

A new method of HACCP for the catering and food service industry

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Abstract

This paper presents the rationale and use of a new method of applying Codex HACCP principles designed specifically for caterers. It charts the process by which the method was developed, set against the backdrop of international efforts to give support to initiatives that more appropriately meet the needs of small and less developed businesses (SLDBs). The method was extensively piloted, evaluated and validated by the UK Food Standards Agency (FSA) and deemed compliant with 2006 EU HACCP requirements. The original ‘Salford Model’ was extended and published as *Menu-safe*, a system that can be used by catering businesses of all types and sizes. Its shortened version, *Safer Food Better Business* (SFBB), has been developed by the FSA into a ready-to-use package for very small catering businesses.

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1. Introduction

In 1993 the European Union issued a food hygiene directive (EU, 1993) establishing a general requirement for all food business to adopt a risk based food safety management system with the principles of the internationally accepted system hazard analysis critical control point (HACCP) recommended. However, each country in the EU interpreted the Directive into their national regulations in different ways – some requiring all the principles of HACCP others only some of them. This led to widely differing levels of interpretation. As a consequence members of the EU, as part of a wide consolidation of food safety legislation, negotiated legal requirements that could be applied to all businesses across the food industry. This Regulation, with no option for national amendment, came into force across Europe in January 2006 (EU, 2004). It requires all food businesses to implement a ‘system based on HACCP principles’.

1.1. HACCP

In 1993 the Codex Alimentarius Commission elaborated a 12-part method for the application of HACCP (See Fig 1). This has achieved international recognition and as such, has become the definitive method of applying HACCP principles. In many countries of the world it is now a standard for both export and the supply of food to major retailers. However, whilst ‘the primary movers in the HACCP system tended to be the larger food manufacturers. . . the applicability of the HACCP system to small and medium sized enterprises (SMEs) has always been questioned’ (Mayes & Mortimore, 2000). Indeed, extensive research and practical experience led the Codex Food Hygiene Committee to initiate the production of guidance documents that would promote flexibility in the interpretation of the method (WHO/FAO 2000, 2006) for such businesses. The term small and less developed businesses (SLDBs) was coined to encompass the scope of this target group.

The Codex 12-part method was coined ‘Classical HACCP’ by the Food Standards Agency (FSA) at the start of this project and has served as a useful benchmark for the development of alternative systems of applying HACCP

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1	Preliminary	Assemble HACCP team
2	Procedures	Describe product
3		Identify intended use
4		Construct flow diagram
5		On-site confirmation of flow diagram
6	Principle One	List all potential hazards Conduct a hazard analysis Consider control measures
7	Principle Two	Determine Critical Control Points (CCPs)
8	Principle Three	Establish Critical Limits for each CCP
9	Principle Four	Establish a Monitoring System for each CCP
10	Principle Five	Establish Corrective Actions
11	Principle Six	Establish Verification Procedures
12	Principle Seven	Establish Documentation and Record Keeping

Fig. 1. The Codex protocol for the application of HACCP principles.

principles. It is used throughout this text to ensure clarity and consistency with FSA documents and texts.

1.2. The catering industry and HACCP

The UK catering industry is the largest sector of the food industry and accounts for approximately 60% of all food businesses. It comprises restaurants, cafes, take-aways, street vendors, hospitals, schools, prisons, residential homes, hotels and other premises where food is produced for immediate consumption. Many of these businesses are small (Airey, 2001), yet commonly operate a far more complex ‘production’ system, with large numbers of inputs, processes and outputs, than the typical food manufacturer. It is hardly surprising, therefore, with no contractual incentives, that there has been little progress with HACCP within catering businesses, as evidenced in a recent review by Taylor (2006).

1.3. UK Government initiative to improve HACCP uptake in the catering industry

With ambitious targets to reduce food borne disease and increase HACCP uptake, the Food Standards Agency announced plans (FSA, 2001) to target the well-documented problems of food safety management within the catering industry. These were summarised by the Chair of an existing Working Party that had, in 2001, failed to find a successful model of HACCP for the industry. This was despite the adaptation and wide scale testing of materials used successfully by large caterers such as McDonalds, Whitbread’s, Greenhall’s and others.

‘...the basic tenants of HACCP are dissonant with many small businesses, who rely on common sense, experience and a modicum of good luck to meet their requirements in relation to food safety. The structured approach...[is]...alien... and can seem like a succession of mountains of which they have no inclination – or confidence – to climb...’ (Miller, 2002)

In 2002, a team at Salford University funded by the Food Standards Agency were tasked with rethinking the problem and developing an innovative new approach to the application of HACCP principles in the catering industry.

2. Methodology

This research study utilised an ‘action research’ methodology (Lewin, 1947) whereby experiential learning took place through the creative integration of ‘theory and practice’. It involved an iterative process of development, piloting, evaluation and review that was conducted over a 3-year period. In total over 300 practitioners, researchers and stakeholders were actively involved in the process. Some of the key milestones are discussed briefly below.

2.1. Stage 1. Review of existing data

This involved a documentary analysis of 50 existing ‘packs’ that had been designed to overcome the problems of using HACCP within the catering industry, and a review of existing literature and research. Barriers, limitations and best practice were identified.

2.2. Stage 2. Creation of new method: the ‘Salford Model’ version 1

A practitioner led, multi-disciplinary team, conducted a series of workshops over a six-month period. The team included caterers, food safety and HACCP experts, management specialists, psychologists, teachers, and representatives from the FSA, Health Protection Agency and the Chartered Institute of Environmental Health. The initial workshop lasted one week and produced a framework on which to build the components of the model. Each subsequent workshop was preceded by further stakeholder review in relation to best practice and technical issues. The output of this stage was the first version of the Salford Model. The scope of the work was restricted to independent restaurants in the first instance. This large sector of the industry had previously been established as having the lowest levels of hygiene standards and staff training (Taylor, 1994) and it was considered that a solution found for this sector would have wide applicability.

Further stages of the project were carefully planned to facilitate rigorous evaluation. This involved selecting appropriate ‘success criteria’, establishing base line data and undertaking process evaluation at regular intervals over a five year period. The validity of this approach was secured through gaining 100% access to a representative sample of businesses and adopting both qualitative and quantitative methods. The methods used were (1) documentary analysis of food safety information within the business, (2) overt video filming of practices, (3) in-depth narrative interviews, (4) cultural audits, (5) micro-biological sampling and (6) analysis of inspection records.

2.3. Stage 3. Piloting and evaluation

A random sample of 50 independent restaurants was identified as pilot sites. The sample was selected from three wards within urban local authorities and this reflected a

diversity of cuisine including Indian, French, Swiss, German, Turkish, Chinese, Italian and British. The model was tested in these businesses by experienced caterers ('mentors') who spent between 20–30 h working with the owner-manager/chefs. In parallel, numerous researchers were involved in the on-going evaluation.

2.4. Stage 4. Modification and validation: 'Salford Model' version 2

The utility, appropriateness and technical accuracy of the Model were determined through detailed analysis of the outputs of the field-testing. A process of technical validation was undertaken by the FSA. The Model was then reviewed extensively. In particular it was presented to numerous Professional Bodies, representatives from the devolved Governments of Scotland, Wales and Northern Ireland, FAO and WHO, national and international conferences and importantly, to the EU members responsible for drafting the imminent HACCP legislation. The FSA also commissioned further wide scale testing in Local Authorities across England. The outcome of this process, although having very few amendments from the original, was Version 2 of the 'Salford Model'.

3. Results

3.1. Outputs

The results of Stage 1 showed that previous HACCP for Catering 'packs':

- (1) Were based on 'rules' rather than 'safe practices'. Rules such as 'chill within 90 min' were often cited, but with no practical guidance on how to achieve this in a small kitchen.
- (2) Used language inaccessible to the end-user. Complex HACCP and microbiological jargon were used throughout all of the texts.
- (3) Failed to address many critical practices. Cross contamination was only addressed in one of 36 texts.
- (4) Focused on what was easy to measure rather than on risk. Routine monitoring focused on fridge temperatures but did not deal adequately with other high risk measurements such as cooking, chilling times and contact times for cleaning products.
- (5) Expected caterers to make technical decisions and validate them. Material relied on caterers with no technical knowledge or expertise to undertake a full hazard analysis.
- (6) Involved incomplete control of specific hazards. Critical cleaning activities such as cleaning chopping boards or knives were not considered in the HACCP plans or pre-requisite cleaning schedules.

- (7) Were based solely on food safety with no reference to how it could be managed.

The role of the manager in terms of supervision, responsibility and review were not considered.

An innovative new 'model' of managing food safety for the catering industry was the output from stages 2–5. The 'Salford Model' consists of a set of documented safe working methods with a record-keeping diary. A brief description of each is presented in Section 3.2–3.5 below with relevant examples. Section 3.6 summarises some of the main findings of the on-going evaluation.

3.2. Salford model documentation: safe methods

The documents form a set of working procedures for all practices in the kitchen that are related to food safety. These are designed in a standard format, based on the well-established concept of Standard Operating Procedures (SOPs), and termed 'safe methods'. These are categorised into five sections: 'Cooking, Chilling', 'Cleaning, avoiding cross Contamination and management Control'. They are designed to:

- Document *safety* aspects of all *practice* with *reasons why*.
- Describe how the manager ensures *control* of these.
- Plan for if things go *wrong*.

Version II consists of a 'bank' of 40 validated and approved safe methods that were found to cover most practices within the sector. The number of safe methods required within a particular business depends on the size and nature of the operation, with the option of creating new methods as and when necessary. Businesses are, however, responsible for the validation of additional methods as they are for the regular verification of cooking and chilling methods to ensure critical limits are being achieved.

The set of safe methods, when completed, fulfil the requirement of HACCP for documentation. They also incorporate the general good hygiene practices that are controlled separately from HACCP when applying the 'classical' method. The requirement to record significant food safety information is dealt with in the Record Keeping Diary that accompanies the safe methods (see Section 3.4). The next section illustrates the component parts of the methods using one typical example that is illustrated in Figs. 2 and 3.

3.3. Example of safe method: COOKING SMALL BIRDS. Menu item: roast chicken

3.3.1. Safety messages: cooking kills harmful bacteria (hazard identification)

Each method has a simple food safety message about the main hazard and how to control it. The team psychologists and FSA communication experts used extensive background experience and research in the development of appropriate safety messages. In this example it is that

Cooking Safe Method 1:
Whole Birds



Thorough cooking kills harmful bacteria

Menu Items:

Safety Point	How do you do this?			
Preheat the oven. This will allow more accurate timing.	Preheat the oven for:			
Do not pack the birds too tightly. This will allow the air to circulate for more even and thorough cooking.	Space between each bird:			
Turn the birds during cooking. This will allow the meat to cook evenly.	How often turned:			
Make sure all the birds are cooked for long enough. It is essential to cook the meat for long enough to kill all harmful bacteria.	Bird Type:			
	Size	Time	Temp	Method (e.g.roast)

Check it	How do you do this?	
Check to make sure that the bird has been cooked through. Normally the leg is the last part to finish cooking so this is the best place to test if a bird is cooked all the way through.	Recommended check: Pierce the leg in its thickest part (between the drumstick and thigh) with a sharp skewer until the juice runs out. These juices must be free from pink/red colouring, all blood residue must have changed to brown and be otherwise clear. Test each bird.	If you do not do this, what do you do?




Fig. 2. Safe method example. Side 1.

‘cooking kills harmful bacteria and makes food safe’. Whilst this is not scientifically accurate in all situations it has been found to effectively communicate the importance of cooking and improve practice (FSA, 2005). The issues of heat resistant toxins and spores are dealt with in the chilling section, and throughout the safe methods there are prompts that highlight the need for all parts of the system to be followed in order to achieve food safety.

3.3.2. Safety points (control measures)

Each safe method contains a list of safety points, which are simple, practical steps taken in most catering operations to make sure food is safely made. Documenting safe catering practices in this format removes almost all of the effort of documentation for small businesses, and also serves as a ‘prompt’ and ensures that all steps are followed

every time. Each safety point is supported immediately with a reason for its necessity, based on the caterers’ and food scientists’ combined experience. This reinforces the importance of each point, and helps to provide an understanding of how to adapt the methods if one step is changed. For example, if pre-heating the oven is not an option for practical or quality reasons, extra cooking time is then required to make the food safe. The juxtaposition of ‘rules’ and ‘reasons’ is also a useful training tool.

The final column of this section is a space for individual businesses to fill in the details that are specific to their own operation. Catering is such a diverse industry that it is impossible to create generic methods for businesses to simply pick up and use. There are differences in equipment, sizes and types of product, cooking methods and styles, and all of these can have an impact on safety. The safe



Prove it

You can use a temperature probe as a periodic test to prove that the method you are following every time is reaching a safe temperature.

When to do this:

1. If your method is different to the one recommended.
2. If you would like extra reassurance that the recommended method is working effectively in your business.
3. If you have a new supplier, new product size or new equipment..

Date	Product	Time/temp required	Time/temp achieved.



What to do when things go wrong:

- **Continue the cooking process:** If the equipment is working and the product is not thoroughly cooked, continue to cook it and then 'check it' again.
- **Speed up the cooking process:** E.g. by dividing the product into portions and/or using different equipment such as using a microwave/deep fat fryer. Remember to 'check it' again and be aware of the increased risk of cross-contamination.
- **Use an alternative menu item:** If further cooking is not possible, the menu item will have to be replaced with something else e.g. a ready cooked product in the fridge that can be reheated or a similar menu item that is ready to serve.
- **Other Safe Options:**
-
-
-

How to stop this happening again:

- Repair or replace equipment and review maintenance procedures.
- Check cooking method (time/temp) and make it safe.
- Make sure you always allow enough time and use the right sized portions.
- Improve staff training in cooking methods.
- Improve staff supervision.



Write down what went wrong and what you did about it in your Diary.

Fig. 3. Safe method example. Side 2.

methods are designed to minimise the effort required by a business, but certainly not to eliminate it. Moreover, the more time a business invests in adding to and improving their safe methods, the more food safety understanding and practices will improve as a result. A sense of ownership of the system, and empowerment of staff within it, fulfils the underpinning concept of HACCP.

3.3.3. *Checking points (critical control point monitoring)*

The final safety point in the process requires greater control as it is the last step where the hazard can be reduced to a safe level. Such focus is a key principle of HACCP and in the safe methods these 'checking points' incorporate a measurable output and continuous 'real-time, every-time' monitoring. For many products every item needs to be checked and haphazard sampling cannot ensure the safety of the menu-items. Such practice, promoted by almost all previous 'packs', negate attempts to improve food safety by

leading caterers toward the false assumption that, for example, the probe testing of a few cooked items is enough to ensure safety of the entire meal. Within catering, where there is little uniformity of ingredients, equipment or recipes there is rarely the opportunity to 'sample' reliably. In this example, every bird must be checked to ensure safety. Practical, sensory methods, such as the juices running clear of blood, are therefore advocated. This ensures that even in a busy kitchen, with perhaps hundreds of 'items' being cooked every day, all food can be 'checked' at critical safety points.

Businesses can, however, still chose to check a sample rather than the whole batch, but they would be required to justify how their method would ensure that every individual product was safe. For example, if a number of whole birds were to be batch cooked *and* it was possible to identify the bird that would cook at the slowest rate (i.e. in relation to position in oven and/or size) then that one could be

used as the test ‘sample’ that would indicate all birds were thoroughly cooked.

3.3.4. *What to do when things go wrong (corrective action)*

This section of the safe method provides practical options for what to do if the product, after cooking according to the prescribed method, fails the safety check. The documented actions are designed to rectify the problem and make the product safe, and to prevent the problem from happening again. There is scope here for the business to add their own ideas that are specific to their operation, such as an alternative piece of equipment that can be used if one is failing, or an alternative dish that can be served if the customers cannot be made to wait. In this way, if the manager of the kitchen is away one day and there is a crisis, the staff can go to the safe method documentation, see what to do and confidently follow the instructions.

3.3.5. *Prove-it (verification)*

The ‘prove it’ section of the method facilitates the process by which businesses periodically verify that their methods are working and that critical limits are being achieved. This documented experimentation gives confidence, both to the caterer and enforcement officer, that the system is under control. This is also required when a new item is added to the menu, or at special occasions where products are being prepared at different sizes and using different methods.

3.4. *The Salford Model record keeping diary (record keeping, verification, review)*

In general, large businesses use considerable amounts of forms, reports and paperwork to control their operations. In the typical small catering business there is likely to be much less bureaucracy and associated paperwork. Part of the reason for this is that the manager knows what is happening in all parts of the business by personally supervising activities. However, the minimal records one would expect in any size of business would include:

- Formalised roles and responsibilities.
- Significant food safety checks and remedial actions.
- Records that can be reviewed to identify commonly occurring problems that need to be solved.
- Evidence for the inspector/auditor that food safety is under control.
- Details of communication between staff within the business.

The output of this project was the identification of the essential records that would be needed to perform these tasks and, just as importantly, a presentation format that would be used rather than ‘shelved’ by the business. The output was an annual diary that includes:

- Page a day or shift format.
- Opening and closing checks.

- Signature of responsibility.
- Exception reporting for when things go wrong.
- Reminders for regular management checks (pest control, cleaning).
- Monthly reviews.
- Staff details and training records.
- Supplier and contractor information.
- Attractive user-friendly format.

3.5. *The evaluation*

When evaluating food safety management systems, ‘success’ is often measured in terms of the percentages of businesses that purport to have implemented them. Whether the businesses are telling the truth, whether they represent a valid sample, whether they have fully implemented and are successfully using the system, and whether food safety is actually improved, are questions that are often ignored.

From the outset the Development Team were committed to establishing, not only the utility of the product to the businesses, but whether it contributed to an improvement in food safety. Highly experienced researchers from a range of organisations were involved in developing the largest, most varied, robust research project ever carried out in the restaurant sector of the catering industry. The rigorous evaluation that accompanied this project was one of the key contributory factors that led to its eventual acceptance by Government, industry and the wider HACCP community.

The evaluation of this project is still on-going but some of the key findings that emerged within the first 6 months are described below.

3.5.1. *Acceptance by caterers*

The Salford Model was enthusiastically received by the businesses at the point when it became apparent to the owner that the purpose was to establish the safety of methods used in the business and was not related to an ‘inspection’. The commitment gained was evidenced by the many hours spent by chefs/managers both during ‘mentor’ visits and between them. Many chefs commented on the fact that ‘... its great ... it’s the first time anyone has come to us to talk about our menu’ and compared this to the confusion and anxiety that they had felt when enforcement officers had talked to them about HACCP.

In summary, all businesses were unanimous in their belief that the ‘pack’ would have a positive effect on their business, bestowing realistic control mechanisms to manage food safely. The decision to recruit and train caterers to undertake the ‘mentoring’ process was confirmed to be a key factor in the acceptance of the model within the businesses.

3.5.2. *Increase in documentation and record keeping*

An essential requirement of any HACCP system is the need for documents and records (Principle 7). Examining paperwork is therefore an objective method of finding evi-

dence of control of food safety procedures within a business. When asked prior to the start of the project to provide evidence of any food safety documentation and record keeping, the majority of the 50 restaurants (65%) had none at all. Of the remaining 35%, there was a mixture of partially complete and piecemeal Good Hygiene Practice documents and record sheets, mostly unused. These ranged from a pest control contract to several sets of cleaning and temperature charts for staff to fill in. Many documents were not filled in, or said to be completed ‘sometimes’ or ‘usually’. Indeed, only 17% had any form of record keeping. Only two businesses had some form of HACCP documentation but there were no records to support these.

Within 6 months of the intervention all businesses had started to document their food safety practices (100%). Two thirds of these (66%) had a fully documented system, with the others were at various stages of completion. As had been anticipated, a correlation was found between menu complexity and implementation time. The Diary was put into action immediately by all the businesses upon completion of the documentation. Half (50%) of the pilot sites were demonstrating full use of all diary components within the first 6 months.

These findings are of particular relevance when set against the backdrop of previous negativity concerning HACCP focused primarily on perceived demands for ‘excessive paperwork’.

3.5.3. Changes in food safety knowledge, attitude and behaviour

Food safety knowledge, attitude and behaviour are difficult to assess using traditional research methods because of the sensitive issues of legal compliance with many true thoughts and actions deliberately concealed. Such issues point towards the necessity for a qualitative, in-depth, discovery-based method and for this reason the narrative interview approach (based on [Hollway & Jefferies, 2000](#)) was selected and used.

Narrative interviews were undertaken in a pre and post intervention scenario in order to evaluate the effectiveness of the new system in the pilot sites. Initial analysis revealed several themes that would consequently act as indicators of change during subsequent interviews. These included (1) management control (2) knowledge (3) awareness of risk and (4) food safety behaviours. Some of the initial findings were:

- (1) A change in management style was identified in most businesses. Managers became more involved, adopting a ‘stricter’ approach to food safety. Responsibilities were more clearly defined and staff involvement increased.
- (2) For many respondents the pack and mentoring process allowed the business to gain valuable information on aspects of food safety. The idea that ‘*its all common sense*’ changed to an acceptance that were

things the respondents did not know and that there was a need for staff and themselves to be educated on issues surrounding food safety. Findings also suggest that the pack bridged the gap between a managerial instruction and its effective, ongoing implementation. Managers reported that staff were ‘now more inclined’ to change their behaviour as they aware given valid reasons ‘why’.

- (3) Respondents highlighted a marked improvement in their knowledge and awareness of food safety risks within their businesses. This was a change from the initial interviews where many ascertained they already had a comprehensive understanding of all food safety and food safety management issues.
- (4) Businesses were seen to be taking a more active role in controlling food safety with routine monitoring and documentation undertaken, changing practices where necessary and in some cases investing in new equipment. Indeed, many businesses took independent initiatives to experiment, particularly with chilling and hot-holding, to determine if their practices met safety limits discussed during ‘mentor’ visits.

In-depth narrative interviews were demonstrated to be the most effective of all evaluation methods used in this project. Its successful within this project has led the FAO to recently recommend it use for measuring behaviour change ([FAO, 2006](#)).

3.6. A new method: from ‘model’ to approved ‘system’

The Salford Model version 2, through an iterative process of stakeholder review and validation was approved by the FSA and deemed to comply with the 2006 Regulation (FSA, 2004). The model was extended to facilitate its use by catering businesses of all types and sizes and the complete system is currently marketed as Menu-Safe ([Taylor & Taylor, 2006](#)). A shortened version, Safer Food Better Business (SFBB) has been developed by the FSA as a ready-to-use package for very small catering businesses that are typically independent operations that employ less than five staff. The relationship between these systems and the classical Codex method is depicted in [Fig. 4](#).

4. Conclusions and recommendations

This action research project was the first attempt, anywhere in the world, to empirically develop a food safety management system for caterers. It remains the only adaptation of the ‘classical’ method that has been demonstrated to have utility to catering businesses and also contribute to improvements in food safety management. In particular, the output demonstrates that there are valid alternatives to the ‘classical’ Codex method and that businesses can comply with HACCP principles without ever having to ‘hear’ or ‘use’ the HACCP jargon. The removal of technical decision making from the business with the outputs,

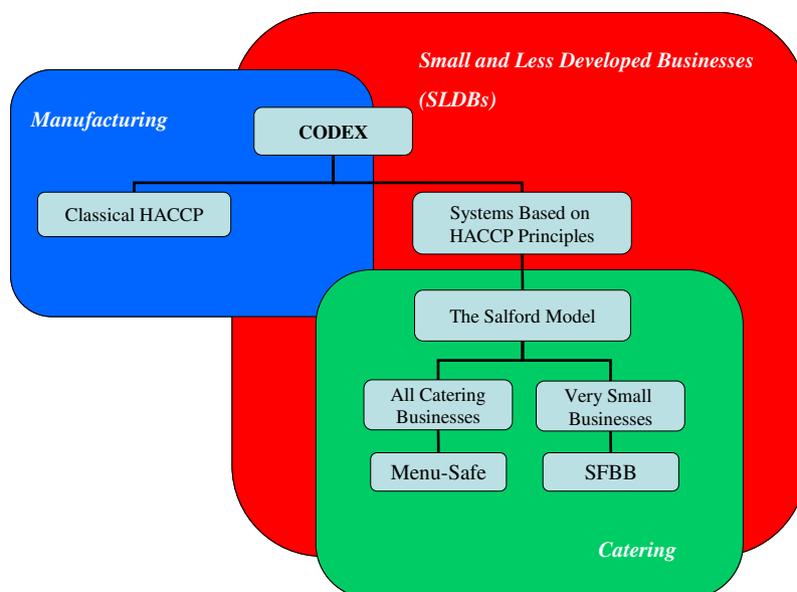


Fig. 4. HACCP methods based based on Codex principles.

derived and validated externally, integrated into the system, is also shown to be a way forward for businesses with minimal technical knowledge.

The ‘Salford Model’ has had far reaching effects on the Governments perception of the catering industry and subsequent policy. In particular the decision to accept the role of management within HACCP and to legitimise close supervision, rather than paper, as an appropriate management style for small businesses. The incorporation of ‘exception reporting’ and a section on management ‘Control’ within the new system—despite there being no explicit legal requirement for this – is evidence of this new thinking.

This project began with a general review of HACCP training that concluded that there was a need for better quality, and greater accessibility, of training across all industry sectors (Taylor, 2002). With regard to the catering industry it was recognised that the new system provided a template for training at a more practical and appropriate level. As a consequence the FSA has already initiated action within the Qualifications & Curriculum Authority, Sector Skills Agency and Professional Bodies and in 2006 new National Occupational Standards for the catering industry were launched.

Perhaps of most significance is the acceptance that caterers are not usually ‘out to poison customers’ and will respond positively to advice and guidance if it is seen to have come from a credible source and presented in an appropriate manner.

In late 2005 plans were announced to roll-out SFBB to businesses across England (FSA, 2005). A £10 million budget was been allocated to be spread over 3 years with money going directly to available local authorities. It is recommended that the success of this initiative be rigorously evaluated, using some of the tools developed and used so successfully in the development phase of this project.

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