

# Evaluating Cabin Crew Food Safety Training using the Kirkpatrick Model: An Airlines' Perspective

## Abstract

**Purpose** - To explore the evaluation of cabin crew food safety training using the Kirkpatrick model.

**Design/methodology/approach** – Using a snowballing technique, 26 cabin crew, managers, supervisors, and trainers participated in in-depth, semi-structured interviews. Summative content analysis was used to evaluate the data.

**Findings** – Twenty-six respondents from 20 international airlines participated in the study. All respondents agreed that evaluating cabin crew food safety/hygiene issues is important in relation to in flight food-handling; for example, *“Training evaluation helps in the improvement of the future training”*; *“We have an end of course feedback form, either done electronically or on paper and that looks at how the delegates felt the training went, if they came away learning something new, if the environment for learning was right, all sorts of things; the questionnaire is quite comprehensive”*; and *“Every trainee is given a feedback form to complete.”* However, significant failures in food safety training and its evaluation were identified.

**Research limitations/implications** – Evaluation of cabin crew food safety training shows it ineffective in some aspects, including learning achieved and behavioural change and these can directly impact on the implementation of food safety practices. Evaluation failures may be due to the lack of available time in relation to other cabin crew roles. Further research may consider using a larger sample size, evaluating training effectiveness using social cognition models and assessments of airline and cabin crew food safety culture.

**Originality/value** – This is the first study that evaluates cabin crew food safety training using the Kirkpatrick model. The findings provide an understanding of the current evaluation of cabin crew food safety training and can be used by airlines for improving and developing effective future food safety training programmes. This in turn may reduce the risk of passenger and crew foodborne disease.

**Keywords** Food safety, Training evaluation, Cabin crew, Kirkpatrick, Airlines

## 1. Introduction

In 2015 the World Health Organization described food contamination and foodborne disease as a growing global problem (WHO, 2015). To ensure its safety most airline food is prepared in centralised production units employing Hazard Analysis Critical Control Point (HACCP) based systems (Kang, 2000, Sherward, 2006). However, divorcing food production from consumption, incorporating a considerable delay, increases the opportunities for food contamination and pathogen growth and survival. Whilst reported cases of aviation foodborne disease are relatively few this may underrepresent its true incidence. Victims may

not present symptoms during the flight and may become dispersed over several continents after disembarking and this makes outbreaks related to inflight meals difficult to identify and investigate (Kang, 2000). Nevertheless when they happen they can present a significant health risk especially if flight crew become affected (McMullan *et al.*, 2007). In a review of pilot incapacitation between 2010 and 2014, half of the occurrences were related to gastrointestinal illness such as food poisoning (Australian Transport Safety Bureau, 2016) and pilot incapacitation due to food poisoning is routinely reported (Havarikommissionen, 2017). Hygiene standards during preparation have been criticized (Babock, 2010) and analysis of airline food has indicated it may not always meet required standards and can contain pathogens (Hatakka, 1998a, 1998b). Poor personal hygiene and inadequate hygiene levels were contributing factors in 11 airline related food poisoning outbreaks from 1967 to 1991, in which 271 cabin crew members were involved (Hatakka, 1993). A variety of studies of airline food poisoning have underlined the importance of training for food handlers in catering units as well as on board aircraft (see for example; Hatakka, 1993;1998a; 1998b; Lambiri *et al.* 1995; Hatakka 2000; McMullan *et al.*, 2007). Recently, Yavari *et al* (2015) identified that the lack of food training and therefore food safety knowledge amongst food handlers, was the biggest barrier to implementing and maintaining HACCP in airline catering.

Whilst reported cases of aviation foodborne disease are relatively few its true incidence may be under reported since airlines and caterers do not publish any data on foodborne outbreaks or customer complaints. With this in mind, the small number of published food poisoning outbreaks in airlines do not provide a true picture of the incidents occurring. Sheward, (2006:24) argued that: “ ... *the airlines are understandably unwilling to sanction their food safety complaint data being published and therefore offer up the documented safety failures of their in-flight food products willingly and for the benefit of media consumption*”. Consequently, it can be argued that there may be many food safety incidents not reported additionally there are no published data on chemical or physical hazards in airline catering (Abdelhakim, 2016; Babock, 2010; Australian Transport Safety Bureau, 2016).

Additional hygiene problems are presented when either cabin, flight crew or passengers acquire an infection prior to boarding and present with symptoms during the flight (Holmes 2009, Kornlyo *et al.*, 2009). This can present additional cross contamination opportunities, especially from pathogens that have a low infective dose, and collectively emphasise the importance of cabin crew personal food hygiene practices. Cabin crew, like other food handlers, need to know and understand what is expected of them so they can operate a high

standard of operational food safety performance and effective training is an important component of this (Griffith, 2014, Zanin *et al.*, 2017).

Food handlers have been identified as one of the main sources and causes of contamination in catering operations (see, for example, Clayton and Griffith, 2004; Hertzman and Barrash, 2007; Seaman and Eves, 2008). According to the Joint Hospitality Industry Congress (JHIC) (1997), all food handlers in catering establishments and at home should be trained/educated to handle food safely. Whilst there is a plethora of studies that address different aspects of food hygiene training worldwide (see, for example, Redmond and Griffith, 2004; Clayton and Griffith, 2004; Bas *et al.*, 2006; Capunzo *et al.*, 2005; Jevšnik *et al.*, 2008; Martins *et al.*, 2012, Zanin *et al.*, 2017) few relate to cabin crew.

Training is a crucial factor in the success of food safety systems, like HACCP (Cochran-Yantis *et al.*, 1996), particularly in relation to flight catering operations (Eves & Dervisi; 2004). Consequently, a deficiency of food safety-related training for food handlers is critical in relation to food-poisoning outbreaks (Motarjemi and Käferstein, 1999). Thus food safety training programmes need to be effectively evaluated (Zanin *et al.*, 2017) and the training evaluation must be purposeful and obviously directed (Shenge, 2014).

Most food safety training evaluations are knowledge based with little attention given to evaluation in, and the role of, the workplace (Ho *et al.*, 2016) although this can be very significant in translating training into to practice (Na-nan *et al.*, 2017). Additionally, Fresh *et al.* (2010) underlined that the work environment, including performance expectation, feedback/coaching, and the capacity to transfer, is one of the main factors with a strong impact on employee training transfer (Na-nan *et al.*, 2017). Therefore, while some organizations were found to be more likely to evaluate the first two steps of the Kirkpatrick model, only the third and fourth steps of the model had significant effects on training transfer (Saks and Burke, 2012).

The main purpose of different training evaluation stages is to help management choose, follow, and assess different training courses (Seaman, 2010) and, in particular, to “*determine the effectiveness of training programmes*” (Kirkpatrick, 1998). Training evaluation helps management to assess and understand the results of its financial investment in training and instructors/trainers and course designers to evaluate a programme’s effectiveness (Kirkpatrick, 1998; Kirkpatrick & Kirkpatrick, 2006; Egan *et al.*, 2007, Zanin *et al.*, 2017). Evaluation allows trainees and supervisors to benefit, allowing them to identify the productivity and cost benefits of training (Noe, 1999).

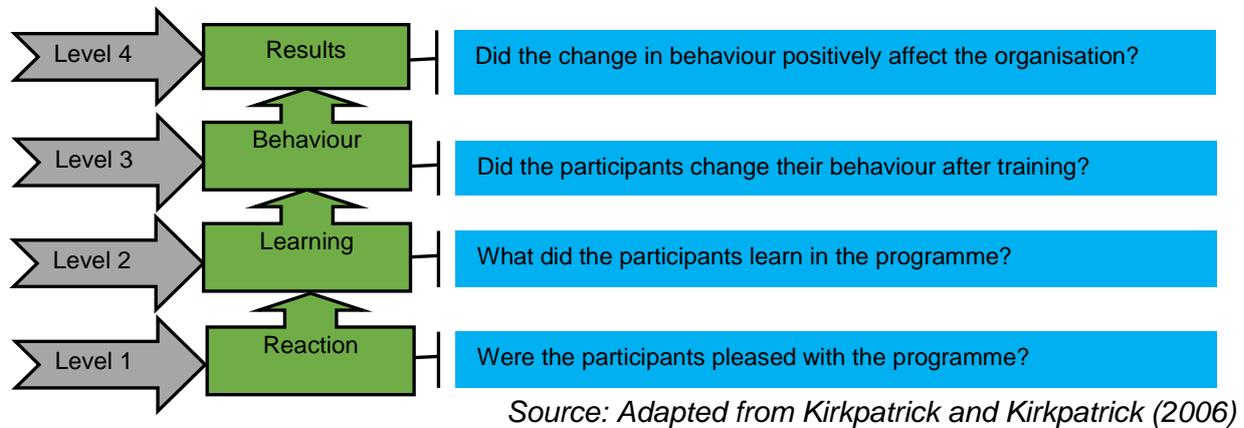
However, this is often not the case with many cabin crew as food handlers (see, for example, Sheward, 2006; Abdelhakim, 2016; Abdelhakim *et al.*, personal communication). There are many models for training evaluation and this study uses the Kirkpatrick model to explore how and when airline managers and supervisors can evaluate their cabin crew food safety training. This may help to develop and improve the effectiveness of future cabin crew food safety training.

### **Kirkpatrick Model**

There are many models for evaluating training including Kirkpatrick's model (1959), Hamblin evaluation framework (1974), Easterby-Smith Evaluation Framework (1994); Swanson's Performance Improvement perspective (1994). Each of these models has strengths and weakness. Although not without some criticisms (Bernthal, 1995, Tamkin *et al.*, 2002; Swanson and Holton (2009), this study uses the Kirkpatrick model which is widely known and understood, has a number of advantages and has been recommended by previous research. It provides a conceptual framework, to explore how and when airlines (managers, supervisors, and trainers) evaluate cabin crew food safety training. It is considered simple to use and easy to apply (Alliger *et al.*, 1997). According to Tamkin *et al.* (2002), it has been described as "the best-known and most widely used framework for classifying evaluation", while Bates (2004) stated that "the most popular approach to the evaluation of training in organisations today is Kirkpatrick's (1976) framework of four 'levels', or criteria". Additionally, Seaman (2010) recommended that Kirkpatrick's model is an effective model for evaluating the effectiveness of food safety training, in particular, if active learning was included (Gavin, 2016).

Kirkpatrick (1959) stated that the sequence of the four levels (reactions, learning, behaviour, and results) reflects the hierarchy of stages of evaluating training programmes; each level is significant and affects the following level (Kirkpatrick and Kirkpatrick, 2006). Moving from the lower to the upper levels, the process becomes more difficult and time-consuming, but the information becomes more valuable (Kirkpatrick, 1998). According to Krein and Weldon (1994) and Kirkpatrick and Kirkpatrick (2006), the four levels attempt to answer four main related questions (see Figure 1). The following paragraphs summarise the aim, significance and techniques required for achieving each level of the Kirkpatrick model.

Figure 1: Kirkpatrick's four levels of evaluation applied to cabin crew food safety training



### **Level 1 – reaction**

- It is identified as “a measure of customer satisfaction” (Kirkpatrick and Kirkpatrick, 2006).
- It measures trainees' perceptions of a training programme, for example, relative to satisfaction with the trainer (Bates, 2004).
- Reactions are necessary for the maintenance of a training programme.
- Positive reaction may not ensure learning, negative reaction almost certainly reduces the possibility of it occurring (Kirkpatrick, 1998).
- It can be measured formally (reaction questionnaires/happy sheets) or informally (verbal questions) (Tamkin *et al.*, 2002).

### **Level 2 – learning**

- It focuses on the extent to which trainees change attitudes, improve knowledge and/or increase skills due to attending a training programme (Kirkpatrick, 1998).
- Before training, learning objectives need to be clearly defined. Therefore, the changes in knowledge, skills, or attitudes (KSA) can be effectively assessed against the training objectives using performance tests (Tamkin *et al.*, 2002).
- The techniques used for assessing KSA obtained during the training, including before (pre-test) and after training (post-test) (Winfrey, 1999: 2), final tests, final examinations, and case studies (Reid and Barrington, 1997).

- Cabin crew food safety training should be recurrent annually, and knowledge should be theoretically tested (Sheward, 2006).

### **Level III – behaviour**

- It focuses on the change in behaviour that has occurred since the trainee attended a training programme (Kirkpatrick and Kirkpatrick, 2006). In other words, this level assesses the transfer of knowledge or skills to the participants' on-the-job behaviour due to training (Kirkpatrick, 1998).
- If the behaviour changes do not transfer to the workplace due to attending the training, then it is necessary to understand why such a change did not appear in the employee's behaviour (Bates, 2004).
- In the case of food safety this may involve an assessment of the organisation's food safety culture (Griffith, 2014).
- The most relevant assessment method to evaluate training effectiveness in the workplace is observation and the use of productivity data (Tamkin *et al.*, 2002). Nevertheless using observation to measure behavioural change generally faces many challenges and time constraints. e.g., cabin crew in aviation (Clayton and Griffith 2004).

In the case of food safety training, Seaman (2010) indicated that food handlers' performance can be measured by many methods, including workplace observations by trained supervisors or managers and asking questions once a specific time (e.g. a month) after training has elapsed. The observations or questioning should be recorded to monitor the difference before and after training. Neal *et al.* (2011) claimed that supervisors may assess employee effectiveness by interviewing them after the training and evaluating food safety behaviours whilst on the job. Furthermore, many studies have found that observing the actual behaviour of food handlers is a crucial indicator of training transfer and effectiveness (Clayton and Griffith, 2004; Green *et al.*, 2006; Pragle *et al.*, 2007; Redmond and Griffith, 2006).

### **Level IV – results**

- It focuses on the organisation's final training outcomes attributable to the participants attending the training programme.
- The assessment of this level is the most difficult compared to previous levels, as it is difficult to assign improvements to the efforts of certain individuals; hence, evaluation is frequently related, in more general terms, to the strength of the organisation. Reid

and Barrington (1997) argued that it might be found in “overall profitability; lack of customer complaints; and a favourable attitude to training”.

In the case of food safety training, the effectiveness of the training programme on organisational performance can be measured by different performance indicators, such as those identified by Seaman (2010), who included “environmental health inspection reports, staff and customer satisfaction, or repeated customer complaints and the types of recurring pest infestations.” Neal *et al.*, (2012) concluded that customer reviews, product evaluation, records and reports, and test results are also among the performance indicators showing the effects of training on the company/organisation. Test results could include the microbiological quality of the food which could be coupled with assessments of food safety culture.

Cumulatively, Kirkpatrick (1998) suggested that training programmes should be evaluated by the participants using questionnaires comprising closed and open-ended questions. Evaluations can benefit trainees and managers in determining the value and relevance of the training in relationship to job expectations. This study aims to assess the managers’ and supervisors’ perceptions of the evaluation of cabin crew food safety training using the Kirkpatrick model. This may help to improve and develop the effectiveness of future cabin crew food safety training reducing the risk of contamination, resulting in greater employee safety and a lower cost to the international community from foodborne illnesses.

## **Methodology**

A qualitative content analysis approach using in-depth semi-structured interviews was used.

### *Sampling and respondents selection*

There are more than 700 civil airlines (Airline-List.com, 2014). Determining the sample size in qualitative research is not easy since there is no set number for how many interviews should be conducted (Oppenheim, 2000). This can be more challenging when the target respondents are hidden and hard to reach, e.g., cabin crew, cabin crew managers/supervisors/trainers, and managers (Johnston and Sabin, 2010). Thus, purposive sampling alongside a snowballing technique was adopted for recruiting respondents.

The interview was piloted with a cabin crew training manager for a single airline (A8), who became “the seed” for the snowballing technique (Johnston and Sabin, 2010). The seed was contacted through the personal network of the first author of this study and was asked to

nominate other people at any airline who would be relevant and willing to help. She recommended two cabin crew members at two different airlines via LinkedIn. These two nominees helped make contact with their training manager/in-flight service managers, who were then included in the sample. Each participant was asked if he/she would help by nominating or suggesting equivalent staff members from other airlines. The recruitment process was conducted online via LinkedIn and Facebook.

Ultimately, 26 respondents participated in this study. The 26 participants were from 20 airlines from the UK, Europe, Middle East, Africa, South America, and the United States and were interviewed in 20 semi-structured interviews. Fourteen interviews were individual interviews and six were group interviews (two respondents per group from each of the six airlines).

#### *Semi-structured interview protocol*

As recommended by Bryman (2004), a six-part interview schedule was developed. The first introductory part identified the demographic profile of the respondents (e.g., age, gender, current position in aviation). The second part explored their role in current cabin crew food safety training (e.g., do you airline train/instruct cabin crew on food safety and hygiene?). The other four parts, from the third to the sixth, focused on the training evaluation process based on the four levels of the Kirkpatrick model e.g., How do you evaluate the reactions of trainees? How and when do you measure/evaluate the learning objectives of cabin crew food safety training? How do you assess the gained/change in the behaviours of trainees after training?

The interviews were undertaken according to the respondents' availability and access; eight were conducted by telephone/Skype (lasting 45-90minutes), nine by email (e-interview), and three face-to-face. Verbal interviews were digitally recorded and transcribed. The techniques used and the research implications for using different modes for interviews in the same study were considered (Opdenakker, 2006). The implementation of three modes of interview within this study is acceptable since the social cues of respondents are not significant for the study (Bampton and Cowton, 2002).

The reliability and validity of the interview data were considered based on the recommendations of Robson (2002), with four threats assessed. These covered subject/participant error (respondents were contacted to ensure they were free at a specific time and they were happy to participate); subject/participant bias (there was no pressure on participants to say anything); observer error (questions were piloted and were asked in the

same order and by the same interviewer - the first author) and observer bias (data were coded, interpreted analysed using a single standardised approach).

### *Ethical considerations*

Prior to the study implementation, all methods and relevant documentation, including the interview schedule, consent form, introductory letter, and participant information sheet were approved by the University Research Ethics Committee (Approval number 3850). Relevant documentation and the ethical approval were sent to all the respondents before they were interviewed.

### *Data analysis*

Analysis of qualitative data obtained from this study utilised a summative content analysis technique (Hsieh and Shannon, 2005). Application of this content analysis approach is recognised when research on a phenomenon is limited and requires further description (Kondracki et al., 2002) and this applies to the evaluation of cabin crew food safety training. The steps of the summative content analysis were: (1) formulating the research questions, (2) selecting the appropriate sample, (3) identifying the categories to be used, (4) outlining the coding process, (5) applying the coding process, (6) determining trustworthiness (validity), and analysing the results of the coding process (Kaid, 1989; Mayring, 2000). Based on the four levels of the Kirkpatrick model and related to the main questions shown in Figure 1, the transcriptions of the 20 interviews were coded and categorised using NVivo 10, which provides researchers with a set of tools to manage and organise data and facilitate its analysis (Bazeley, 2007).

## **Results and discussions**

The results of this study are presented and discussed based on the four levels of the Kirkpatrick model. Table 1 summarises the major findings related to each level.

Table 1: A summary of Kirkpatrick’s levels of cabin crew food safety training

Levels of Kirkpatrick model.	Airlines		Respondents		Examples of evidence
	N	%	N	%	
Level 1: Reaction	18	90	23	88.5	<p>“Every trainee is given a feedback form to complete” (A3MCCST).</p> <p>“The training programme is evaluated by cabin crew as a whole. They also evaluate its curriculum, training materials, the instructor, the surrounding environment of the training place, and finally add any comments that may enhance the training process” (A1DCS).</p> <p>“ .....at the end of any training ... we have an end of course feedback form, either done electronically or on paper, and that looks at how the delegates felt the training went, if they came away learning something new, if the environment for learning was right, all sorts of things; the questionnaire is quite comprehensive” (A2RDLCLA1).</p>
Level 2: Learning	9	50	11	42.5	<p>“At the end of the e-learning course... there is a test, which is a random bank of questions. I think it’s about 20 questions they are asked from a random bank and they have to pass at an 80% pass rate”(A2RDLCLA1).</p> <p>“They have; of course, the module, and they have quizzes to check their level of knowledge and learning throughout the module”(A12HRS&amp;CCT).</p> <p>“We did have the test, but it is a kind of an open book test because all the questions involved in the test are common sense questions, so they are actually quite silly questions like “washing your hands before start working, ... that is it ” (A14CCS).</p>
Level 3: Behaviour	10	55	14	53	<p>“we rely on observation for the performance assessment of crew members in the briefing before take-off” (A6CCTS).</p> <p>“We used to do simulation and mock-ups as a practical assessment. We used to serve proper food and drinks just like a real flight. We always give feedback about the temperature of casseroles, the way the food is served, and the temperature of the drinks” (A12HRS&amp;CCT).</p> <p>“After the initial training, the cabin crew members start a kind of on-the-job training where s/he is under evaluation during the flight by the cabin supervisors or on-board evaluators or instructors, who assess the cabin crew performance as a whole” (A1DCS)</p>
Level 4: Results	20	100	26	100	<p>“For sure we consider any customer complaints in relation to any issue or problem on board including food service-related problems and dissatisfaction” (A5CCM).</p> <p>“Yes, this is done by catering together with an in-flight service. They analyse customer complaints and look for solutions” (A9CCST1).</p>

### **Level 1: Cabin crew reaction to food safety training**

The evaluation of cabin crew training is recommended and outlined by aviation entities, such as the EU Civil Aviation Authority. A cabin crew service trainer acknowledged such requirements: “EU OPS 1.1005 is the initial safety training, and describes the training itself depending on the next which is 1.1010/ 1.1015/ enclose to 1.1025 which is a training course on how the crew members can be assessed ” (A9CCST1). The results revealed that all airlines, including those without specific cabin crew food safety training, evaluate the

trainees 'reaction to training programmes. Airlines used both electronic as well as paper formats to facilitate access and analysis of feedback about training programmes.

However, only three airlines (A2, A9, and A12) used a separate feedback form to evaluate the reaction and 'satisfaction' of cabin crew to the food safety training rather than a form referencing the training provided or an evaluation or measurement of training effectiveness. Besides giving feedback on what they felt towards the food safety training programmes, cabin crew also gave their comments and recommendations for future improvement and development of the training course. Some airlines go back to analyse the 'happy sheet' to evaluate the progress and effectiveness of the training programmes from the trainees' perspectives. A research and development leader from a major airline clarified that : "... and then, around six months later, if there is a specific need, we might go in and look at how successful the training has been and if it has met the criteria" (A2RDLCLA1).

More specifically, one airline (A9) indicated that cabin crew satisfaction was assessed through the analysis of the food safety training feedback forms, and therefore they updated the training in light of the previous year's comments. A Cabin Crew Service Trainer explained that:

*The main factor for us is cabin crew satisfaction....[there is ]..... a special feedback form, which is anonymous. We also review other factors ...this year's training was based mostly on the feedback we received from the previous winter's training. Some of the feedback was: They want to have more practical training... more interactive training and not just sitting around and listening to what we are telling them; they want to participate in the training. We reflected upon this, and they were participating in 80% of the training (A9CCST2).*

The feedback forms differ from one airline to another in many ways, such as the nature of the forms (e.g. electronic form in the case of A2) (Tamkinet *al.*, 2002). These findings are in line with Bates, (2004) and Kirkpatrick and Kirkpatrick (2006), who stated that *measuring reactions provides valuable feedback, which helps evaluate the programmes and also gives comments and ideas for improving future programmes.*

### **Level 2: Evaluating cabin crew food safety learning objectives**

The learning objectives should to be clearly defined before training, therefore, the changes in knowledge, skills, or attitudes (KSA) can be effectively evaluated (Tamkin *et al.*, 2002, Zanin *et al.*, 2017). The results showed that airlines could be categorised into three groups with regard to their evaluation of the achieved cabin crew food safety learning objectives. Firstly,

6 out of 18 airlines (A2, A14, A12, A11, A19 and A20) evaluated the gained knowledge of cabin crew food safety separately and explicitly from other training courses and in this case cabin crew were required to sit for a theoretical test. The test was online (A2 and A12) or was a paper-based in nature (A14) (Table 1). In addition, respondents from airlines A11, A19 and A20 stated that they evaluated their cabin crew food safety knowledge via a test (A19 and A20) or an interview (A11), but they did not refer to any particular type of tests. In such cases, assessing food safety knowledge is a compulsory requirement by the airline itself or by the local authority and therefore achieving the required score in the theoretical test is mandatory for flying, according to airlines (e.g. A9 and A12), “.....it is a legal test; if you do not pass, you are not allowed to fly” (A9CCST2) and the Ministry of Health (such as in the case of A12), “It is a legal obligation” (A12HRS&CCT).

Secondly, three airlines (A9, A15 and A16) evaluated the knowledge and learning objectives of their cabin crew on food safety inclusively in the foodservice initial test. Tests in these cases were paper-based. Respondents from those airlines discussed the following:

*We have a test for service routine, and also service training considers these things [food safety], as part of that as well as food hazards and, of course, in the test it could be from 30-50 questions and normally 3 or 4 questions are about food safety (A9CCST2).*

*Yeah. It is done generally in the case of all training programs, but in the case of food safety and hygiene, there are no direct or specific tests or assessments on this area. However, some questions or situations can be mentioned in the case of the food service test (theoretical test like students at school) (A15CCM).*

However, while evaluation of learning objectives should be undertaken before (pre-test), during and after training (post-test) (Winfrey, 1999: 2), using final tests and case studies (Reid and Barrington, 1997, Bates, 2004), all airlines in this study used only the final tests to evaluate the achievement of their learning objectives.

Finally, half of airlines with cabin crew food safety training (9/18) did not test or assess their cabin crew's food safety knowledge gained throughout the training. A cabin crew training manager stated that: “there is no kind of test or examinations related directly to food safety or food poisoning and so on. We test cabin crew on service as service but nothing related to food hygiene issues” (A5CCTM). However, these findings are at odds with the recommendations of Sheward (2006) where it is indicated that knowledge should be theoretically tested.

### **Level 3: Evaluating cabin crew food safety behaviours**

The focus of the third level of Kirkpatrick model is to assess the transfer of knowledge or skills gained through training to the trainees' workplace (Kirkpatrick, 1998). The results indicated that 55.5% of airlines implementing food safety training (n=10) assessed cabin crew food handling practices during or after their training. Observational evaluation focused on, *"for example, the method of serving meals to passengers, the cabin crew's attitudes, appearance and grooming during the performing of their duties and whilst having food or drinks, touching food, hair etc"* (A5CCTM). These findings are in line with what has been suggested by (Tamkin *et al.*, 2002) and Kirkpatrick and Kirkpatrick (2006) that observation is the most effective technique to assess the change in behaviours of trainees after training. Furthermore, many studies have found that observing the actual behaviour of food handlers is a crucial indicator of training transfer and effectiveness (Clayton and Griffith, 2004; Green *et al.*, 2006; Pragle *et al.*, 2007; Redmond and Griffith, 2006).

The observation of cabin crew food safety behaviours was conducted at three different levels with regard to who performed the observation and when it took place. Firstly, for three airlines (A1, A5, and A6) cabin crew managers/supervisors observed cabin crews' food-handling practices, after their induction, during their practical training (Table1). Secondly, three airlines (A9, A17 and A18) assessed their cabin crew behaviour, including food handling, once a year during a "line-check". This assessment was conducted by cabin crew supervisors or managers: *"we are evaluating training as a whole, and during the flight, it is senior cabin crew's responsibility. Each cabin crew member needs to pass each year a line-check during flying"* (A9CCST1); *"Cabin crew members are observed in flight during annual recurrent checks"* (A18CCS). Finally, in four airlines (A2, A4, A15, and A13) respondents observed cabin crews' food-handling practices whilst on board during flights. In this case the observation was conducted consistently by cabin crew managers/supervisors and conducted inconsistently by "ghost riders" or "Mr. X" or as 'mystery shoppers'. In this regard, a cabin crew manager confirmed that *"...To ensure and measure the level of compliance with the guidelines for food safety, often there are "ghost riders", "Mr. X", who are hired to observe the crew's performance. (A15CCM).*

Moreover, respondents were asked to give examples of cabin crew, on-board, food-handling malpractices. Table 2 summarises unhygienic behaviours, which were observed and/or self-reported, by respondents.

Table 2: Observed and/or self-reported cabin crew food handling malpractices on-board

Observed behaviours	Examples of Evidence
Failure to implement acceptable hygiene and food-handling practices in the Galley.	<p>... I do remember one of my colleagues picked up the glass, with some drink in it, with her fingers inside the cup (A4CCM).</p> <p>Certainly, we have some cabin crew who are careless about galley cleaning or tidying. Let's say less than 10% of them. This can be corrected by recurrent and effective training (A5CCTM).</p> <p>During code share flights, I have noticed that many cabin crew members just opened the label and touched the hot food with their finger to check the temperature. So you can imagine the situation! (A4CCM).</p>
Physical contamination	<p>A broken glass when it had been broken on a plate of food or something like that. Also, a hair on one flight and once a fly as well (A9CCST2).</p> <p>Sometimes we may find a cockroach and may notice a hair in a salad, but in all the years I have worked, I think I found such cases maybe four or five times (A13CCTM).</p>
Failure to implement adequate personnel hygiene	<p>They need to have their hair tied back. However, some female cabin crew may not follow such requirements, although it is done for health and safety reasons (A9CCST2).</p>
Eating passengers' food	<p>... With Business and First Class, if the passengers do not eat their meals, of course we eat them because they will be thrown out otherwise (A9 CCST2).</p>

The tabulated findings indicate that cabin crew are responsible for some food contamination malpractices. This requires airlines to pay far more attention to effective evaluation of cabin crew food safety training as well as their on-board food handling. Such evaluations may lead to improvements in the level of service and reduce contamination and food safety customer complaints. It could be that the food handlers did not know what was expected of them or because they chose not to implement a known practice (Clayton *et al.*, 2002) with the real problem one of food safety culture (Zabukosek *et al.*, 2016). Whilst “cockpit flight safety culture” is more frequently studied that of cabin food safety culture is not, yet the latter can have disastrous consequences.

#### **Level 4: Evaluating cabin crew food safety training results**

Monitoring customer complaints is an established mechanism to assess the effectiveness of training programmes (Reid and Barrington, 1997; Kirkpatrick, 1998; Seaman, 2010; Neal *et al.*, 2012). The respondents (n=26) explained that all airlines (n=20), including airlines without cabin crew food safety training (A8 and A10), depended on customer/crew complaints as an indicator of their quality of service, including food safety. However, more than a quarter of respondents (35%) established that most customer complaints were related to food quality and the available choices of food items and were not related to food safety and contamination. For example, “there are no incidents of food poisoning in my company as far as I know; we have a meeting where we read complaint letters from passengers. Many of the passengers in Economy Class are asking for better quality food” (A17CCTS),

and, *“the majority of the complaints are about the type and quality of meals, not its safety”* (A6CCTS). Alternatively, few respondents including A5CCTM and A6CCTS affirmed, *“There are a few complaints regarding food spoilage and contamination”*, (A5CCTM and *“In the case of contamination, this happened when a hair was found twice in the last year”* (A6CCTS).

Due to the significance of customer complaints as an indicator for service quality and training effectiveness, the mechanisms of handling customers’ food service-related complaints appear to be relatively consistent between airlines. Based on the interview transcripts, the sequence of steps for handling such complaints is as follows:

1. Once a food safety-related incident occurs on board with a passenger and/or cabin crew and/or cockpit crew, *“there are some complaints from the cockpit crew and cabin crew themselves regarding the variety and safety of meals”* (A1DCS).
2. After this, the incident is reported by the cabin crew to the cabin crew manager or director. In addition, in some serious cases where on-board foodservice will not continue due to suspected food poisoning or contamination, these cases have to be reported to the captain: *“What we usually do is just let them talk to the purser/or cabin manager, and the purser has to find what the actual problem is and then guide them through the correct procedures.”* (A13CCTM).
3. Any contaminated food on board is placed in a plastic zipped bag and refrigerated to be sent to the hub catering by another flight or to be kept on-board until the flight returns back to the hub: *“Where there is a food hygiene incident on-board, they have food sample bags that they are supposed to put foods in to be taken back. They also have an on-board form, an on-board system where they can also send back a report to customer services”* (A2RDLCLA1). Technologically: *“We train our cabin crew leaders on the use of iPads, they can actually use iPads to take a photograph of the food sample and as soon as the aircraft has landed wherever they are in the world, they can email that photograph straight back to the relevant department”* (A2RDLCLA2). Cabin crew are required to collect the food sample, but using this technology, they can quickly address such issues without waiting for the flight back to the hub.
4. On arrival back at the base location, the suspect food and the report have to be sent to the catering laboratory for analysis: *“They will have to get in touch with the flight catering unit to find out if there is a contamination problem or just an upset stomach on the part of the passenger”* (A13CCTM).
5. Finally, the analysis results have to be shared with customers and the flight service departments of the airlines, who then share the feedback with the customer: *“The*

*Customer Care and Cabin Safety Departments keep statistics of all complaints, compliments and general customer feedback in this regard” (A7MCSTIS).*

There appears to be a strong link between in-flight service and customer service on any airline, especially with regard to food safety and on-board complaints: “*Obviously, if there is an incident on board and a customer complaint comes in, then it is dealt with by our customer relations team, and it will be dealt with very, very quickly*” (A2RDLCLA1). Airlines usually audit caterers at regular intervals regarding all services, including food safety issues. In case of food safety complaints caterers often keep refrigerated samples of meals for a week. This policy may help caterers and airlines defend their situation if there are complaints about food contamination. However, there is limited access to the customers’ complaints and food safety related records and reports. In addition, if the real-number of unpublished food safety incidences and contamination on airlines is considered, this can be a real indicator for the size of the problem of in-flight food contamination (Sheward, 2006; Abdelhakim, 2016).

### **Conclusions, limitations and further research**

In the interests of passenger and crew safety there is the need to evaluate food safety training effectiveness. Collectively, the findings indicate this is not well executed since many airlines did not explicitly evaluate it. Additionally, the inadequacy of training evaluation is reflected by the lack of consistency and depth in the methods used. This study is the first to evaluate cabin crew food safety training using the Kirkpatrick model and the findings supported both the need for its use as well as its utility. Only three airlines used a separate and specified form to explicitly evaluate the reaction of cabin crew about the food safety training provided (level 1). Additionally, half of airlines with cabin crew food safety training did not test or assess their cabin crew’s food safety knowledge gained throughout the training. More than a quarter of airlines with food safety training evaluated the gained knowledge separately, and explicitly, from other training courses and cabin crew were required to sit for an obligatory theoretical test. However, whilst the evaluation of learning objectives should be undertaken before( pre-test), during and after training, (post-test), all airlines in this study used only final tests to evaluate the achieved learning objectives (level 2). Some airlines used observation of food handling practices to assess training efficacy but there was considerable variation in how this was undertaken. Although conducted inconsistently, observations during flights, by a “ghost riders” or “Mr X” or as ‘mystery shoppers’, exposed food-handling malpractices by cabin crew (level 3). All airlines considered customer complaints as an indicator for service quality and training effectiveness. However, there is limited access to the customers’ complaints and food safety

related records and reports. Findings also indicate a need for the development and use of a tool to measure cabin crew food safety training effectiveness.

Like any empirical research, this study has some limitations. Although the sample size of 20 airlines worldwide achieved the aim of the study, further larger scale investigations are needed to gain a broader and more comprehensive understanding and to explore the extent to which these study results can be generalised. This can be achieved by using a quantitative approach to investigate the extent of each level of the Kirkpatrick model in the training of cabin crews on food safety. Additionally, while this study gives a better understanding of the analysis stages of the customer food service/safety related complaints, an in-depth and extensive study is required to fill in the gaps in this area. Other aspects of cabin crew food safety training, e.g. contents, methods of training, trainers etc. as well as assessments of food safety culture are required.

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