson and Kolose,
569 2010). Sustainability of safety culture in businesses is essential for a positive change
570 in human and organizational behaviour to take place. According to the UK Chartered
571 Institute of Occupational Safety and Health (IOSH) (2015), a positive safety culture
572 has three key elements: (1) rules for effectively controlling hazards; (2) a positive
573 attitude towards risk management; and, (3) the capacity to learn from accidents, near
574 misses and safety performance indicators. All these guidelines and indicators are set
575 out at the management level in an organization. It is the role of the senior managers
576 to motivate employees to adhere to these guidelines and promote a positive safety
577 culture (IOSH, 2015).

578 **5. Conclusions, limitations and future work**

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

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

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

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

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

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

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

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

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

656 **Word count: 6,492 (excl. tables and figures)**

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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

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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> <ul style="list-style-type: none"> Priorities and attitudes Food hygiene, risk perception and knowledge 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>Observations to undertake</p> <p>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>	
<p>Appendix C: Background, purpose and application of the tool</p>	<p>Background</p> <p>What is food safety culture?</p> <p>Purpose of the tool</p> <p>Application: Understanding food safety culture</p> <p>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>	<p>7</p>

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
<p>Participants were aware of the importance of safety culture.</p> <p>Safety culture is already a core part of food businesses, although it might be without their knowledge.</p> <p>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.</p>	<p>Clearly defining safety culture for stakeholders' as well as food business operators' understanding of the term.</p> <p>Limiting the effect of negative business culture on employees so as to not change their attitudes for the worse.</p> <p>Limiting the role of national and micro-cultures.</p> <p>Designing a toolkit which is comprehensive, reliable and valid and yet easy and practical to use.</p> <p>Addressing different types of food businesses (e.g., small, medium and large-scale businesses; businesses that employ temporary and permanent staff).</p>

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>