Food & Drink Research Unit Uned Ymchwil Bwyd a Diod

# Prioritising Food Safety Culture Measures To Generate A Bespoke, Food Manufacturing Industry Appropriate Tool Laura Hewitt\*<sup>1</sup>, Professor Arthur Tatham<sup>1</sup>, Dr Paul Hewlett<sup>2</sup>, Professor David Lloyd<sup>1</sup> and Professor Elizabeth C. Redmond<sup>1</sup>

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## Introduction

Annually, 10% of the global population reportedly acquire foodborne disease (WHO, 2015), indicating food safety continues to be a public health challenge. Within the food industry, a positive food safety culture (FSC) is considered to complement the foundation of robust food safety management systems (Griffith, 2014), and this is required to minimise the risk of food borne disease. Indeed, measurement and improvement of food safety culture is legislative and a Global Food Safety Initiative (GFSI, 2019) requirement for food and drink manufacturing and processing (FDMP) businesses. Commercial measurement mechanisms may be prohibitively costly, whilst bespoke FSC culture measurement mechanisms developed with appropriate expertise may specifically address business needs and be more financially viable (GFSI, 2019). However, challenges exist when utilising FSC models to structure bespoke food safety culture measurement mechanisms for industry. Balancing academic and industry priorities needs to be considered when developing measurement mechanisms in order to optimise collation of relevant and pertinent data, useful to the business, as well as practical suitability to facilitate employee responses without impeding on business employment tasks.

# Purpose

To rationalise an existing bespoke quantitative FSC questionnaire to enhance practical feasibility within a low risk FDMP processing business.

## Methods

#### Questionnaire Development and Implementation

Use of in-depth interviews with FDMP management and operative employees (n=21) enabled collation of qualitative data concerning factors that influenced FSC in the business. This qualitative data informed development of a bespoke FSC quantitative questionnaire to enable determination of a quantitative measure of FSC. The questionnaire was distributed in an online format to all staff in the business. Response time was recorded.

Ethical approval obtained from the Healthcare and Food Ethics Committee at the Cardiff School of Sport and Health Sciences (reference number: PGT-2878).

Rationalisation of Questionnaire

To prioritise and condense the FSC questionnaire, intercorrelations between attitude statements associated with food safety culture components (Taylor and Rostron, 2018) were determined using Kendall's Tau-b co-efficient. Significant (p<0.01) correlations resulted in statement removal; pre- and post-rationalisation, further analyses (Mann Whitney-U test) ensured statement removal did not significantly (p<0.01) impact overall coded FSC scores.

## Results and Discussion

# Key Findings

Within each FSC category, correlations were assessed to determine which statements could be removed. The statements selected were screened to ensure key food safety culture dimensions were sufficiently addressed. Likert scale responses were coded from 1-5, mean average was used to determine cumulative attitude toward the FSC categories. Attitude statement removal is indicated in red with Kendall Tau-B correlation coefficient values presented in tables 2-5.

- Cumulatively, 23% of statements were rationalised from FSC questionnaire.
- Implementation of revised rationalised questionnaire showed reduction in completion time by 6 minutes.
- Operative response rate increased from year one to year two by 11%.

**People:** The category initially contained 29 attitude statements, seven were identified to rationalise leaving 22 remaining statements.

**Process:** The category initially contained 32 attitude statements, nine were identified to rationalise leaving 23 remaining statements.

Purpose: The category initially contained 22 attitude statements, four were identified to rationalise leaving 18 remaining statements.

**Proactivity:** The category initially contained 18 attitude statements, four were identified to rationalise leaving 14 remaining statements.

#### Table 1: Rationalisation outcomes per FSC dimension

Pre-rationalisation	Post-rationalisation	Change	
mean	mean		
3.94	3.92	No significant change	
3.84	3.82	No significant change	
3.68	3.75	No significant change	
3.58	3.52	No significant change	
	mean 3.94 3.84 3.68	mean     mean       3.94     3.92       3.84     3.82       3.68     3.75	

## People

Perceptions of empowerment and trust have been identified as a fundamental element of organisational culture (Denison *et al.*, 2013). During qualitative interviews undertaken in the business, it was identified that feeling empowered to make decisions relating to food safety and quality was important to a strong food safety culture with one operative employee stating that they had "absolutely no problem stopping a line if I see anything" (Operative 5). As such, assessing employee confidence to make such decisions was included within the FSC measurement questionnaire. Throughout the FSC questionnaire rationalisation process, it was essential that these perceptions were adequately captured.

#### Table 2: Correlated Attitude Statements—People

Correlated Attitude Statements		$T_b$
I feel comfortable stopping a production line if there	Operatives feel confident highlighting	.584**
were a risk to food safety.	food safety risks to me/I feel comfortable	
	raising food safety issues to my manager.	
I take pride in my work in the company.	I am trusted to uphold high food safety	.608**
	standards.	
My team feel appreciated for their efforts.	I feel recognised for my part in successful	.696**
	food safety audits.	

\*\*Correlation is significant at the 0.01 level.

### Process

Consistency has often been cited as a key element of a robust and mature FSC (Zanin et al., 2021). Qualitative findings from interviews in the company undertaken as part of questionnaire development identified differing perspectives from management and operative employees. Management reported differences "No, because I think it depends on the individual that's managing it" (Manager 1), whereas operatives perceived consistency "we are expected to work to a standard that's been put in place, so everyone following the same rules" (Operative 9). Thus identifying this area as a key area for exploration and inclusion within the rationalised questionnaire.

#### Table 3: Correlated Attitude Statements—Process

Correlated Attitude Statements		T <sub>b</sub>
Traceability is maintained for all products with high efficiency.	We always maintain traceability of all products.	.800**
The decision-making process associated with food safety management is clear and straightforward.	All departments work effectively together.	.643**
Managers of all production departments handle food safety issues in the same way.	I am confident that all employees adhere to the same food safety standards.	.631**

\*\*Correlation is significant at the 0.01 level.

## Purpose

Understanding of the company vision and values should provide the foundations for employee behaviours, therefore underpinning behaviours relating to food safety. Differing perceptions were identified between participant groups with managements identifying being "leaders" (Manager 1), "making a positive difference" (Manager 4) and "maintaining growth" (Manager 0) as key and operatives identifying "quality products" (Operative 5) and "money" (Operative 1) as driving business factors. This, therefore, highlights the importance of understanding employee perceptions of the vision and values of the business in order to understand the underlying FSC of the business.

#### **Table 4: Correlated Attitude Statements—Purpose**

Correlated Attitude Statements		T <sub>b</sub>
am inspired by the group's vision.	My role directly contributes to achieving	.704**
	the group's vision.	
Food safety is considered within company values.	When managing food safety, the company	.719**
	values are adhered to.	
There are clear key performance indicators for food	Data is available to monitor food safety	.561**
safety in place.	standards.	

\*\*Correlation is significant at the 0.01 level.

# Proactivity

Risk perception and awareness have both been identified as fundamental elements of human behaviour (Siegrist and Arvai, 2020) which is particularly salient within robust food safety management. Awareness was identified as a key attribute of the company's FSC and there was a general consensus between operative and management that awareness could be improved upon as part of the qualitative interviews undertaken with management and operative employees. One management participant stated "we could do more with managers" (Manager 10), indicating a need to ensure perceptions are explored within the rationalised questionnaire.

#### Table 5: Correlated Attitude Statements—Proactivity

Correlated Attitude Statements		$T_b$
am aware of external food safety influences.	The company has a good awareness of future	.619**
	food safety risks.	
There are frequent learning opportunities availa-	All learning opportunities are effectively pre-	.692**
ole around food safety available to me.	sented	
The budget to address food safety issues is in-	Investment in other areas is prioritised over in-	.684**
sufficient.	vestment in food safety compliance.	

\*\*Correlation is significant at the 0.01 level.

# Significance of study

Statistical rationalisation of FSC measurement mechanisms allows for academic and industry needs to be satisfied, whilst not impacting FSC measurement and improvement data.

Industry benefits include;

- improved business perception toward FSC measurement
- increased participation and management commitment

Ultimately contributing to improvement identification within businesses thus improving food safety standards.

Whilst quantitative questionnaires provide a breadth of data essential to understand elements of food safety culture within FDMP businesses, it is noted that they cannot be the sole measure due to the complexities of FSC measurements. Triangulation of data types has been found to provide a more in-depth understanding of FSC (De Boeck *et al.*, 2019).

## References

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