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A Study of Food Safety Training and Associated Barriers to Effective Training Outcomes

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A STUDY OF FOOD SAFETY TRAINING AND ASSOCIATED BARRIERS TO EFFECTIVE TRAINING OUTCOMES

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ABSTRACT

The safety of food is fundamental to public health, businesses and wider society and effective food safety training is an essential element to ensure safe food reaches our consumers. This is true for all food business operators in all sectors of the food industry including food service, retail and manufacturing facilities. Not complying with food safety obligations can have a serious impact on human health and serious consequences for the food business operator. In 2015 the World Health Organisation reported that almost 1 in 10 people fall ill every year from eating contaminated food and 420,000 die as a result. Children under 5 years of age are particularly at risk, with 125,000 children dying from foodborne diseases every year. Food safety is a shared responsibility and governments, the food industry and individuals need to do more to make food safe and prevent foodborne diseases. The aim of this study is to identify the barriers and problems that may affect the outcomes of food safety training, by examining the methods of training used within the food industry and to identify what food businesses are currently pursuing in order to develop and improve their food safety training. This survey was conducted from October to December 2018 and 171 food businesses participated. Discussions with trainers were conducted in December 2018 and international responses were gathered in October 2018. The study identified that 95% of food businesses do provide food safety training for employees whereas 5% are non-compliant. A majority of food businesses (68%) chose in-house training as their main method of training and online/eLearning was the least preferred at 17%. Findings from this study showed that 85% of food businesses employ non-nationals, with Polish (58%) being the most common language spoken.

Sixty percent of respondents believe that language may be a barrier to food safety standards, due to a general lack of understanding when training is conducted in English. Meanwhile, language barriers are used by some employees as an excuse to avoid implementing training appropriately. Incorporating a selection of languages may help to overcome that barrier. Overall, the study identified the main barriers to food safety training as; no interest amongst employees (92%), lack of understanding (89%) and lack of management support (85%). Therefore, it is recommended that a strong food safety culture is built into the food businesses. Blended learning, group work and experience sharing needs to be brought into training programmes, in order to get employee engagement and make training more interesting.

DECLARATION

I hereby certify that this material, which I now submit in part fulfilment of the requirement for the award of MSc in Food Safety Management, is entirely my own work and has not been taken from the work of others save and to the extent such work has been cited and acknowledged within the text of my work.

This thesis was prepared according to the guidelines for dissertation production in the MSc. Food Safety Management and has not been submitted in whole or in part for an award in any other Institute or University.

The work reported on in this thesis conforms to the principles and requirements of the institutes guidelines for ethics in research.

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Signed   _____

               Candidate

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ABBREVIATIONS

EC – European Community

ECDC – European Centre for Disease Prevention and Control

EFSA – European Food Safety Authority

EHAI – Environmental Health Association of Ireland

EHO – Environmental Health Officer

FB – Food Business

FBO – Food Business operator

FIC – Food information for consumers

FSAI – Food Safety of Ireland

FSMS – Food Safety Management System

HACCP – Hazard Analysis Critical Control Point

HPSC – Health Protection Surveillance Centre

HR – Human Resources

HSE – Health Service Executive

IFSQN – International Food Safety and Quality Network

KSA – Knowledge, Skills and Attitudes

LYIT – Letterkenny Institute of Technology

NHP – National Hygiene Partnership

NSAI – National Standards Association of Ireland

PCA – Peanut Corporation of America

QQI – Quality and Qualifications Ireland

RTE – Ready to Eat

SOP – Standard Operating Procedure

UK – United Kingdom

US – United States

WHO – World Health Organisation

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1. LITERATURE REVIEW

 "Safer food saves lives. With every bite one eats, one is potentially exposed to illness from either microbiological or chemical contamination. Billions of people are at risk and millions fall ill every year, many die as a result of consuming unsafe food" (WHO 2015).

The safety of food is fundamental to our businesses and effective Food Safety Training is an essential element to ensure safe food reaches our consumers. This is true for all food business operators across all sectors of the food industry including, food service, retail and manufacturing facilities.

Although there are many resources, methods and guidance notes available for food safety training, it is not always guaranteed that the training provided will be effective and applied in the workplace.

Several reasons why the training may not be effective could include; irrelevant training, cost, lack of resources, lack of food safety culture, poor management commitment, lack of interest, language barriers or methods of training not suitable for the employee or the organisation.

1.1 Background

WHO "Estimates of Global burden of foodborne diseases 2007 – 2015", is the most comprehensive report to date on the impact of contaminated food on health and well-being (WHO, 2015).

Since the beginning of humanity foodborne diseases have been an issue for all societies. Those who are particularly at risk are the young, the elderly and those immune compromised where the symptoms of food related diseases can be fatal and those who survive may suffer from delayed physical and mental development.

Foodborne diseases can cause short-term symptoms, such as nausea, vomiting and diarrhoea; diarrhoeal diseases are responsible for more than half of the global burden of foodborne diseases.

Among the findings of the WHO report (WHO, 2015), almost 1 in 10 people fall ill every year from eating contaminated food and 420,000 die as a result. Children under 5 years of age are at particularly high risk, with 125,000 children dying from foodborne diseases every year.

The report highlights that although the WHO European region has the lowest estimated burden of foodborne diseases globally, more than 23 million people in the region fall ill from unsafe food every year, resulting in 5000 deaths.

Diarrhoeal diseases account for most foodborne illnesses in the WHO region with most common being Noroviruses infections, causing an estimated 15 million cases, followed by Campylobacteriosis, causing close to 5 million cases. Non-typhoid Salmonellosis cause the highest number of deaths – almost 2000 annually. (WHO, 2015)

In the 2016 US annual report on the surveillance for foodborne disease outbreaks (Daniel *et al*. 2015) stated that 839 foodborne disease outbreaks were reported, resulting in 14,259 illnesses, 857 hospitalisations, 17 deaths and 18 product recalls.

Using only the year to date data for 2018 in Ireland, there have been 83 enforcement orders issued by EHO's, 86 food alerts notified by the FSAI, 49 of which were product recalls with 37 of those due to undeclared allergens (FSAI News Centre, 2018)

Recently in the media there has been three deaths reported in relation to undeclared allergens in the UK, while a recent audit conducted by the FSAI in Ireland on the compliance of allergen control on food businesses for non-prepacked food resulted in only six out of the fifty FB audited recorded as fully compliant (FSAI Audit Report, 2017)

Not complying with food safety can have serious impact on human health and serious consequences for the food business operator e.g. A US food business owner sentenced to 28 years in prison for knowingly shipping *Salmonella* tainted peanut butter to his customers, resulting in 9 deaths, 714 confirmed illnesses and causing one of the largest product recalls. (CDC, 2009).

Food safety is a shared responsibility and governments, the food industry and individuals need to do more to make food safe and prevent foodborne diseases (WHO 2015), and they also state that there remains a significant need for education and training on the prevention of foodborne diseases among food producers, suppliers, handlers and the public.

The WHO is working closely with national governments to help set and implement food safety strategies and policies that will in turn have a positive impact on the safety of food in the global market place (WHO 2015).

1.2 Food Safety Culture

Food Safety is not simple and despite numerous foodborne outbreaks worldwide resulting in foodborne illnesses, it remains a challenge to enforce scientifically validated safe food handling behaviours for food producers, processors, distributors, retailers and food service outlets.

To achieve food safety success, it means going beyond traditional training, testing and inspectional approaches to managing risks. It requires a better understanding of organisational culture and the human dimensions of food safety. To improve food safety performance of retail, manufacturing and food service establishments, you must change the way people do things.(Powell, Jacob and Chapman 2011).

The WHO (2006) identified five factors, which are primary contributors to foodborne Illnesses and these include; improper cooking procedures, temperature abuse, poor personal hygiene, cross contamination and buying from unsafe sources. (Powell, Jacob and Chapman 2011) believe that these human behaviours can be changed by thought and behaviour by the food business, with the right approach to creating a culture of food safety by applying the best science with the best management and communication systems.

A food business that has a strong food safety culture choses it because of the value it places on the safety of its customers and employees and they prioritise this over any other culture in the organisation, because cutting costs can be damaging to the business e.g. financial loses, bankruptcy, damage to brand identity and in some cases

imprisonment. A study conducted by (Abidin, Arendt and Strohbehn 2013) on 'Exploring the Culture of food safety, the role of organisational influences in motivating employees' safe food handling practices, revealed that more than 40% of non-compliance with safe food handling practices was due to poor organisational food safety culture.

An example of this is the Peanut Cooperation of America (PCA) *Salmonella* outbreak in 2009, company President Parnell was sentenced to 28 years in prison for knowingly shipping *Salmonella*-tainted peanut butter, which was linked to 9 deaths and 714 confirmed cases of illness (CDC, 2009).

Evidence found poor food safety cultures and a former buyer recalled a filthy plant with a leaky roof and windows left open, allowing birds into the building. The lack of food safety culture was most evident in the description the way the Peanut Cooperation dealt with finished product that tested positive for *Salmonella* spp. while shipping the product to their customer despite the positive test results (Leighton 2016).

(Griffith, Livesey and Clayton 2010) mention in their study on 'The assessment of food safety culture', that food handlers can only be as hygienic as the business, the leadership within requires, allows and encourages it to be and this is influenced by the facilities provided as well as the management systems and culture in place.

Food safety culture starts at the top and flows downward; Management support and commitment, system and processes and employee attitude and behaviour make it. Strong leadership skills and strong management are necessary to influence a positive food safety culture. Leadership deals with influencing people to follow, while management focuses on maintaining systems and processes. Barriers mentioned were lack of resources, time labour, financial and expertise (De Boeck *et al*. 2015).

In a separate study (De Boeck *et al*. 2018) on 'Food safety climate in Belgian food processing companies', mentioned that training is critical, training itself will not change behaviour and that even trained employees fail to execute certain tasks according to what they have been taught. That is why it is important to have manager support and reinforcement in the workplace for training to be effective.

For food safety training to be effective, employees must perceive that food safety and food safety training are valued in the organisation, which might be achieved by making resources available allowing regular training and retraining. Instead of reflecting that training is merely a formal administrative issue (Seaman and Eves 2010), (De Boeck *et al.*2018) agree and state that the expected goal of food safety training is to improve food handler's compliance with food safety guidelines. Whereas food safety culture focuses on proper food handling practices as a way of doing business.

Values, beliefs and attitudes regarding food safety is almost entirely dependent upon the knowledge, standards, motivation and leadership of the person in charge and how they communicate with and are trusted by staff (Powell, Jacob and Chapman 2011).

1.3 Food Safety Knowledge

Food handlers have direct contact with food and play a very important role in the prevention of food contamination. Research has shown that inadequate cooking improper time/temperature control and cross contamination have been implicated in food-borne outbreaks. It is difficult to establish the role of the infected food handler, but the transmission of food-borne pathogens to the public during food preparation is well known and lack of adequate food safety knowledge is one of the main causes (Greig, Todd, Bartleson, & Michaels, 2007).

Personal hygiene and good hygiene practices present the major preventative actions for pathogen transmission from food handling personnel to the final consumer.

A study was performed in three European countries, Serbia, Greece and Portugal (Smigic et al. 2016) with the aim of investigating and comparing the level of food safety knowledge among food handlers in restaurants, catering companies and takeaways. There were 377 food handlers involved. Results from the study indicated that there is lack of adequate knowledge related to adequate temperature of cooking, storing or holding food. Although a majority of food handlers knew what the required temperature inside a refrigerator is, only 41% of them answered that a given temperature of 13℃ is not adequate for storing cold food. This identifies that the participants still do not completely understand cold storage and its influence on microbial activities (Smigic et al. 2016).

Gaps in food safety knowledge was identified when food handlers were asked about food products and related food-borne diseases. Only 36% knew that smelling, tasting or visually checking food is not a guarantee that food is safe. This was one of the most concerning knowledge gaps determined from the studies conducted (Smigic *et al*. 2016) and (Gomes-Neves *et al*. 2007).

1.4 Allergens

A food allergy occurs when the body's immune system sees a certain food as harmful and reacts by causing symptoms – this is an allergic reaction.

There are 14 allergens which must be declared and include; Cereals containing gluten, Crustaceans, Eggs, Fish, Peanuts, Soybeans, Milk, Nuts, Celery, Mustard, Sesame seeds, Sulphur dioxide and Sulphites, Lupin, Molluscs (FSAI Allergens, 2018).

Food information for Consumers (FIC) Regulation (EU) No 1169/2011 requires that food allergens must be declared on prepacked foods and in December 2014, this was extended to include; S.I.No.489 of 2014 stating that food allergen information for non-pre-packaged food must be provided in written format to consumers (FSAI Legislation, 2018).

People with allergies can become very ill due to allergic reactions. In some extreme cases, this can be fatal. Results from a survey by the FSAI found that 1 in 10 adults in Ireland say that they have a food allergy or food intolerance (FSAI Press release, 2018).

In a press release on Monday 1st October 2018 the FSAI stated that Food Business Operators (FBO) are still not doing enough to provide written allergen information to consumers and are not complying with regulation EC 1169:2011 to ensure consumer health is protected. The FSAI advice line handled 64 consumer complaints about unavailable or incorrect written allergen information and not providing or providing in accurate written information to customers was one of the reasons closure orders were served on seven food businesses since September 2017 (FSAI News Centre, Allergens, 2018).

The FSAI completed a targeted audit of food businesses to determine the level of compliance with EU and Irish legislation relating to the provision of food allergen information on non-prepacked food in May 2017 (FSAI, 2017). Fifty food businesses selected randomly were audited against their compliance with FIC regulations, results revealed that there was a low level of compliance in providing proper written allergen information, 32% of FBO audited did not provide written information and 26 of the businesses audited supplied inaccurate or incomplete allergen information (FSAI, 2017). Out of the 50 business establishments audited, 44 (88%) food business establishments had findings that require corrective action and 6 (12%) had no findings and were fully compliant with the allergen information requirements specified in Regulation (EU) No 1169/2011 and S.I. No.489 of 2014 (FSAI, 2017).

Supporting businesses to do the right thing the FSAI provide a helpful Guidance note No.28 on Food Allergen Information for Non-Prepacked Foods in Ireland, along with an advice line, information booklets and free online Menucal (FSAI, 2018).

Thirty-seven of the 86 food alerts issued by the FSAI year to date have been in relation to undeclared allergens on labels of prepacked food by manufacturers (FSAI food alerts, 2018).

1.4.1 Consequences of non-compliance with FIC Regulation for allergens

The media have reported several deaths due to fatal allergen reactions in recent times, Jon di Paolo wrote in the Independent UK on Friday 28th October 2018, that on 17th July 2016 a 15-year-old girl died of anaphylaxis because Pret a Manger food labelling failed to warn her that one of their baguettes purchased at Pret a Manger at London Heathrow's Terminal 5.contained allergens, The baguette, which was manufactured to Pret specifications, contained sesame to which she was allergic. There was no specific allergen information or warnings on the baguette packaging or on the food display cabinet, which reassured the 15-year-old. The Pret a Manger complaints log between 17th July 2015 and 29th June 2016 showed nine cases of sesame-related allergy incidents also. (Independent UK, 2018).

On 8th October 2018, Sophie Evans wrote in the Mirror UK, just a year after the incident above about a further fatal incident. In December 2017, there was a second victim of Pret a Manger, a 42-year-old woman who died after she ate a super-veg rainbow flatbread. The flatbread was supposed to be dairy-free in fact contained dairy protein. The woman had a fatal allergic reaction to milk protein found inside the flatbread bought in a Pret store in Stall Street in Bath, Somerset. This was a guaranteed dairy-free yoghurt by Pret supplier CoYo and discovered to contain dairy protein (Mirror UK, 2018).

The Journal reported on the 26th October 2018 that two takeaway workers were convicted, after a 15-year-old teenage girl died following severe allergic reaction from a takeaway meal in the UK. On 30th December 2016, the girl left a note in the comments section of the order alerting the takeaway that she had a nut allergy, but the workers failed to take appropriate action. There was no appropriate systems or conditions in place to protect the girl or any other customer with a known allergy and on the 1st January 2017, the girl died (Journal, 2018). The owner and chef both denied the responsibility of the death of the girl, even though the owner had earlier pleaded guilty to food standards and health and safety offences and these were so extensive that the council issued them with an immediate closure order. There was little evidence of any attempt by the defendants to comply with advice and guidance issued to them by the local authority (The Journal, 2018).

1.5 Enforcement orders

Environmental Health Officers (EHO) routinely and regularly inspect food businesses, and they have the power to enter any premises without any warning given. Following the inspection, the FBO will receive a written report from the EHO outlining what needs to be improved and actioned within a certain period. An Improvement Notice is served in the event of a more serious issue and if this is not complete by the date given, then the EHO can seek an Improvement Order in the District Court. If grave or immediate danger to health a closure order is issued to the food business (HSE, 2018).

Using only the year to date data for 2018 the Food Safety Authority of Ireland have reported a total number of 83 enforcement orders issued by the HSE, 73 of which are closure orders, 7 prohibition orders and 3 improvement orders (FSAI, enforcement reports, 2018). These enforcement orders range across all sectors of the food industry and include; takeaways, canteens, restaurants, cafes, butcher shops, retailers, wholesalers, manufacturing plants, public house, slaughter houses, processors, cutting plant and food stalls. Some of the main reasons for these enforcement orders include; no HACCP in place, poor hygiene practice and pest control issues including sighting of a live rat, inadequate allergen information, lack of food safety knowledge and inadequate food safety training (FSAI enforcement reports, 2018).

1.6 Training, Development, Education and Learning

There is much confusion surrounding the terms "training", "education", "development" and "learning", to the point where they are often used interchangeably, it is often necessary to define and explain each of these in order to clarify the associated activities and desired outcomes within the organisation (Masadeh 2012). These are discussed in more detail below.

1.6.1 Training

Training can be described as a planned and organised activity aimed at modifying or developing the knowledge, skills and attitudes (KSA) of an individual enabling them to perform effectively in their current work role. Knowledge refers to what someone knows; Skills relate to what someone can do, Attitudes reflect how someone behaves. Expected outcomes of training are that the trainee should be able to perform specific tasks within a job. Methods associated with training are instruction, demonstration, practice and feedback and often used in conjunction with standard operating procedures (SOP's) (Garavan *et al,* 1997).

1.6.2 Development

Development can be described as the growth and improvement of an individual's abilities and skills, with a longer-term focus than training, involving a border subject matter and includes both formal and informal learning experiences. Development involves a combination of on the job and off the job learning experiences. Expected outcomes of development include time management, improved problem solving, interpersonal skills and relationship management. Methods associated with

development include role-play, case studies, outdoor development, presentation and discussion (off the job), action learning, mentoring, counselling and coaching (Costine *et al,* 2012).

1.6.3 Education

Education is aimed at developing knowledge and possibly skills and attitudes that enable the individual to perform effectively in their current or future roles. It includes methods such as lectures, guided reading, workshops and seminars. Expected outcomes are usually defined in academic terms e.g. qualification but may be related to a future role (Garavan *et al*, 1995).

1.6.4 Learning

Training, development and education have at least one thing in common says (Costine *et al,* 2012) they all involve learning. Learning is a process where individuals acquire knowledge, skills and attitudes. We can learn consciously (be aware that we are learning something new) or unconsciously (learn through the accumulation of experiences).

1.7 Training Methods

There are several types of training methods, which food business operators use to deliver food safety training within the food industry. Discussed in more detail below.

1.7.1 E-Learning

The E-Learning concept means the entire computer based educational tools or systems, which allow learners to get their education anytime and anywhere. E Learning offers the ability to share different kind of materials such as PDF's, word documents, slideshows and video, as well as the ability to conduct online virtual classes. E learning technologies can be used to make a course exciting, entertaining and challenging. Course content, should be updated to give the very latest information. E Learning offers a faster, cheaper and potentially better and alternative mode of learning to learners in a flexible time and place (Hammad *et al*. 2018). Courses can be designed in an interactive way that includes the fun of using different methodologies and technologies, like the multimedia and the games, which enhance the engagement of the trainee. Hammad *et al*. (2018) goes on to say that, using e learning surely enhances the ability of learning but also depends on the learning environment, knowing more about the target group is important in order to build the learner materials.

1.7.2 Blended Learning

Blended approaches use multiple methods to deliver learning, combining face to face interactions with online activities. A common approach features the delivery of theory-based content through e-learning, prior to actual participation in training event where the focus is on practical application (Cobb 2018)

1.7.3 In-House Training

In-House training is specifically suited to suit the business needs. Carried out within the food business to educate, develop and improve the employee's skills; it can be both practical based and theory based. It may be one of the most cost-effective solutions as there are no travel expenses or course payments. This is normally delivered through the businesses own HR division and staff (eLearning Industry, 2017).

1.7.4 External Training

Professionals outside of your organisation deliver external training; these professionals are skilled at not only at the subject of the training, but also at teaching. However, external trainers can be expensive, so not always a cost-effective solution for employers. The FSAI advise that it is important to ensure the training providers have experiences in the food industry, a background in food safety training and knowledge of how people learn and appropriate training skills (FSAI 2017b).

1.8 Food Safety Training

Several authors stated that the success of training programmes providing only information is unclear and that changes in improper food safety practices are not usually achieved. To avoid this problem, food safety training programs based on theoretical and practical activities have revealed to be important tools in which food handlers can put acquired knowledge into practice. The effects of food safety training on food handlers knowledge has been previously described, however, the information about the real impact on food safety by practical food safety training is scarce (Soares *et al*. 2013).

Both pre and post training support given by managers is an important element for food hygiene training to be effective, to motivate food handlers to enact the safe food handling practices learnt during training. A previous study explored the personal views of food handlers, their managers, and accredited training providers towards the provision and evaluation of food hygiene training in the south-west London region. It explored the pre and post training support given to food handlers and its effects on the attitude and behaviour of food handlers to enact safe food handling practices in the workplace. In total 70 telephone interviews were conducted. The findings from the study on 'Perceptions of hygiene amongst food handlers, managers and training providers', as stated by (Seaman and Eves 2010) demonstrated that most food industry managers are aware of their responsibilities to train food handlers, but often do not provide adequate support to promote the regulations of safe food handling practices or evaluate its effectiveness. Consequently, any positive effects gained from the food hygiene training programmes may last only a short time.

Effective training is essential to improve knowledge perceptions and should be offered to all food handlers. It needs to be specific according to the function that the food handler carries. Training food handlers at the workplace is a way to approximate the theory of the practice and ensure that they will know what to do in their workplace. An effective model of training is selective, strengthens the knowledge, avoid irrelevant information, accommodate the education levels of the food handlers, use languages according to food handler's nationality and encourage positive attitudes (Abdullah Sani and Siow 2014). The content of the information, the form of communication and who communicates are determinants (Zanin et al. 2017).

Observations made during a study conducted by (Rowell *et al*. 2013) on the 'Influence of food safety training on grocery store employees' performance of food handling practices'. Determining the effectiveness of manager training and how the training affected the grocery stores performance on hot and cold self-service bars, suggested that the training barriers, such as time constraints, communication and inadequate resources, need to be taken into consideration. The researchers noted that there were barriers in many of the stores in the study and therefore suggested that it would be beneficial for future studies to examine what affect these barriers might have on employee and performance.

The House of Commons Agriculture Committee on Food Safety (HCACFS, 1998) noted that medium and smaller-sized businesses do not have the same level of food safety expertise as larger premises and even when undertaken, training may not be of enough quality. Safe food handling and the effective implementation of training

programmes depends essentially on well-trained, knowledgably and positive minded managers within food businesses (Seaman 2010).

Other studies have also noted management commitment as an important element of ensuring good hygienic standards, citing both a lack of management awareness and negative attitudes towards hygiene among the top five factors contributing to a business representing a significant or high risk to public health (Seaman and Eves 2006). Unless managers can fully appreciate the inherent risks involved in their food-handling practices, they are unlikely to recognise the need to train or the contribution that training can make to the food industry and society as whole. To transfer skills after training employees must have the opportunity to practice and refine them, otherwise the knowledge learned will likely be forgotten (Seaman 2010).

Studies indicate that very little research has been carried out to determine the barriers and problems that may prevent food handlers from implementing good practice (Clayton *et al*. 2002). Research conducted by Clayton *et al*. (2002) in a study on 'Food Handlers' beliefs and self-reported practices' showed that the main barriers to food safety behaviours were lack of time, staff and equipment and cost. The study demonstrated that the presence or absence of tools, equipment, supplies, time and other resources might influence perceptions about the value or importance of training, which subsequently influenced motivation to attend and perform during training.

In their own research (Seaman and Eves 2006) argued that knowledge imparted by traditional training course cannot be assumed to translate into desired changes in behaviour. As well as the appropriateness of material conveyed during a course, influences pre – post training is suggested as factors that influence the extent to which desired behaviour changes take place. Motivation from managers and selection of an appropriate course are important in determining the attitude that the trainee has entering training and adequate support needs to be given to the trainee once training is complete. In this period, mentoring the trainee in translating knowledge into practice is important.

1.8.1 Food Safety Training a Legal Requirement

Food Safety Training is a legal requirement for everyone in the food industry. All food business operators are to ensure that, "*food handlers are supervised and instructed and/or trained in food hygiene matters commensurate with their work activity*". In accordance with the European Regulation (EC) No. 852/2004 on the Hygiene of foodstuffs (EC 2004) and referenced in Regulation (EC) No. 853/2004 laying down specific hygiene rules for food of animal origin (EC 2004).

The responsibility for the supervision and training of staff lies with the proprietor of the food business. From the 1st January 2006, staff responsible for the development and maintenance of the food business Hazard Analysis Critical Control Point (HACCP) system must have received adequate training in the application of the HACCP principles (FSAI, 2015A). Food safety training is essential to the commercial viability of a company it assists companies in becoming more efficient, competitive and profitable, raises performance standards, reduces wastage, assists in the production of safe food, complies with food legislation requirements, promotes a good company image, increases staff morale and improves staff retention.

The implementation of knowledge acquired during food safety training requires the provision of the appropriate resources and motivational support by management. Results of several studies have shown no direct link between training, knowledge and practice, unless training is relevant to what trainees do in their everyday jobs and is supported by management (FSAI 2015A).

Smigic *et al*. (2016) states that training programs should not be performed only to satisfy legal requirements and to provide basic and general information. They should serve as a major tool to communicate with food handlers, by simple and targeted explanation related to specific identified issues.

The FSAI say that for food safety training to be successful a recommended training approach is required that proactively encourages the implementation of skills and knowledge in the food business; it will require the involvement and commitment from management, the trainer and the trainees.

1.8.2 Inspection of Training

Enforcement Officers (EHO's) may assess food safety training when conducting a food safety inspection in a food business premises. They may observe hygiene practices and verify food safety knowledge of staff. They may also enquire as to whether the food business maintain food safety records or ask about the food safety training that has been provided (FSAI 2007)

1.9 Food Safety Training Guides

The Food Safety Authority of Ireland have training guides that assist food businesses meet their legal obligation (FSAI 2015ʙ)

- **Level 1 Induction Skills** – Specifies the standards expected of employees who have been working less than three months in the food business. It is split into two stages and outlines what all employees must be able to demonstrate before they start handling food and what employees must be able to demonstrate within 1 month of starting work (FSAI 2015ʙ)

- **Level 2 Additional skills** – describes the standards expected of those who have been working more than 3 months, covering what the employee is expected to demonstrate within 3-6 months when working in high-risk area and 6-12 months when working in a low risk area (FSAI 2015ʙ)

- **Level 3 – Food Safety Training for Management** - outlines the food safety skills that should be demonstrated by managers and supervisors in food businesses (FSAI, 2016)

The FSAI guides detail the food safety skills that food handlers and non-food handlers should be able to demonstrate in the workplace. They contain relevant information; checklists and records that can help businesses meet their legal requirement for training and requires companies to have the necessary in-house food safety and training expertise if designing, developing and delivering their own in-house training. Another training option would be to recruit the services of a training provider to either design or deliver training specifically for the business needs, use of external training

providers, or e-learning programmes that are used in conjunction with management

support and follow up (FSAI, 2015A).

The FSAI also have a "Safe Food to Go" booklet which is available in eight different

languages, English, Chinese, Czech, Latvian, Lithuanian, Romanian and Polish. It can be

used as an aid to basic food safety training outlining the food safety skills that food

handlers must be able to demonstrate before they start handling food in the

workplace (FSAI, 2017).

1.9.1 National Standards Authority of Ireland

Food Standards developed by the National Standards Authority of Ireland (NSAI)

Irelands official standards body include:

- **I.S.340:2007 and AMD 1:2015 "Hygiene in the catering sector",** provides

  guidance to compliance for the food hygiene and the food information to

  consumers regulations for the operators of food catering establishments and is

  available in Chinese, Irish and polish languages (NSAI, 2018).

- **I.S.341:2007 and AMD 1:2015 "Hygiene for food retailing and wholesaling",**

  provides guidance to compliance for the food hygiene and food information to

  consumers regulations for the operators of food retail and wholesale

  businesses (NSAI, 2018)

1.10 Accredited Food Safety Training

Several training programmes provide accredited food safety training. All though it is not mandatory, Food businesses can send their employees on these programmes to gain certification. As discussed below.

1.10.1 Food Safety Authority of Ireland – Food Safety and You

The FSAI Food Safety and You is a three-hour induction-training programme for employees in all sectors of the food industry. Designed to be delivered by supervisors/managers/trainers to their staff within their own food business. The FSAI Food Safety & You is based on the skills outlined in the FSAI Level 1 induction skills. The training skills workshop is certified by the FSAI. Participants who attend and complete the assessment will become approved trainers to deliver the FSAI induction programme. The duration of the course is two days and cost €300 per person. (FSAI Food Safety and You, 2018).

1.10.2 The National Hygiene Partnership (NHP)

The NHP offers The Management of food Hygiene Programme, *The Essential Guide to HACCP Compliance;* designed to enable food businesses to conform to EU Food Safety Legislation. This programme forms an integral part of the national drive to improve food safety standards throughout the entire food industry.

Based on the NSAI I.S. 340:2007 and I.S. 341:2007 as mentioned above and satisfies the requirements for the FSAI Level 3 guidelines in Food Safety Skills for Management (NHP, 2017).

The course is delivered over 5 days. On completion of the programme, participants are required to take a two-hour written exam. If successful participants will be trained both in the principles and practices of effective food hygiene management, gaining the knowledge and skills necessary to formulate and implement a comprehensive Food Safety Management System (FSMS) in the workplace and to organise the necessary training for their staff.

1.10.3 Quality and Qualifications Ireland (QQI)

The QQI are an Independent state agency responsible for promoting quality and accountability in education and training services in Ireland. Established in 2012 by the Qualifications and Quality Assurances (Education and Training) Act 2012 and has taken over the functions of;

- National Qualifications Authority of Ireland (NQAI)
- Further Education and Training Awards Council (FETAC)
- Irish Universities Quality Board (IUQB)
- Higher Education and Training Awards Council (HETAC)

The QQI offer Level 4, 5 and 6 courses on the Irish National Framework of Qualifications, which are linked to the FSAI levels 1, 2 and 3.

Before a programme can be delivered to a QQI accreditation, providers are continually monitored and reviewed by the QQI (QQI, 2012).

1.10.4 Environmental Health Association of Ireland (EHAI)

The EHAI are Irelands leading provider of accredited food safety training in partnership with other training professionals in Ireland, with a focus on improving food safety knowledge and standards to the benefit of businesses, workers and the public. The EHAI offers two courses, The EHAI Primary Course in Food Safety and the EHAI refresher Course in Food Safety. Once a pass of 50% is achieved for the primary course the certificate is issued and valid for 5 years, once having completed a food safety programme within the last five years this can be refreshed and updated with the EHAI Refresher Course Certificate, once a pass of 50% is achieved this is valid for 3 years (EHAI, 2018).

1.11 Objectives

The purpose of this study is to:

- Identify what methods of food safety training are used within the food industry

- Identify the barriers and problems that may affect the outcomes of the food safety training

- Identify what recommendations could be made to overcome these barriers and

- To identify what food businesses are currently pursuing in order to develop and improve their food safety training

2. METHODOLOGY

2.1 Questionnaire design

A survey was generated on Survey Monkey, which consisted of 22 questions (as per Annex. I). the survey was designed to collect data on Food Safety Training throughout the food industry and to examine aspects such as: what training is being provided? Who delivers it? What methods were trainers using? Etc. In addition, it sought to identify potential barriers that may affect the outcome of training, and to collate recommendations from the industry on how training could be conducted more effectively.

The survey was aimed at Managers, HR Managers, Technical/Quality Managers, Chefs and those individuals who were responsible for organisation and/or delivery of the training within a food business. In total 171 responses were collected by Survey Monkey electronically using Web links, Email and Social Media (Facebook and LinkedIn) during the period from October to December 2018. In addition, the survey was posted on International Food Safety and Quality Network (IFSQN) to gather wider international views on food safety training, in addition to the 171 responses from the survey, a further ten comments were made on the IFSQN. Face to Face discussions with several trainers (n=5) were also conducted and documented, to identify what avenues they were currently pursuing in order to further develop their training methods and material.

2.2 Data Analysis

The responses from these 171 questionnaires were analysed by exporting the results from Survey Monkey to an excel file. All questions were analysed individually and values for total responses, manufacturing, retail and food service were included. Discussions with trainers and comments from the IFSQN were documented.

3. RESULTS

3.1 Survey Monkey Questionnaire

"Food Safety Training with a focus on the potential barriers that my impact the

effectiveness of the training outcomes" (See Annex. I.)
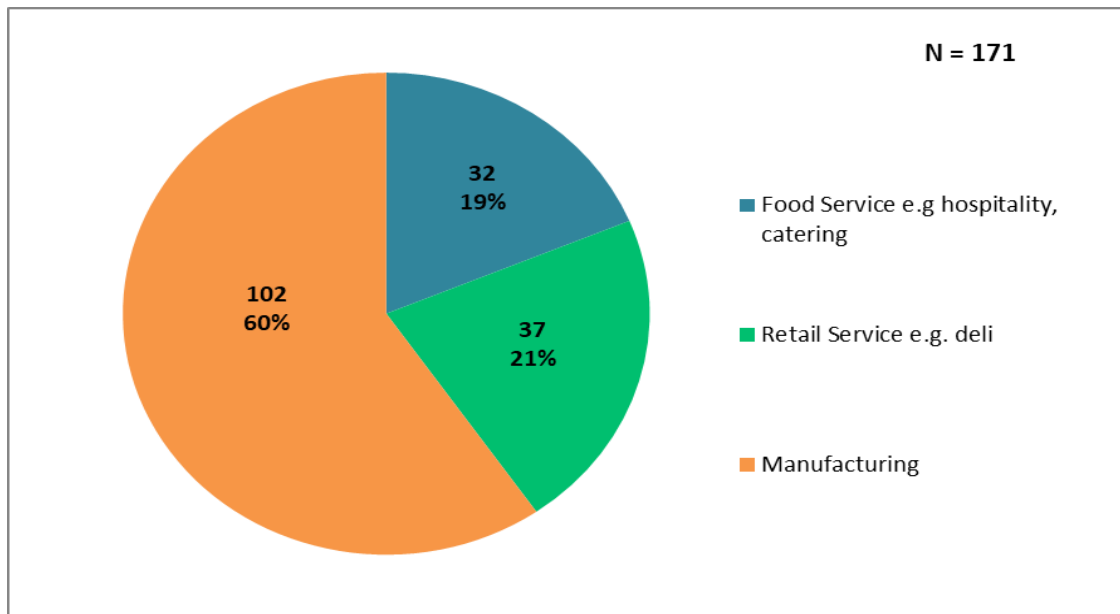
Figure 1. **Identification of associated categories of work for all of the 171 Food**

Industry Sectors respondents Surveyed.

The majority of individuals surveyed (n=171) in this study were from the

manufacturing sector (60%), followed by the retail (21%) and food service (19%).

3.1.2 Examination of Food Safety Training, Levels and Methods of provided

Survey Question 2. Do you provide food safety training for your employees?

(n=170)	YES	NO
Manufacturing (101)	93 (55%)	8 (4%)
Retail (37)	37 (22%)	n/a
Food Service (32)	31 (18%)	1 (1%)
Total	**161 (95%)**	**9 (5%)**

- **Only 170 (99%) of individuals out of the 171 completed this question**

<u>Table 1.</u> **Examination as to whether Food Safety Training is provided to employees in the food businesses that the 170 respondents worked in.**

The table indicates that 95% of respondents do provide Food Safety Training for employees while 5% do not; it identifies who said yes or no for each sector.

Survey Question 3. If yes, what level of food safety training is provided?

(n=167)	Level 1	Level 2	Level 3	All 3 levels	Other
Manufacturing	44	34	15	38	14
Retail	14	9	7	23	1
Food Service	9	7	7	7	3
Total	**67 (40%)**	**50 (30%)**	**29 (17%)**	**75 (45%)**	**18 (11%)**

- Only 167 (98%) individuals out of the 171 completed this question, participants had the choice to answer all options if applicable
- 'Other' Annual refresher training, HACCP, Site specific, Allergen awareness, cleaning chemicals, internal GHP, EHAI

Table 2. The Level of Food Safety Training provided to employees by the respondents were they work.

The table gives a breakdown of the level of training provided to employees in the

respondent's workplace (n=167) manufacturing (99), retail (37) followed by food

service (31).

Survey Question 4. What method is used to deliver your food safety training?

Method of Training - First option			
(n=167)	**Online/eLearning**	**In-house**	**External**
Manufacturing	8 (5%)	75 (44%)	9 (5%)
Retail	17 (10%)	20 (12%)	4 (2%)
Food Service	4 (2%)	19 (11%)	4 (2%)
Total	**29 (17%)**	**114 (68%)**	**17 (10%)**
Method of Training - Second option			
Manufacturing	13 (8%)	9 (5%)	49 (29%)
Retail	5 (3%)	13 (8%)	12 (7%)
Food Service	2 (1%)	5 (3%)	15 (9%)
Total	**20 (12%)**	**27 (16%)**	**76 (45%)**
Method of Training - Third option			
Manufacturing	9 (5%)	N/A	1 (0.5%)
Retail	4 (2%)	1 (0.5%)	9 (5%)
Food Service	4 (2%)	N/A	1 (0.5%)
Total	**17 (10%)**	**1 (1%)**	**11 (7%)**
Overall total	66 (39%)	142 (85%)	104 (62%)

- **Only 167 (98%) individuals out of the 171 completed this question, participants had the choice to answer all options 1st, 2nd, 3rd if applicable**

Table 3. Examination of methods used by food businesses to deliver training to employees.

The table gives a breakdown of the different methods of training provided by food businesses (n=167) manufacturing (99), retail (37) food service (31) to train employees. The 'first option' is their preferred method, highlighting that In-house training (68%) is the preferred method of training overall, a reason given for this was that it could be tailored to the business's needs.

3.1.3 Examination of the delivery of Food Safety Training within the Food Industry

Survey Question 7. If an external trainer is used, is the food safety training delivered onsite or offsite?

(n=154)	External	Onsite	Both
Manufacturing	9	52	29
Retail	14	10	10
Food Service	4	15	11
Total	27 (18%)	77 (50%)	50 (32%)

- **Only 154 (90%) individuals out of the 171 completed this question**

Table 4. Examination as to where food safety training is delivered if an external trainer is used to train employees.

The table indicates that for respondents (n=154) manufacturing (90), retail (34) and food service (30) food safety training is delivered externally (18%), onsite (50%) and both (32%) when an external trainer is sourced.

Survey Question 8. If the training is delivered onsite who delivers the training?

(n= 166)	Qualified food safety trainer	Experienced member of staff	Member of management	Other
Manufacturing	69	39	23	6
Retail	23	6	8	1
Food Service	28	5	3	2
Total	**120 (72%)**	**50 (30%)**	**34 (20%)**	**9 (5%)**

- **Only 166 (97%) individuals out of the 171 completed this question, participants had the choice to answer more than one option if applicable**

- **'Other' one person is all three, train the trainer personnel, food safety manager**

Table 5. Examination as to who delivers the Food Safety Training to employees within the respondent's work place.

The table identifies who delivers food safety training onsite to respondents (n=166) manufacturing (99), retail (36) and food service (31) it highlights that 72% of food businesses have a qualified food safety trainer to conduct the training.

Survey Question 6. What is the average duration of the training?

(n= 168)	<1hour	2 hours	Half Day	Full Day	Other
Manufacturing	19	49	22	14	6
Retail	5	12	10	11	1
Food service	7	8	10	6	2
Total	**31 (18%)**	**69 (41%)**	**42 (25%)**	**31 (18%)**	**15 (9%)**

- **Only 168 (98%) individuals out of the 171 completed this question participants had the option to choose a number of options**

- **'Other' this will depend on type and level of training provided**

Table 6. Respondent's average duration of Food Safety Training provided to employees in their workplace.

The table highlights from (n=168) manufacturing (100), retail (37), food service (31), that 41% on average spend 2 hours delivering food safety training.

Results also indicated that refresher training is carried out by 82% of food businesses approximately every 1-2 years or when performance indicates so.

Survey Question 20. Are competency tests carried out to evaluate the food safety knowledge and basic skills of the trained employee?

(n=169)	Yes	No
Manufacturing (102)	85	17
Retail (36)	28	8
Food Service(31)	19	12
Total	**132 (78%)**	**37 (22%)**

- **Only 169 (99%) individuals out of the 171 completed this question**

Table 7. Examination to whether food businesses carry out competency assessments to evaluate the food safety knowledge and basic skills of their trained employee.

This table indicates that 78% of respondents (n=169) do provide competency assessments for employees while 22% do not; it gives a breakdown per sector as to who said yes and no.

Survey Question 18. Are there enough resources to carry out training when required?

(n=170)	Yes	No
Manufacturing (102)	73	29
Retail (37)	32	5
Food Service (31)	25	6
Total	130 (76%)	40 (24%)

- **Only 170 (99%) individuals out of the 171 completed this question**

Table 8. Examination as to whether or not there is enough resources in the respondent's food business to conduct food safety training when required.

The table identifies that 76% of food business (n=170) say they have the resources to conduct training while 24% say they do not.

Survey Question 19. If no, what are the reasons for this?
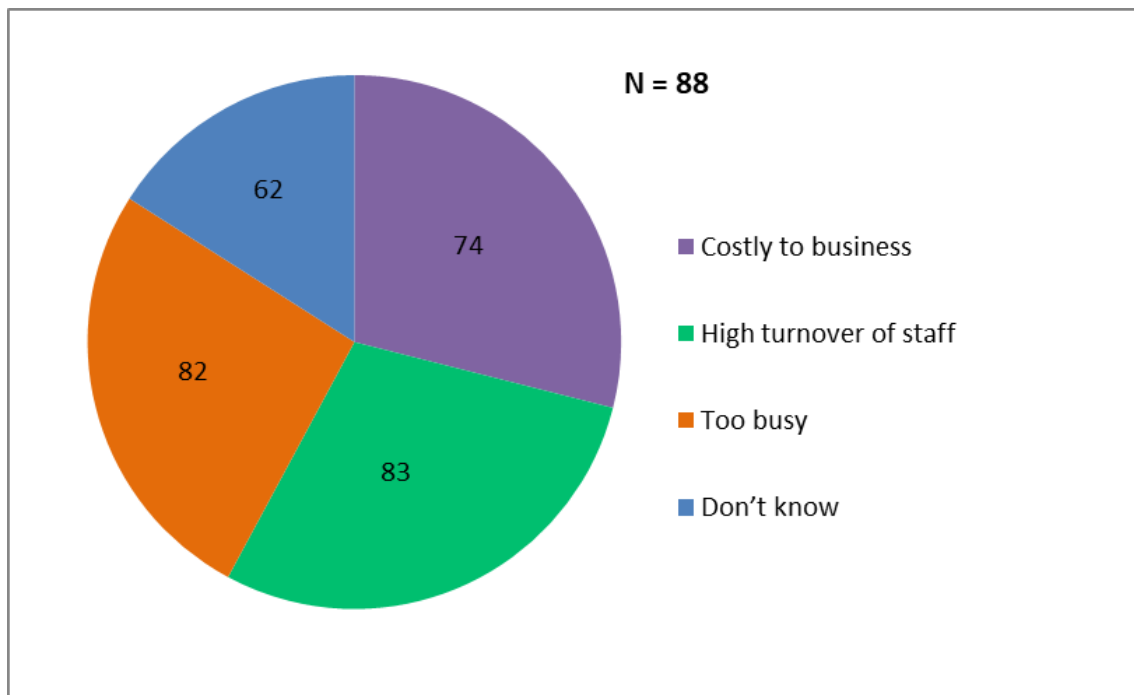
- **Only 88 (51%) individuals out of the 171 completed this question, participants had the choice to select one or more of the following reasons above, '1' being their main reason.**

<u>**Figure 2.**</u> **Respondent's reasons for not having resources to carry out food safety training when required for employees.**

This chart indicates that (n=88) of respondents did not have resources due to high turnover of staff (83) and too busy (82).

3.1.4 Examination in to online/eLearning training (if applicable to the business)

Survey Question 9. After completion of the online/eLearning training, did it prove to be effective through trainee's work performance/knowledge?

(n=76)	Yes	No
Manufacturing (34)	20	14
Retail (27)	24	3
Food Service (15)	10	5
Total	**54 (71%)**	**22 (29%)**

- **Only 76 (44%) individuals out of the 171 completed this question**

Table 9. Examination as to whether respondent's online/eLearning training method was reflective through the trainee's work performance/knowledge.

This table indicates that 71% of participants said online/eLearning training was reflective while 29% said it was not.

Respondent's perception as to why the online/eLearning training method may not have been reflective through the trainees work performance/knowledge.

Individuals (n=61) from sectors manufacturing (31), retail (16) followed by food service (14) have the perception that language is a possible barrier, along with no interest among staff and a lack of understanding.

Survey Question 11. How do you think online/eLearning training could be improved for your business?

N=(83)	Delivered in more languages	Better software	Blended Learning	Don't know
Manufacturing	10 (12%)	10 (12%)	20 (24%)	8 (10%)
Retail	10 (12%)	6 (7%)	13 (16%)	2 (2%)
Food Service	7 (8%)	7 (8%)	9 (11%)	1 (1%)
Total	**27 (32%)**	**23 (28%)**	**42 (50%)**	**11(13%)**

- **Only 83 (49%) individuals out of the 171 completed this question, they had the choice to answer more than one option if applicable**

Table 10. Respondent's perception as to how online/eLearning training may be improved.

The table indicates the responses per food industry sector, for ways in which they perceive online/eLearning training may be improved.

3.1.5 Examination of non-national employees and perceived barriers in Food Safety Training

Survey Question 12. Is there non-nationals employed in your business?

(n=170)	YES	NO
Manufacturing (102)	85 (50%)	17 (10%)
Retail (36)	29 (17%)	7 (4%)
Food Service (32)	30 (18%)	2 (1%)
Total	**144 (85%)**	**26 (15%)**

- **Only 170 individuals out of the 171 answered this question**

Table 11. **Respondents as to whether or not Non-nationals are employed in their businesses.**

This chart indicates that 85% of participants do have non-nationals employed in their work while the other 15% do not.

Survey Question 13. If yes, what is the most common language used?

(n=147)	Polish	French	Chinese	Romanian	Other
Manufacturing (86)	47 (38%)	1 (1%)	2 (1%)	9 (6%)	47 (32%)
Retail (31)	23 (16%)	1 (1%)	3 (2%)	4 (3%)	9 (6%)
Food Service (30)	17 (12%)	0	1 (1%)	3 (2%)	14 (10%)
Total	**86 (58%)**	**2 (1%)**	**6 (4%)**	**16 (11%)**	**70 (48%)**

- **Only 147 (86%) individuals out of the 171 completed this question, they had the option to choose more than one language if applicable**

- **'Other' Lithuanian(12), Slovakian(3), Croatian(1), Hungarian(4), Moldavian(2), Brazilian(1), Arabic(1), German(1), Italian(1), Russian(6), Portuguese(8), Pakistani(1), Spanish(2), Vietnamese(1), Thai(1).**

Table 12. Examination into the most common language used if participants have non-national employees employed in their work.

This table identifies that Polish (58%) is the most common language used amongst the respondents.

Survey Question 14. What level of English do your non-national employees have?

N = 148

7% 10	Very little
57% 85	Basic
33% 48	Fluent
2% 5	Don't know
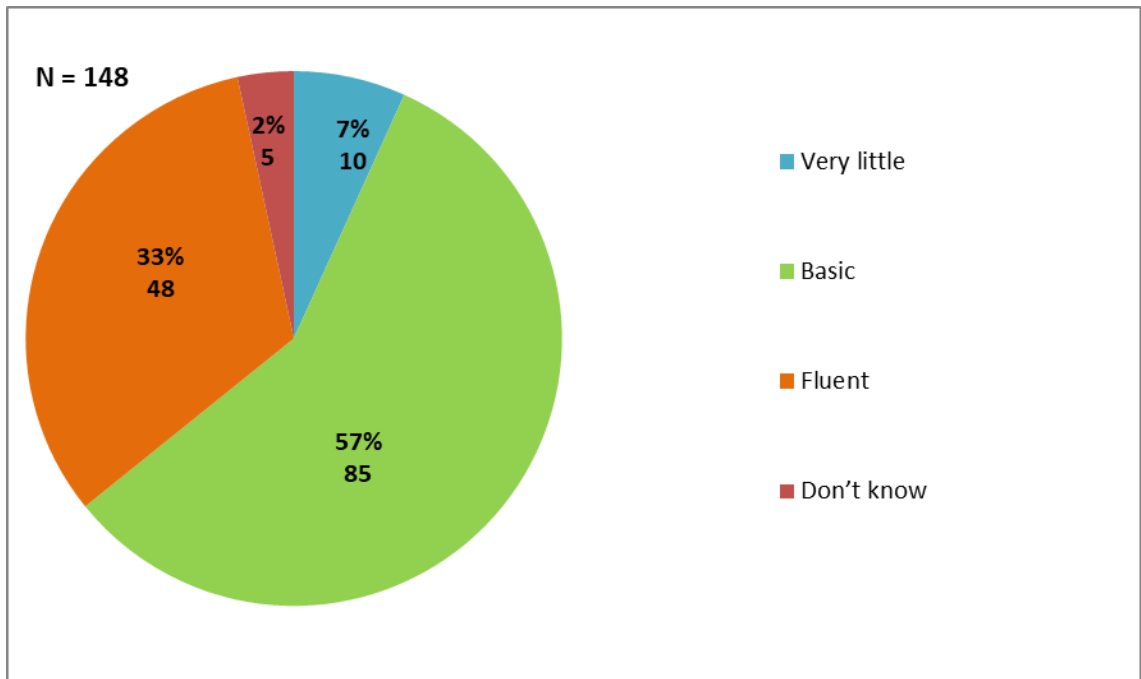
- **Only 148 (87%) individuals out of the 171 completed this question**

Figure 3. **Examination into the Level of English of non-national employees employed in the respondent's work place.**

The chart indicates that 57% of respondents indicate that non-national employees have basic English, Manufacturing (55), retail (19) and food service (11).

Survey Question 15. Do you consider language to be a barrier in the effectiveness of food safety training outcomes?

(n=160)	Yes	No	Don't Know
Manufacturing (95)	61	31	3
Retail (35)	19	13	0
Food Service (30)	17	12	3
Total	**97 (60%)**	**57 (36%)**	**6 (4%)**

- **Only 160 (94%) individuals out of the 171 completed this question**

Table 13. Respondents' perception to whether or not language is a barrier in the effectiveness of Food Safety Training outcomes.

This chart indicates that 60% of respondents perceive that language may be a barrier in the effectiveness of food safety training outcomes; they say that there is a general lack of understanding when training is conducted in English.

3.1.6 Examination into respondents perceived barriers and recommendations

Survey Question 21. In your opinion, what do you consider the biggest barrier in non-effective food safety training?

"No interest" and a "Lack of Understanding" where two of the main perceived barriers identified from the respondents from 166 individuals out of the 171 who answered the question.

Survey Question 22.

Further responses and recommendations given by the three food industry sectors below. For full list (See appendix II.)

"More than training, it is a culture change that is required which must be implemented by all, especially from top down"

"Retention of staff"

"Smaller companies may not have the resources to understand or deliver the required training needed to be compliant"

"One thing we have incorporated this year in our training are more images of what we see daily that is not acceptable and can result in a food safety risk and less wordy slides. Also several videos were included so as to meet all the learning styles of the trainees"

"If it was made more interesting rather than technical. Staff would show more interest"

"Non-Native Speaker trainers are available but sometimes lack of understanding the problem and support from management's side"

"I don't see any issue with Food Safety Training or how it could improve, it will always fail if people are not interested - mainly agency staff - they would work one day here, another day somewhere else. Generally Trainers are available but there are difficulties in getting staff released for training"

"No interest can sometimes be because employees don't understand how it applies to them. They see it as - we've always done it this way and nothing has ever happened so why should we care"

"I believe greater focus should be placed on food safety training in all sectors of food production in order to alleviate the current issues with allergens in particular. Operators must understand the seriousness of cross contamination in order to help us eliminate these errors"

"The lack of interest it is a big Issue. Also, the lack of understanding why food safety is important"

"Companies need to ensure a basic understanding of the English language is a pre requisite to employment if food safety training is to be effective especially with non-national candidates"

"Management not empowering employees who in turn leave, creating high turnover. Lack of funds made available for training is also an issue"

3.2 Responses from International Food Safety & Quality Network (IFSQN)

Additional responses from the IFSQN (10) on their perception on food safety training, potential barriers and recommendations – includes responses from Canada (1), United States (5), Philippines (1), United Kingdom (2) and France (1).

Posted by Diane Fox - 18 October 2018 - 07:04 PM

Good evening all,
I am currently completing my MSc in Food Safety Management and in the process of circulating my survey; it is based on Food Safety Training with a focus on the potential barriers that may impact the effectiveness of the training outcomes. I would be interested to hear your comments and suggestions on the research topic and if any of you were willing to participate in the survey, I will forward the link. Thanks

(1) Posted 18 October 2018 - 07:24 PM (Canada)

"Wow, if you could figure out how to get employees to buy into the training in this field that would be fantastic!

How to keep the same material year after year relevant and timely so that employees don't disengage because this is the 10th time in 9 years they've heard all of this before".

(2) Posted 18 October 2018 - 09:23 PM (United States)

"Language and culture barriers are big issues. If paper-based learning is used, comprehension is another. Once you are passed those barriers, buy-in/employee motivation is a major struggle".

(3) Posted 19 October 2018 - 02:05 PM (United States)

"I am interested to see if my barriers are the norm (although judging from the above comments, they seem to be)".

(4) Posted 22 October 2018 - 07:26 AM (Philippines)

"If on the "perspective" of the trainee, how would she/he like to be trained? For the training techniques, there will be 10 (classroom), 20 (coaching) and 70 (OTJ), more often, food safety training in many companies are being restricted in classroom (or same with E-learning), hence only 10% retention.
I may also add if the classroom if they preferred the mostly they listen or there are group work or experience sharing to avoid the usual mostly "theoretical", the problem mostly is how it can be applied to real-life settings as much as possible".

"I have found the most success in programs where I can get the team to take ownership of the program. If they feel as though their actions are making an impact or if they feel as though they are able to shape how the program is being built then we are able to really get the group engaged".

"Interesting topic as I am Polish, working in UK as technical assistant with years of experience in food safety (2 more years to finish my MSc in food technology) I recently became a trainer in my company. In addition, to be honest struggling with creation of training program that would work and change the culture.

Lack of support from management especially to release people from production for training and constant excuses of busy periods. Lack of interest from people...
Not everyone have/use a computer or maybe it is only their excuse not to do online training...cannot force them though...
We have polish-speaking workers therefore; I can provide training in both languages, which is handy".

"Our last training session was Jeopardy. It was a refresher course on GMPs, pest control, allergens. I divided the class into 3 teams each having a service bell in front of them. Everyone named their teams and I had a scorekeeper and some dollar store gifts. We reviewed the training material and then played.

It went like this - Name one thing we use for allergen control.
(Someone - omg, she just old us)
Team one hits bell - Green containers!
Me - sorry no -
Team two hits bell - What is green containers?
Me - that is correct!
The bells were going off like crazy and there was lots of laughter (and learning), senior management could hear all the commotion and came into to watch for a bit. I was told that that was the most engaging, interactive training session ever witnessed".

"We shifted gears this year after doing refresher training every year. We gave a simple written test and were appalled at the low scores from some of the employees who have been here for many years. We rewarded those who scored 100 with gift cards. Others were retrained. Our plan is to continue training but offer a variation of the test once a year and think of new ways to engage the crew".
Jeopardy is a great idea!

"I was thinking of introducing competency assessment
Few variations - basic GMP, for procedures and allergen control
Based on the result decide if refresher training is needed
Annual refresher is impossible to be arranged and noticed they all say 'yes I know'...
So why don't they follow the procedures?"(Appendix. III)

A combination of different methods works the best. A big advantage of a trainer

(thus not by e learning) is the interaction with the group and the discussions".

3.3 Results of Discussions with Trainers

Documented discussions that were conducted with several trainers (n=5), identifying what training they currently provide and what avenues they were currently pursuing in order to further develop their training methods and material.

3.3.1 External Training & Consultancy Company – Documented December 2018 – Discussion with Trainer/Consultant

This trainer believes that there is a necessity for food safety trainers to adopt on-line training options as this allows more flexibility to businesses. Some retailers provide their food safety training on-line. It allows training to fit in with each individual's working schedule. It would be interesting to note which is more effective in the transfer of learning. Like all training though, the embedding of learning in work practices takes place through effective supervision, coaching and provision of regular feedback back by managers.

This training/consultancy company is in the process of supporting retailers in improving their Pest Management System and Communication Process to prevent closures, as there were at least three retailers closed down last year due to pest issues. Prosecutions and closures are on the increase and the authorities seem to be taking a zero tolerance approach, which is very concerning.

3.3.2 Leading Meat Manufacturing Company - Approximately 300 employees

Documented December 2018 – Discussion with Technical Manager

Current Training

Day 1. Induction – 4hours, DVD and induction package containing a copy of all policies. Including induction to HACCP, product quality, health & safety and traceability.

Day 2. Full factory tour, trainee is 'Buddied up' with an experienced member of staff where they receive a full day training. Train the Trainers monitor and assess the 'Buddy's' to ensure they are delivering effective on the job training.

A four-week training programme - for the trainee is put in place with the 'Buddy' where on the job training will be completed. Once these four weeks are completed, the head trainer is notified who will then assess if the trainee was successfully trained and understands the SOP's, if the both the trainer and trainee are satisfied with the training then the trainee signs of the SOP's electronically.

Annual Refresher Training - Induction, policies and SOP's are completed all over again.

External Training – Sourced if required, e.g. 15 key employees from different areas throughout the business where send on a two-day HACCP course to give them a good understand of HACCP.

New to the business – Is the 'Be the Positive' (BTP) training, which consists of four key elements; Communication, Coaching, Feedback and Time Management. This is for managers within the business who deliver training and/or supervise staff, on constructive ways of how to be at work and to able to give both positive and negative feedback to employees.

Training Application – there is a new training application for anyone who has a smart phone in the company, this provides access to all policies including, allergen and glass breakage procedures, also a newsfeed which shares if there were visitors onsite or an upcoming BRC audit etc.

Employees have the opportunity to develop their skills and/or if they would like to take up something new the company will support and invest in employee's further education. The company are in the process of developing their procedures in three different languages and include; English, Polish and Lithuanian. It is a very established business and do not have huge problems with language.

3.3.3 Bakery Manufacturing Company – Approximately 50 employees

Documented November 2018 – Discussion with Quality Manager

Training provided – Classroom training, materials used are power point and procedures. Level 1 and Level 2 training is conducted separately, Level 3 training is not provided. There are a number of different nationalities employed in this company and include Romania, Italian, Brazilian, Mexican, Chinese, with the majority of employees been Chinese, Latvian, Polish, South African, Nigerian, Croatia and Serbia.

All employees have a good level of English (advanced) apart from the Chinese whose English would be below the basic level.

A translator is required for Chinese employees and because the company do not have the resources for this another member of staff with better English has to assist the trainer. Procedures are translated through google translator.

Refresher training - is provided more frequently due to communication barriers and the trainees have to be pulled aside from time to time to go through procedures again.

Recommendations - The trainer recommends that if virtual academy training was in employee's language, this may make it easier.

3.3.4 Leading Retailer – Documented November 2018 - Discussion with HR Trainer/Organiser x 2

Training Provided – Online and Virtual Academy training, which provides Level 1 and Level 2 food safety training, deli training and Allergen training.

Level 3 training classroom training is provided for managers, supervisors and senior members of staff.

New to the business for 2019 – Introduction of new modules through Virtual Academy, Butchery, Deli, Bakery and Fruit & Vegetable departments.

The new modules consist of Visuals, animations and aviators and include assessments at the end of each section.

Deli Academy – Module Level 5 QQ1 certified in Food Safety and HACCP

The deli academy is a set of six modules, which will be available for stores to send their employees on, Food Safety and HACCP is a module within the academy and employees will have the opportunity to complete and become QQI certified.

It includes a blend of classroom learning, practical learning, eLearning, Independent learning and work based learning and assessments.

Retail Apprenticeship – Module Level 6 QQI certified in Food Safety Operations and HACCP.

Working in conjunction with Retail Ireland this module is currently been designed with Letterkenny Institute of Technology (LYIT) and will be part of the Retail Apprenticeship provided by Retail Ireland. For employees to have the opportunity to gain QQI Level 6 Certification in Food Safety Operations and HACCP.

It includes a blend of classroom learner, lectures, workshops, independent learning and workplace learning and assessments.

Future of Training - Gamification

Currently trialling Gamification for customer service training and if it is effective it may also be developed to provide food safety training in the future. Gamification is the delivery of training through simulation, which increases awareness, it is an efficient learning solution in a high turnover staff environment; it can be accessed through iPads, Laptops and tablets. Covering different learning styles, visual, hearing and has a high level of retained learning.

4. DISCUSSION

Studies indicate that very little research has been carried out to determine the barriers and problems that may prevent food handlers from implementing good practice (Clayton *et al*. 2002). This study conducted research across food industry sectors manufacturing, retail and food service, along with discussions with trainers and international feedback from food safety professionals, to try to identify the potential barriers, which may affect food safety training outcomes, along with recommendations for future development to improve training overall. Smigic *et al*. (2016) says that training programs should not be performed only to satisfy legal requirements and to provide basic and general information. They should serve as a major tool to communicate with food handlers, by simple and targeted explanation related to specific identified issues.

Food safety is a shared responsibility and governments, the food industry and individuals need to do more to make food safe and prevent foodborne diseases (WHO 2015), and they say that there remains a significant need for education and training on the prevention of foodborne diseases among food producers, suppliers, handlers and the public. This study has identified that 95% of food industry sectors manufacturing (55%), retail (22%) and food service (18%) do provide food safety training for employees, however 5% of the industries do not provide training (See table.1). Findings from a previous study demonstrated that most food industry managers are aware of their responsibilities to train food handlers, but often do not provide adequate support to promote the regulations of safe food handling practices or evaluate its effectiveness (Seaman and Eves 2010).

The Level of training provided by 167 respondents established that (45%) of these provide all three levels of training, followed by level 1 (40%), level 2 (30%) and level 3 (17%), other training (11%) includes HACCP, Allergen, cleaning chemicals and site-specific training is provided (See table.2). Methods used to deliver training where examined (See table.3); 'In-house' training (68%) resulted as the main method that food industries including manufacturing 44%, retail 12% and food service 11% use to deliver their training. Followed by external training 45% as their second option and online training 17% as their third option, overall 85% of the food businesses use in-house training, 62% external and 39% online/eLearning. Although online training was the least preferred method, it showed most popular amongst the retail food sector (See table.3).

If an external trainer is sourced to deliver food safety training for the respondents food businesses (154) this study identified that 50% of the training is conducted onsite, 18% externally and 32% both onsite and external. Seventy-two percent have a qualified food safety trainer onsite, who delivers the food safety training when required with the average duration of training being 2 hours to complete (See table 6). Results indicated that 82% of food businesses carry out refresher training approximately every 1-2 years or when performance indicates so. Competency assessments to evaluate the food safety knowledge and basic skills of trained employees are conducted by (78%) of 169 respondents (See table 7), manufacturing 50%, and retail 17% followed by food service 19%, 22% did not carry out these assessments. To transfer skills after training employees must have the opportunity to practice and refine them, otherwise the knowledge learned will likely be forgotten (Seaman, 2010).

When asked if food businesses had enough resources to carry out food safety training when required (76%) said 'yes' and 24% said 'no'. Their reasons been that they are 'too busy' or have a 'high turnover' of staff (See figure 2). It was mentioned in a previous study 'that food handlers can only be as hygienic as the business, the leadership within requires, allows and encourages it to be and this is influenced by the facilities provided as well as the management systems and culture in place' (Griffith, Livesey and Clayton 2010).

If applicable to their food business (n=76), respondents were asked if they found online/eLearning training to be an effective method of training through trainees performance and knowledge, 71% said 'yes' whereas 29% disagreed. Their reasons been due to possible language barriers (21%), no interest among staff and a lack of understanding (21%). Mentioned also was that this type of training has gone both ways in that it has been extremely helpful for some, while others rush through it and do not retain the information or did not care. ELearning offers a faster, cheaper and potentially better and alternative mode of learning to learners in a flexible time and place (Hammad *et al*. 2018). Eighty three respondents (51%), recommend that if online/eLearning training was combined with another classroom learning (Blended approach) that this may help in the effectiveness of the training outcomes, as the blended approaches use multiple methods to deliver learning, combining face to face interactions with online activities (Cobb 2018).

A further issue identified from the 170 respondents, was that 85% of food businesses employ non-nationals while 15% do not. It was noted from 147 respondents, manufacturing 38%, retail 16% and food service 12% that Polish (58%) is the most common language used in the food industry. Romanian 11%, French 1%, Chinese 4% and a variety 48% of other languages including Lithuanian, Slovakian, Croatian, Hungarian, Moldavian, Brazilian, Arabic, German, Italian, Russian, Portuguese, Pakistani, Spanish, and Vietnamese are also used (See table.12).

The majority of non-nationals in respondent's food businesses have basic English (57%); fluent 33% and 7% have very little English. Out of 160 food businesses, (60%) believe that language may be a barrier in the effectiveness of food safety training outcomes while 35% disagree (see table 13). The majority of food businesses 53% from 112 respondents say that there is a general lack of understanding when training is conducted in English, while 40% say that language barriers are used by employees as an excuse to avoid implementing training appropriately. Powell, Jacob and Chapman, (2011), say that "To achieve food safety success, it means going beyond traditional training, testing and inspectional approaches to managing risks. It requires a better understanding of organisational culture and the human dimensions of food safety, to improve food safety performance in food businesses establishments, you must change the way people do things."

When Food businesses were asked what did they consider to be the main barriers in non-effective food safety training overall, from the 166 respondents 'no Interest' (92%) amongst employees scored the highest. Then lack of understanding 89% followed by

language and lack of management support at 85% and lack of resources 79%. This differs from research conducted by Clayton *et al*. (2002) in a study on 'Food Handlers' beliefs and self-reported practices' that showed that the main barriers to food safety behaviours were lack of time, staff and equipment and cost.

Further comments were made by food businesses (see Appendix. II), highlighting that - "It's more than training; it is a culture change that is required which must be implemented by all, in a study conducted by (De Boeck *et al*. 2018) its mentioned that training is critical, training itself will not change behaviour and that even trained employees fail to execute certain tasks according to what they have been taught. This is why it is important to have manager support and reinforcement in the workplace for training to be effective especially from top down". Respondents in this study also mentioned "Retention of staff". "If it was made more interesting rather than technical, staff would show more interest". "The lack of interest is a big issue, also the lack of understanding why food safety is important", Training food handlers at the workplace is a way to approximate the theory of the practice and ensure that they will know what to do in their workplace (Abdullah Sani and Siow 2014). "Smaller companies may not have the resources to understand or deliver the required training needed to be compliant", this was also noted by (HCACFS, 1998) that medium and smaller-sized businesses do not have the same level of food safety expertise as larger premises and even when undertaken, training may not be of enough quality.

Following my post on the International Food Safety & Quality Network (IFSQN) on 18th October 2018, a number of responses (n= 10) were received from Canada(1), United States(5), Philippines(1), United Kingdom(2) and France(1) (See Appendix. III). In relation to their perception of barriers in food safety training, a Canadian participant questioned how best to get buy in from employees in this field and how to keep the same training material relevant and timely so employees don't disengage. Participants from the United States mentioned that language and culture are big issues and comprehension is another when paper based learning is used. A study conducted by (Abidin, Arendt and Strohbehn 2013) revealed that more than 40% of non-compliance with safe food handling practices was due to poor organisational food safety culture. De Boeck *et al.* (2015) says that food safety culture starts at the top and flows downward; management support and commitment, system and processes and employee attitude and behaviour make it.

Other participants from the United States discussed how they maximise the groups engagement when the team get to take ownership of the programme and that their actions make an impact – notably when they feel as though they are able to shape how the programme is been build.

In one example, engagement from employees was sought also by the use of a game with buzzers played in three teams called Jeopardy, this game brought a lot of laughter and interaction into the training session. In other incidences were employees scored low in refresher training, the trainer would reward those who scored 100% with gift cards while others would be then retrained. Response from the Philippines was that training should also be based on the perspective of the trainee and what technique they prefer to be trained in and that group work and experience sharing should be

used to avoid the usual theoretical training. Response from United Kingdom included lack of management support, lack of interest from employees and difficulties in creating a training program that would work and change the culture. Competency assessments were introduced for basic GMP procedures and allergen control, as annual refresher training is impossible to control. (See Appendix. II. For sample of competency test issued from UK respondent). Respondent from France mentioned that a combination of different methods works best and a big advantage of a trainer is the interaction with the group and the discussions.

This study identified the different levels and training methods across manufacturing (2), retail (2) and an external training company (1), along with what avenues the trainers were currently pursuing in order to further develop their training methods and material. These trainers conduct or assist in the development and delivery of food safety training within their food business. Some of the key findings from these discussions as per (section 3.3) was that it was very notable the difference in the level of resources and training provided between the two manufacturing businesses one of which was a large meat company with approximately 300 employees, while the other was a small bakery company with approximately 50 employees. The larger company provided 2 days training along with a four-week training programme, annual refresher training and external training when required. The smaller company provided level 1 and level 2 training and more frequent refresher training due to communication barriers, with limited resources to do so. Trainers from the retail company, which support over 1200 retail stores, provide level 1 and level 2 online virtual academy training and level 3-classroom training. Seaman and Eves,(2010) say that both pre and

post training support given by managers is an important element for food hygiene to be effective, to motivate food handlers to enact the safe food handling practices learnt during training.

The external trainer/consultant believes that there is a necessity for food safety trainers to adopt on-line training options as this allows more flexibility, also the embedding of learning in work practices takes place through effective supervision, coaching and provision of regular feedback by managers.

This study amongst the five trainers has identified very positive and continuous development for the future of Food Safety Training. The retail company are currently working on and trialling some new methods and levels of training which will be introduced in 2019 including a QQI level 5 module 'Food Safety and HACCP' as part of a Deli Academy. QQI level 6 module 'Food Safety Operations and HACCP' as part of the Retail Apprenticeship working in conjunction with LYIT and Retail Ireland. More modules are also been introduced through virtual academy and including Butchery, Bakery, Deli and Fruit and Vegetables. The modules consist of new visuals, animations and aviators. The trainer from the bakery company recommends that if virtual academy training were in employee's language, it would make training a lot easier. The meat company are currently in the process of developing their procedures in three different languages including English, Polish and Lithuanian, this links in with the findings that Polish (58%) was the most common language used. They have recently introduced a training app for employees to access on their smart phones; the app provides employees with company procedures and SOP's. The external training company is in the process of supporting retailers in improving their pest management

system and communication process to prevent closures, as in 2018 (year to date data) there have been a total number of 83 enforcement orders issued by the HSE, 73 closure orders, 7 prohibition orders and 3 improvement orders (FSAI, enforcement reports,2018).

5. CONCLUSIONS/RECOMMENDATIONS

The majority of food businesses in this study carry out food safety training when required. For those who did not, this was mainly due to having a high turnover of staff or just that they were too busy. In-house training methods are widely used, with the average duration of training consisting of 2 hours delivered by a qualified food safety trainer. Levels 1, 2 and 3 food safety training, along with HACCP and allergen training is provided. To evaluate the food safety knowledge and basic skills of trained employee's food businesses carry out competency tests to assess and refresher training is carried out every 1-2 years or when performance indicates so. Online/eLearning training was the least preferred method used to train employees and some food businesses didn't find the training reflective in employees work performance/knowledge, this was due to no interest among employees, a lack of understanding and possible language barriers. The online/eLearning method of training is becoming more popular as it allows more flexibility to the business and allows training to fit in with each individuals working schedule but for it to be effective overall, it may have to be blended with another method of training e.g. classroom. Non-national employees have a basic level of English and the most common language spoken is Polish. It was perceived that language might be a barrier in the effectiveness of training outcomes due to a general lack of understanding when training is conducted in English, also language barriers are used by employees as an excuse to avoid implementing training appropriately.

Results from the studies undertaken throughout this research identified that the main barriers were 'no interest amongst staff', 'a lack of understanding and a lack of management support' and that it's not just training that is required but culture change too which should be implemented by all from top management down. It was evident following discussions with trainers that future development for food safety training is being carried out or currently being trialled, these include QQ1 Level 5 and 6 in food safety, which involves more on the job training, training applications for smart phones and procedures provided in different languages.

5.1 Recommendations

Based on the findings from this study it is evident that the following recommendations should be made;

- Food businesses need to focus on building a strong food safety culture starting from top management down in order to motivate employees
- Level 3 training should be mandatory for managers and supervisors and this should be assessed when inspected by the authorities
- Training programmes should be designed and tailored to the food business itself
- For online/eLearning training to be fully effective, this method should not stand-alone and should be blended with another method of training preferably classroom
- More group work and experience sharing along with on the job training should be used to avoid the usual theoretical training, using a combination of different methods to keep training more interesting and get employees engagement

- Training needs to be relevant and kept up to date, real life crisis and situations e.g. food borne outbreaks, closure orders etc. need to be incorporated into training programmes to highlight the serious consequences that can happen due to poor food safety culture and practices

- Trainers should also be assessed to ensure that they are qualified and knowledgeable in food safety to be able to deliver food safety training

- A selection of languages need to be in incorporated into training programmes

- Further research needs to be conducted on actual training programmes and training methods used, to assess the level of interest and the level of understanding that has been gained by employees

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A study of food safety training and associated barriers to effective training out comes

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ABSTRACT:
The safety of food is fundamental to our businesses and effective food safety training is an essential element to ensure safe food reaches our consumers. This is true for all food business operators across all sectors of the food industry including, food service, retail and manufacturing facilities. Not complying with food safety can have a serious impact on human health and serious consequences for the food business operator. The World Health Organisation in 2015 reported that almost 1 in 10 people fall ill every year from eating contaminated food and 420,000 die as a result. Children under 5 years of age are particularly at risk, with 125,000 children dying from foodborne diseases every year. The aim of this study was to identify the barriers and problems that may affect the outcomes of food safety training, by examining the methods of training used within the food industry and to identify what food businesses are currently pursuing in order to develop and improve their food safety training. The survey was conducted in October to December 2018; 171 food businesses participated. Discussions with trainers were conducted in December 2018 and international responses were gathered in October 2018. The study identified that 95% of food businesses do provide food safety training for employees whereas 5% are non-compliant. Majority of food businesses (68%) chose in-house training as their main method of training, online/eLearning was the least preferred at 17%. Findings from this study showed that 85% of food businesses employ non-nationals, with Polish (58%) been the most common language spoken. Sixty percent believe that language may be a barrier, due to a general lack of understanding, when training is conducted in English, language barriers are used by employees as an excuse to avoid implementing training appropriately. Incorporating a selection of languages may help to overcome that barrier. Overall, the study identified the main barriers into food safety training outcomes as no interest amongst employees (92%), lack of understanding (89%) and lack of management support (85%). It is recommended that a strong food safety culture be built into the food businesses. Blended learning, group work and experience sharing needs to be brought into training programmes, in order to get employee engagement and make training more interesting.
Keywords: *Training, Food Safety, Barriers, Methods*

1. LITERATURE REVIEW

"Safer food saves lives. With every bite one eats, one is potentially exposed to illness from either microbiological or chemical contamination. Billions of people are at risk and millions fall ill every year, many die as a result of consuming unsafe food" (WHO 2015). The safety of food is fundamental to our businesses and effective Food Safety Training is an essential element to ensure safe food reaches our consumers. This is true for all food business operators across all sectors of the food industry including, food service, retail and manufacturing facilities. Among the findings of the WHO report (WHO, 2015), almost 1 in 10 people fall ill every year from eating contaminated food and 420,000 die as a result. Children under 5 years of age are at particularly high risk, with 125,000 children dying from foodborne diseases every year. Using only the year to date data for 2018 in Ireland, there have been 83 enforcement orders issued by EHO's, 86 food alerts notified by the FSAI, 49 of which were product recalls with 37 of those due to undeclared allergens (FSAI News Centre, 2018). Recently in the media there has been three deaths reported in relation to undeclared allergens in the UK. While a recent audit conducted by the FSAI in Ireland

on the compliance of allergen control on food businesses for non-prepacked food resulted in only six out of the fifty FB audited recorded as fully compliant (FSAI Audit Report, 2017). Food safety is a shared responsibility and governments, the food industry and individuals need to do more to make food safe and prevent foodborne diseases (WHO 2015).To achieve food safety success, it means going beyond traditional training, testing and inspectional approaches to managing risks. It requires a better understanding of organisational culture and the human dimensions of food safety. To improve food safety performance of retail, manufacturing and food service establishments, you must change the way people do things.(Powell, Jacob and Chapman 2011). A study conducted by (Abidin, Arendt and Strohbehn 2013) on 'Exploring the Culture of food safety, the role of organisational influences in motivating employees' safe food handling practices, revealed that more than 40% of non-compliance with safe food handling practices was due to poor organisational food safety culture. An example of this is the Peanut Cooperation of America (PCA) *Salmonella* outbreak in 2009, company President Parnell was sentenced to 28 years in prison for knowingly shipping *Salmonella*-tainted peanut butter, which was linked to 9 deaths and 714 confirmed cases of illness (CDC, 2009). The effects of food safety training on food handlers knowledge has been previously described, however, the information about the real impact on food safety by practical food safety training is scarce (Soares *et al.* 2013). Effective training is essential to improve knowledge perceptions and should be offered to all food handlers. It needs to be specific according to the function that the food handler carries. Training food handlers at the workplace is a way to approximate the theory of the practice and ensure that they will know what to do in their workplace. An effective model of training is selective, strengthens the knowledge, avoid irrelevant information, accommodate the education levels of the food handlers, use languages according to food handler's nationality and encourage positive attitudes (Abdullah Sani and Siow 2014). The content of the information, the form of communication and who communicates are determinants (Zanin et al. 2017). Studies indicate that very little research has been carried out to determine the barriers and problems that may prevent food handlers from implementing good practice (Clayton *et al.* 2002). Food Safety Training is a legal requirement for everyone in the food industry. All food business operators are to ensure that, "*food handlers are supervised and instructed and/or trained in food hygiene matters commensurate with their work activity*". In accordance with the European Regulation (EC) No. 852/2004 on the Hygiene of foodstuffs (EC 2004) and referenced in Regulation (EC) No. 853/2004 laying down specific hygiene rules for food of animal origin (EC 2004).

2. METHODOLOGY

2.1. Questionnaire design

A survey was generated on Survey Monkey, which consisted of 22 questions. The survey was designed to collect data on Food Safety Training throughout the food industry and to examine aspects such as: what training is being provided? Who delivers it? What methods were trainers using? Etc. In addition, it sought to identify potential barriers that may affect the outcome of training, and to collate recommendations from the industry on how training could be conducted more effectively.

The survey was aimed at Managers, HR Managers, Technical/Quality Managers, Chefs and those individuals who were responsible for organization and/or delivery of the training within a food business. In total 171 responses were collected by Survey Monkey electronically using Web links, Email and Social Media (Facebook and LinkedIn) during the period from October to December 2018. In addition, the survey was posted on International Food Safety and Quality Network (IFSQN) to gather wider international views on food safety training, in addition to the 171 responses from the survey, a further ten comments were made on the IFSQN. Face to Face discussions with several trainers (n=5) were also conducted and documented, to identify what avenues they were currently pursuing in order to further develop their training methods and material.

2.2 Data Analysis

The responses from these 171 questionnaires were analysed by exporting the results from Survey Monkey to an excel file. All questions were analysed individually and values for total responses, manufacturing, retail and food service were included. Discussions with trainers and comments from the IFSQN were documented.

3. Results

3.1. Examination of food safety training, levels and methods provided

Respondents from (n=170), 95% of food industry sectors manufacturing 55%, retail 22% and food service 18% do provide food safety training for employees, however 5% of the industries do not. The level of training provided by 167 respondents established that (45%) of these provide all three levels of training, followed by level 1 (40%), level 2 (30%) and level 3 (17%), other training (11%) includes HACCP, allergen, cleaning chemicals and site-specific training is provided. In-house' training (68%) resulted as the main method that food industries including manufacturing 44%, retail 12% and food service 11% use to deliver their training. Followed by external training 45% as their second option and online training 17% as their third option, overall 85% of the food businesses use in-house training, 62% external and 39% online/eLearning.

3.2 Examination of the delivery of food safety training within the food industry

From 154 food businesses this study identified that if an external trainer is sourced to deliver food safety training 50% of the training is conducted onsite, 18% externally and 32% both onsite and external. Seventy-two percent have a qualified food safety trainer onsite, who delivers the food safety training when required with the average duration of training being 2 hours to complete. Results indicated that (82%) of food businesses carry out refresher training approximately every 1-2 years or when performance indicates so. Competency assessments to evaluate the food safety knowledge and basic skills of trained employees are conducted by 78% of 169 respondents manufacturing 50%, and retail 17% followed by food service 19%, 22% did not carry out these assessments. Is there enough resources to carry out food safety training when required 76% said 'yes' and 24% said 'no'. Their reasons been that they are 'too busy' or have a 'high turnover' of staff

3.3 Examination into online/eLearning training

Respondents (n=76) 71% of participants said online/eLearning training was reflective while 29% said it was not. Individuals (n=61) from sectors manufacturing (31), retail (16) followed by food service (14) have the perception that language is a possible barrier, along with no interest among staff and a lack of understanding. (51%) recommend that if online/eLearning training was combined with another classroom learning (Blended approach) that this may help in the effectiveness of the training outcomes.

3.4 Examination of non-national employees and perceived barriers in food safety training

Respondents (n=170), 85% of food businesses employ non-nationals while 15% do not. It was noted from 147 respondents, manufacturing 38%, retail 16% and food service 12% that Polish (58%) is the most common language used in the food industry. Romanian 11%, French 1%, Chinese 4% and a variety 48% of other languages. The majority of non-nationals in respondent's food businesses have Basic English (57%); fluent 33% and 7% have very little English. Out of 160 food businesses, (60%) believe that language may be a barrier in the effectiveness of food safety training outcomes while 35% disagree. Food businesses 53% from 112 respondents say that there is a general lack of understanding, when training is conducted in English, while 40% say that language barriers are used by employees as an excuse to avoid implementing training

appropriately. From the 166 respondents 'no Interest' (92%) amongst employees scored the highest. Then lack of understanding (89%) followed by language and lack of management support at (85%) and lack of resources (79%).

International Food Safety & Quality Network (IFSQN) on 18th October 2018, a number of responses (n= 10) were received from Canada(1), United States(5), Philippines(1), United Kingdom(2) and France(1). Responses include; how could we get buy in from employees in this field and how to keep the same training material relevant and timely so employees don't disengage. United States mentioned that language and culture are big issues and comprehension is another when paper based learning is used. Engagement from employees was sought also by the use of a game with buzzers played in three teams called Jeopardy. Training should also be based on the perspective of the trainee. United Kingdom included lack of management support, lack of interest from employees and difficulties in creating a training program that would work and change the culture. France mentioned that a combination of different methods works best and a big advantage of a trainer is the interaction with the group and the discussions.

Future developments in training; following discussions with trainers, the retail trainer are currently developing a QQI level 5 module 'Food Safety and HACCP' as part of a Deli Academy. QQI level 6 module 'Food Safety Operations and HACCP' as part of the Retail Apprenticeship working in conjunction with LYIT and Retail Ireland. The meat company are currently in the process of developing their procedures in three different languages including English, Polish and Lithuanian, this links in with the findings that Polish (58%) was the most common language used. They have recently introduced a training app for employees to access on their smart phones; the app provides employees with company procedures and SOP's. The external training company is in the process of supporting retailers in improving their pest management system and communication process to prevent closures

4. DISCUSSION

Studies indicate that very little research has been carried out to determine the barriers and problems that may prevent food handlers from implementing good practice (Clayton et al. 2002). This study conducted research across food industry sectors manufacturing, retail and food service, along with discussions with trainers and international feedback from food safety professionals, to try to identify the potential barriers, which may affect food safety training outcomes, along with recommendations for future development to improve training overall.

Food safety is a shared responsibility and governments, the food industry and individuals need to do more to make food safe and prevent foodborne diseases (WHO 2015). This study has identified that 95% of food industry sectors manufacturing 55%, retail 22% and food service 18% do provide food safety training for employees, however 5% of the industries do not provide training. The Level of training provided by 167 respondents established that (45%) of these provide all three levels of training, followed by level 1 (40%), level 2 (30%) and level 3 (17%), other training (11%) includes HACCP, Allergen, cleaning chemicals and site-specific training is provided (See table.2). Methods used to deliver training where examined (See table.3); 'In-house' training (68%) resulted as the main method that food industries including manufacturing 44%, retail 12% and food service 11% use to deliver their training. Followed by external training 45% as their second option and online training 17% as their third option, overall 85% of the food businesses use in-house training, 62% external and 39% online/eLearning.

If an external trainer is sourced to deliver food safety training for the respondents food businesses (154) this study identified that (50%) of the training is conducted onsite, 18% externally and 32% both onsite and external. Seventy-two percent have a qualified food safety trainer onsite, who delivers the food safety training when required with the average duration of training being 2 hours to complete Results indicated that (82%) of food businesses carry out refresher training approximately every 1-2 years or when performance indicates so. Competency assessments to evaluate the food safety knowledge and basic skills of trained employees are conducted by 78% of 169 respondents (See table 7), manufacturing 50%, and retail 17% followed by food service 19%, 22% did not carry out these assessments. To transfer skills after training employees must have the opportunity to practice and refine them, otherwise the knowledge learned will likely be forgotten (Seaman, 2010). Seventy six percent of respondents said they have resouces for training while said 24% said 'no'. Their reasons been that they are 'too busy' or have a 'high turnover' of staff.

If applicable to their food business (n=76), respondents were asked if they found online/eLearning training to be an effective method of training through trainees performance and knowledge, 71% said 'yes' whereas 29% disagreed. Their reasons been due to possible language barriers (21%), no interest among staff and a lack of understanding (21%). Eighty three respondents in (table 10), (51%) recommend that if online/eLearning training was combined with another classroom learning (Blended approach) that this may help in the effectiveness of the training outcomes, as the blended approaches use multiple methods to deliver learning, combining face to face interactions with online activities (Cobb 2018).

A further issue identified from the 170 respondents, was that 85% of food businesses employ non-nationals while 15% do not. It was noted from 147 respondents, manufacturing 38%, retail 16% and food service 12% that Polish (58%) is the most common language used in the food industry. Romanian 11%, French 1%, Chinese 4% and a variety 48% of other languages.

The majority of non-nationals in respondent's food businesses have basic English (57%); fluent 33% and 7% have very little English. Out of 160 food businesses, (60%) believe that language may be a barrier in the effectiveness of food safety training outcomes while 35% disagree. The majority of food businesses 53% from 112 respondents say that there is a general lack of understanding when training is conducted in English, while 40% say that language barriers are used by employees as an excuse to avoid implementing training appropriately. Powell, Jacob and Chapman, (2011), say that "To achieve food safety success, it means going beyond traditional training, testing and inspectional approaches to managing risks. It requires a better understanding of organisational culture and the human dimensions of food safety, to improve food safety performance in food businesses establishments, you must change the way people do things."

From the 166 respondents main barriers identified were 'no Interest' (92%), Then lack of understanding (89%), language and lack of management support at (85%), lack of resources (79%). This differs from research conducted by Clayton et al. (2002) in a study on 'Food Handlers' beliefs and self-reported practices' that showed that the main barriers to food safety behaviours were lack of time, staff and equipment and cost.

IFSQN responses (n= 10) were received from Canada(1), United States(5), Philippines(1), United Kingdom(2) and France(1). In relation to their perception of barriers in food safety training, a Canadian participant questioned how best to get buy in from employees in this field and how to keep the same training material relevant and timely so employees don't disengage. Participants from the United States mentioned that language and culture are big issues and comprehension is another when paper based learning is used. A study conducted by (Abidin, Arendt and Strohbehn 2013) revealed that more than 40% of non-compliance with safe food handling practices was due to poor organisational food safety culture. De Boeck et al. (2015) says that food safety culture starts at the top and flows downward; management support and commitment, system and processes and employee attitude and behaviour make it.

Other participants from the United States discussed how they maximise the groups engagement when the team get to take ownership of the programme and that their actions make an impact – notably when they feel as though they are able to shape how the programme is been build.

In one example, engagement from employees was sought also by the use of a game with buzzers played in three teams called Jeopardy, this game brought a lot of laughter and interaction into the training session.Response from the Philippines was that training should also be based on the perspective of the trainee and what technique they prefer to be trained in and that group work and experience sharing should be used to avoid the usual theoretical training. Response from United Kingdom included lack of management support, lack of interest from employees and difficulties in creating a training program that would work and change the culture. Respondent from France mentioned that a combination of different methods works best and a big advantage of a trainer is the interaction with the group and the discussions.

Two manufacturing businesses one of which was a large meat company with approximately 300 employees, while the other was a small bakery company with approximately 50 employees. The larger company provided 2 days training along with a four-week training programme, annual refresher training and external training when required. The smaller company provided level 1 and level 2 training and more frequent refresher training due to communication barriers, with limited resources to do so. Trainers from the retail company, which support over 1200 retail stores, provide level 1 and level 2 online virtual academy training and level 3-classroom training. Seaman and Eves,(2010) say that both pre and post training support given by managers is an important

element for food hygiene to be effective, to motivate food handlers to enact the safe food handling practices learnt during training.

The external trainer/consultant believes that there is a necessity for food safety trainers to adopt on-line training options as this allows more flexibility, also the embedding of learning in work practices takes place through effective supervision, coaching and provision of regular feedback by managers. The retail company are currently working on and trialling some new methods and levels of training which will be introduced in 2019 including a QQI level 5 module 'Food Safety and HACCP' as part of a Deli Academy. QQI level 6 module 'Food Safety Operations and HACCP' as part of the Retail Apprenticeship working in conjunction with LYIT and Retail Ireland.The trainer from the bakery company recommends that if virtual academy training were in employee's language, it would make training a lot easier. The meat company are currently in the process of developing their procedures in three different languages including English, Polish and Lithuanian, this links in with the findings that Polish (58%) was the most common language used. They have recently introduced a training app for employees to access on their smart phones; the app provides employees with company procedures and SOP's. The external training company is in the process of supporting retailers in improving their pest management system and communication process to prevent closures, as in 2018 (year to date data) there have been a total number of 83 enforcement orders issued by the HSE, 73 closure orders, 7 prohibition orders and 3 improvement orders (FSAI, enforcement reports,2018).

5. CONCLUSION

The majority of food businesses in this study carry out food safety training when required. For those who did not, this was mainly due to having a high turnover of staff or just that they were too busy. In-house training methods are widely used, with the average duration of training consisting of 2 hours delivered by a qualified food safety trainer. Levels 1, 2 and 3 food safety training, along with HACCP and allergen training is provided. To evaluate the food safety knowledge and basic skills of trained employee's food businesses carry out competency tests to assess and refresher training is carried out every 1-2 years or when performance indicates so. Online/eLearning training was the least preferred method used to train employees and some food businesses didn't find the training reflective in employees work performance/knowledge, this was due to no interest among employees, a lack of understanding and possible language barriers. Non-national employees have a basic level of English and the most common language spoken is Polish.

Results from the studies undertaken throughout this research identified that the main barriers were 'no interest amongst staff', 'a lack of understanding and a lack of management support' and that it's not just training that is required but culture change too which should be implemented by all from top management down.

Recommendations include regular assessment of trainers, update training programs to include more languages, group work and real life experiences, level 3 training should be made mandatory for all management and supervisors. For online/eLearning training to be fully effective, this method should not stand-alone and should be blended with another method of training preferably classroom. Food businesses need to focus on building a strong food safety culture starting from top management down in order to motivate employees.

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8. APPENDICES

Appendix. I.

Survey Questionnaire

Food Safety Training with a focus on the potential barriers that may impact the effectiveness of the training outcomes

Thank you for agreeing to participate in this survey. Your feedback is very valuable. This survey will not take longer than 8 minutes to complete.
Please note: all responses are completely anonymous and cannot be traced back to respondent.
Responses will be combined and summarised in a report to further protect anonymity.

1. What sector of the food industry applies to your business?

◯ Food Service e.g. hospitality, catering

◯ Retail Service e.g. deli

◯ Manufacturing

2. Do you provide Food Safety Training for your employees?

◯ Yes

◯ No

3. If yes, what level of Food Safety Training is provided?

☐ Level 1 – Induction   ☐ Level 3 – Food Safety Skills for Management

☐ Level 2 - Additional skills   ☐ All the above

☐ Other (please specify)

| |
| |

4. What method is used to deliver your Food Safety Training?
(Please select more than one if required. Put 1 beside main method of training, and 2 beside other training)

Online/eLearning	
In-house training	
External consultant/trainer	

5. What are your reasons for choosing your main method of training (marked 1 above)

☐ Most cost-effective method e.g. not having to book a trainer or room

☐ Most time effective method e.g. easy to organise

☐ Found it to be an effective method of training overall

☐ Employee preference

☐ Other (please specify)

_____

6. What is the average duration of the training?

☐ <1 hour

☐ 2 hours

☐ Half day training

☐ Full day training

☐ Other (please specify)

_____

7. If an external trainer is used, is the food safety training delivered onsite or offsite?

◯ External

◯ Onsite

◯ Both external and onsite

8. If the training is delivered onsite who delivers this training?

☐ Qualified food safety trainer (qualification in food safety management)

☐ Member of Management

☐ Experienced member of staff

☐ Other (please specify)

_____

9. If the Training is delivered through online/eLearning methods please answer the following Questions: (If not move on to Q 12)

After completion of the online/eLearning training, did it prove to be effective through trainee's work performance/knowledge?

◯ Yes

◯ No

10. If No, what do you think the reasons for this were?

☐ Possible language barriers   ☐ Not an effective method of training

☐ Not user friendly   ☐ Not applicable

☐ No interest among employees/Lack of understanding

☐ Other (please specify)

11. How do you think online/eLearning training could be improved for your business?

☐ Delivered in more languages e.g. employees' native language   ☐ Combined with another classroom learning (blended approach)

☐ Better software, training packages etc.

       ☐ Don't know

☐ Other (please specify)

12. Is there non-nationals employed in your business?

◯ Yes

◯ No

13. If yes what is the most common language used?

☐ Polish   ☐ Chinese

☐ French   ☐ Romanian

☐ Another Language/s (please specify)

14. What level of English do your non-national employees have?

◯ Very little

◯ Basic

◯ Fluent

◯ Don't know

15. Do you consider Language to be a barrier in the effectiveness of food safety training outcomes?

◯ Yes

◯ No

◯ Don't know

16. If yes, how is this a barrier, and how does this impact in your food company?
     Please tick more than one point if preferable.

☐ A general lack of understanding when training is conducted in English

☐ Time consuming &/or expensive to deliver training in the employees' native language

☐ Language barriers are used by employees as an excuse to avoid implementing training appropriately

☐ A lack of interest or food safety culture, regardless of the language training is conducted in

☐ Retraining may have to be carried out as the training was not effective the first-time round

☐ Other (please specify)

[   ]

17. How often do your employees receive refresher training?

Please write in the no. of years approximately

[   ]

Only when lack of appropriate performance indicates a need for fresher training

[   ]

Never

[   ]

Other, please specify

[   ]

18. Are there enough resources to carry out training when required?

◯ Yes

◯ No

19. If no, what are the reasons for this?

	Costly to business	☐ N/A
	High turnover of staff	☐ N/A
	Too busy	☐ N/A
	Don't know	☐ N/A

20. Are competency tests carried out to evaluate the food safety knowledge and basic skills of the trained employee?

◯ Yes

◯ No

21. In your opinion, what do you consider the biggest barrier in non-effective food safety training?

	Language	☐ N/A
	No interest	☐ N/A
	Lack of management support	☐ N/A
	Lack of understanding	☐ N/A
	Lack of resources	☐ N/A

22. Have you any further comments on Food Safety Training in Ireland, perceived barriers and potential improvements that could be made?

Appendix. II.

Q22 Have you any further comments on Food Safety Training in Ireland, perceived barriers and potential improvements that could be made?

1	More than training, it is a cultural change that is required which all which must be implemented by all Especially from top down.
2	Retention of staff
3	ongoing training using many different methods is the best approach
4	Not at this time
5	Smaller companies may not have the resources to understand or deliver the required training needed to be compliant.
6	All staff must be trained in basic food safety before the start to work in a food business to protect the public
7	One thing we have incorporated this year in our training are more images of what we see daily that is not acceptable and can result in a food safety risk and less wordy slides. In addition, several videos were included to meet all the learning styles of the trainees.
8	Trainings are the most effective when these are tailor made for the company where the training is given.
9	The main reason for this training is to improve our understanding about food safety there is not enough information on site for staff and management to look over and refresh their minds when it's necessary.
10	If it was made more interesting rather than technical. Staff would show more interest
11	Non Native Speaker trainers are available but sometimes lack of understanding the problem and support from management's side.
12	I think multilingual general food safety & general hygiene online courses with exams at the end would be very beneficial for many companies within the industry.
13	When looking at the effectiveness of training please keep in mind that people can be forgetful. Identify that as a potential hazard to any process and build in methods to help prevent forgetfulness.
14	Generally Trainers are available but there are difficulties in getting staff released for training
15	Employee engagement is always my biggest struggle, since the topic is quite boring, and every year I try to think of different ways to try to get people to pay attention, whether with bribes (e.g. candy for participation) or by switching up how I present information.
16	Would love to see more guidelines, literature and government regulations that are in line with current practices.
17	I do not see any issue with Food Safety Training or how it could improve, it will always fail if people are not interested - mainly agency staff - they would work one day here, another day somewhere else.

18	More support should be given by your trainer with in the year they should call to shop and make sure it was totally understood and paper work is right
19	Very expensive for external training
20	An app would be a good idea which could then be customised to the particular food business you work in
21	Training programmes could be developed specifically for small/medium sized production operations & delivered in house.
22	No interest can sometimes be because employees do not understand how it applies to them. They see it as - we have always done it this way and nothing has ever happened so why should we care.
23	Training manual for the Food Sector to help with in House training, with better in depth notes that would keep the employees interested and be willing to participate in training.
24	staff requirements (language, pace)
25	Anyone attending a course should be able to demonstrate by means of a written or oral exam at the end of external Food Safety Training at any level. At the lower level of some food, safety-training attendance is enough to receive a certificate and I just do not think this is satisfactory, as the trainee has no opportunity to show they understand the importance of Food Safety and the employer has no proof that the employee understands the importance of it or has picked up what was taught. Otherwise, what is the point of paying for external training at lower levels?
26	Greatest risk often not intended - a personal life situation can cause stress and lead to lower attention levels and introduce risk, even with loyal, seasoned and experienced employees; however, these are often unknown situations to employer and may arise unexpectedly in otherwise excellent employees.
27	Too much emphasis on HACCP when training should be relevant to production site as external consultants only provide generic information which does not resonate with staff as they can't relate To it in their working day. It is also difficult to get some staff 'on board' with BRC Requirements/customer (Aldi/Lidl) audits when there is no perceived benefit or risk apparent to them therefore resulting in NC's.
28	e learning will probably be a good way forward
29	While the on line training is great. It may not be refreshed as regular as it should be due to cost. So the refresher training is the same training completed every 18 months for a number of years
30	Food Safety Train the trainer to all Supervisors,
31	I believe greater focus should be placed on food safety training in all sectors of food production in order to alleviate the current issues with allergens in particular. Operators must understand the seriousness of cross contamination in order to help us eliminate these errors.
32	Costly
33	Staff should be legally obliged to have training. Business operators should be legally obliged to offer. Needs to be enforced
34	There are many external people carrying out training but if the course is not properly accredited by someone e.g. CIEH, then the training is always questionable. All training should be accredited by a recognised agency.
35	The lack of interest it is a big Issue. Also, the lack of understanding why food safety is important.

36	Quite often employees/operatives are sent on training but the manager does not do or has not received any training. Therefore, when employees go back to the work place there is a barrier to them implementing what they have learnt; as the manager is not interested/perceived, s/he is being shown up by the operative.
37	Needs a continuous effort to keep standards. There is always room for improvement.
38	More training is required
39	I would recommend to Employ staff with at least basic English speaking skills
40	A current shortage of workers in the food industry will result in lower competency/ skills of the people employed to the detriment of the industry
41	Companies need to ensure a basic understanding of the English language is a pre requisite to employment if food safety training is to be effective especially with non-national candidates.
42	Imbalance of workload.
43	Management not empowering employees who in turn leave, creating high turnover. Lack of funds made available for training is also an issue

Appendix. III.

Training Competency (following the procedure)

Procedure:

_____

____

Employee Name: _____ Date observed: _____

Observer: _____

For each job requirement, record Yes if employee shows competency, or No if they are not competent. All 'no' responses require retraining and re-evaluation. Turn completed report in to Technical Manager or Technical Assistant.

Job Requirement	Competent? Yes or No
Does the worker consistently work at a pace that keeps up with the orders received? Is the worker viewed by the lead, manager and other workers as someone who "does his/her part" or "can hold their own" while working?	
The worker ensures that the procedure is being followed. (observed)	
Worker demonstrates understanding of the procedure.	
Worker uses proper techniques so procedure is being followed. (observed)	
Does the worker complete pre-operational checks? (Previous product and/or labels removed /equipment and area cleaned/right paperwork in place/right ingredients and/or labels etc.)	
Are the records for start-up checks being completed at the time of the check?	
Are the records to support checks completed during the production being completed? (Metal detection, weight checks, etc.)	
Worker keeps defined work area clean throughout the day and at the end of the shift. (observed)	
Is re-training required?	

This employee has completed their training and is deemed competent in this role.

_____ Date: _____

Signature

Notes:

Appendix. IV.

GUIDE FOR AUTHORS

INTRODUCTION

Food Control is an international journal that provides essential information for those involved in food safety and process control.

Food Control covers:

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