

Reducing the burden of HACCP on SMEs [☆]

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Received 30 November 2003; received in revised form 14 June 2004; accepted 15 June 2004

Abstract

Despite the acknowledged contribution of Small and Medium Enterprises (SMEs) to the food industry there is increasing evidence that Hazard Analysis Critical Control Point (HACCP) implementation is limited in this sector, with the burden of implementation perceived as potentially insurmountable. Using an action research methodology, this in-depth, government funded research project took the form of a two stage, 18 month investigation into methods of reducing burdens of HACCP on SMEs. Stage one indicted that SMEs see HACCP as a difficult, complex set of activities requiring great amounts of time effort and with few, if any, perceived benefits. In stage two, however, with the help of research tools developed, a number of SMEs completed HACCP and many made good progress on a tight timescale. This research thus concludes that SMEs can achieve HACCP if they are provided with sufficient guidance and support in a context of general consensus of HACCP terminology and requirements. Recommendations are made, many of which have been subsequently adopted by the UK Food Standards Agency.

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Keywords: HACCP; SMEs; Implementation; Burdens; Action research

1. Introduction

Practical experience and a review of food safety literature indicates that success in developing, installing, monitoring and verifying a successful Hazard Analysis Critical Control Point (HACCP) system is dependent on overcoming a complex mix of managerial, organisational and technical hurdles. In coping with this set of interrelating factors, even the largest food companies, equipped with significant resources of money, technical expertise and management skills face a difficult chal-

lenge; the Small and Medium size Enterprises (SMEs) often feel that the difficulties of HACCP are potentially insurmountable (Route, 2001; Gilling, Taylor, Kane, & Taylor, 2001; Taylor, 2001). These problems are particularly salient when considering the impending European legislation that will require documented HACCP in all food businesses from 2006.

That HACCP is limited within SMEs is indeed reflected in recent studies in the UK and Europe, which found them less likely to invest in hygiene and food safety than large companies and less likely to have a HACCP system in place (Gormley, 1999; Mortlock, Peters, & Griffith, 1999). One study identified that for companies with less than 50 staff, HACCP implementation decreased proportionately to the decrease in number of employees (Paniscello, Quantick, & Knowles, 1999). It is evident, however, that SMEs contribute substantially to the production, manufacture and retail of food in both advanced and developing countries, and

[☆] This research was funded by the Ministry of Agriculture Fisheries and Food (MAFF) and was carried out with support from an expert advisory panel including Mike Dillon, Tony Mayes, Sara Mortimore Carol Wallace.

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the safety of their food operations affects the integrity of the entire chain (Department of Trade and Industry, 1998). The application of HACCP systems within SMEs is therefore a major step forward in protecting public health, and solutions to the many problems currently inherent in this task are thus an important focus of enquiry (World Health Organisation, 2000).

This paper describes the results of a two stage, 18 month government funded project carried out during 1998 and 1999 in the North West of England, which took the form of a novel and highly in-depth investigation into methods of reducing burdens of HACCP for SMEs. It aimed to uncover general problems, propose solutions and identify opportunities for SMEs in their attempt to develop systems that are technically sound, appropriate and manageable.

2. Method

This project used an in-depth action research approach to avoid the methodological limitations of self-reporting and data gathering by survey (Oppenheim, 1973). It was divided into two stages.

2.1. Stage one: development and testing of research questions and creation of the HACCP 'tool kit'

A review of the literature was undertaken leading to the construction of a comprehensive, computerised database of HACCP research results published over the last twenty years (Taylor & Taylor, 2000). Following an open invitation to all SMEs in Preston a structured workshop involving 30 local businesses was then undertaken. The outputs from these two activities were used to compile a complete set of research questions involving technical, organisational and managerial issues.

A thorough search through trade bodies, local authorities and suppliers in the North West led to the discovery of 11 SMEs with a HACCP system in place. An in-depth examination of their HACCP activities was conducted using the research instruments developed above. This involved both detailed questioning and an examination of plant, equipment, workforce and documentation. Six of the eleven businesses met the selection criteria by having a fully documented HACCP system.

Discussion with industry representatives/pilot site managers/EHO's and others at these six sites suggested that a model was needed which could guide SMEs through the entire HACCP process. Essential elements of the model were identified as (1) that it would build on existing good practice (2) it would be user friendly (3) generate Good Hygiene Practice (GHP) (4) focus on the true number of CCP's and thereby (5) reduce record keeping and (6) ease verification. Based on these parameters a 'tool-kit' approach was developed (see

The 'tool-kit' model components:	
1.	Affidavit from senior manager accepting the need for HACCP and supporting the implementation plan.
2.	Project plan giving time and activities required.
3.	Management tools: self-diagnostic audit, team building activities, problem solving, project planning.
4.	Technical tools: guide to GHP, guide to HACCP.
5.	Structured documentation: GHP template, HACCP template.
6.	Software guidance notes.

Fig. 1. The toolkit approach to HACCP (adapted from Kane & Taylor, 2000).

Fig. 1), adapted from Kane and Taylor (2000). This was designed to yield maximum safety with minimum effort, particularly in terms of documentation. This was coined the Min–Max Model.

2.2. Stage 2: from 'review' to 'action research'

Using a database provided by North West Fine Foods, an umbrella organisation representing 200 SMEs in the North West, all of these businesses were invited to take part in Stage 2. Of the 36 that volunteered, the four smallest food businesses were selected for an initial piloting phase. The tool-kit model was explained and demonstrated to them after which very positive initial feedback was obtained.

Following this, an 'action research' methodology was developed whereby the tool-kit would be applied to the implementation of actual HACCP systems in a number of sector specific SMEs. Action research is an approach developed by the contention that complex social systems cannot be reduced for meaningful study, and that they can be studied best by introducing changes into the process and observing the effects of these (Lewin, 1947). It was felt that this approach would enable the most realistic assessment of the tool-kit utility.

Overall, 30 of the 34 businesses met the selection criteria and were thus suitable for this next stage of the research (see Fig. 2). Each company either had no existing HACCP system or had decided to completely overhaul their present system. A research protocol was written and businesses agreed to undertake the activities required. For example, they agreed to keep a diary of activities, undertake a serious attempt to achieve HACCP, produce an affidavit from senior management agreeing to provide all reasonable time and resources to develop and install HACCP, attend a series of training events and allow access to their premises and documentation. It was also laid down in the research protocol

ID	INDUSTRY SECTOR	TYPE OF BUSINESS
1	Primary Producers	Game Production
2	Primary Converters	Meat Slaughter House
3		Egg Packing Company
4		Meat Processing Plant
5		Meat Cutting Plant
6		Smoked Meat Producer
7		Manufacturers
8	Dairy – Cheese Producer	
9	Dairy – Ice Cream Producer	
10	Chutney Manufacturer	
11	Christmas Pudding Manufacturer	
12	Pickle Manufacturer	
13	Pizza Manufacturers	
14	Pies and Pates Production	
15	Confectionary Manufacturers	
16	Cook-Chill Meal Production	
17	Bakery	
18	Snack Manufacturers	
19	Fudge Manufacturers	
20	Sandwich Production	
21	Caterers	Bakers Function Catering
22		Public House Restaurant
23		Nursing Home Catering
24		School Catering
25		Function Catering Business
26		Catering Butcher Business
27		Institution Catering
28	Retailers	Fish and Chip Business
29		Baker Retailer
30		Retail

Fig. 2. Sites for stage 2 field research.

that the research team would not produce the HACCP plan or imply or impose their own views/demands of a HACCP system on the 24 food businesses involved.

The time frame for the action research activities was six months, and it was intended that a HACCP system would be developed for at least one product line within this time. The 30 food businesses involved were provided with a wide variety of support materials, consultancy, training and IT facilities which could be accessed on a voluntary basis only. Their local Environmental Health Officers (EHO's) were invited to participate in the project and many enthusiastically attended the training days and workshops.

The tool-kit model was further refined during this second stage and its utility firmly established.

2.3. Results: stage one

2.3.1. Excess, erroneous documentation

The results indicated that documentation and record keeping overburdened most of the HACCP systems investigated. Close examination of the nature of the documents used in the pilot sites revealed a general 'clutter' of HACCP plans and recording forms with plans often not related to the process on site and many documents out of date.

It was also revealed that decision-making processes concerning CCP's were frequently unfocused, inaccurate

and invalid. They demonstrated attempts to control Good Hygiene Practice (GHP) and quality issues through HACCP documentation, with a consequence of too many CCP's and often no real of control of any of them. Furthermore, the critical limits documented were often expressed as 'general targets' and there was a failure to monitor them effectively. Subsequent corrective action plans were found to be incomplete.

2.3.2. Limited flowcharting

The pilot sites made only limited use of flow charting despite the fact that the development and control of HACCP systems is aided by a clear vision of the complex sets of relationships, processes and flows involved. The use of charts and charting software would help SMEs considerably in the exploration of issues of potential or actual process or product failure. However, software to develop or manage the HACCP system was not used in any of the sites despite the wide availability and cost of commercial packages.

2.3.3. Lack of validation and verification

There was little evidence of documented validation activities in the pilot sites. It was clear from the interviews that most owner-managers had little idea what the term meant or how they could validate their own systems. Internal verification was identified as the responsibility of the Environmental Health Officer

(EHO) by owner-managers of the small businesses. The medium sized companies, however, did undertake limited auditing activities. As with other forms of record keeping there was no clear strategy or focus attached to these activities.

2.3.4. *Insufficient expertise and training*

The time taken in developing a HACCP plan varied greatly from less than three months to more than a year. An important factor in the slow and inappropriate development of HACCP was identified as a lack of knowledge of both HACCP methodology and food safety. There was a clear difference between small and medium sized companies with the latter having technical managers on-site and the resources to buy in technical expertise as needed. The smaller companies did not have sufficient in-house expertise in HACCP methodology and were wary, even if money was available, of hiring consultants to give them the guidance they needed. They relied, instead, on the regular visits of the EHO's.

Managers from only two of the pilot sites had undertaken training in HACCP methodology. This corresponded to a better understanding of the system and more focused identification of CCP's. Technical qualifications were restricted to short professional courses in Food Hygiene, except for Site 6 (meat cutting plant) where a graduate technologist was employed.

2.3.5. *Lack of management skills*

The results identified significant issues relating to company management and organisation. These were that a combination of strong leadership and strong culture (i.e. the acceptance of a common set of values by all those working in a business) facilitated the development of HACCP. It is interesting to note that the better HACCP plans originated in organisations where employee involvement is high.

Implementation of the HACCP system also appeared to be delayed due to a lack of management skills in organising the project. Project management is a tool for achieving objectives within a set time frame, to cost and to the quality demanded, yet no companies in the sample used it to manage the HACCP implementation process. Indeed, none of the *P* companies questioned identified HACCP as a 'project' that would need planning in a special way in order to achieve it effectively and within a particular time and cost frame.

2.4. *Results: stage two*

2.4.1. *Utility of the 'tool kit' approach*

Stage 2 of this project attempted to test the tool-kit model developed from earlier responses of Stage 1 businesses. The tool-kit (see Fig. 1) consisted of a series of guides to managerial, organisational and technical issues framed within an incremental approach to HACCP that

provided technical and managerial training and consultancy. At the end of the set six month period a number of businesses had achieved HACCP whilst others were at various points on the way to HACCP. This indicates that the tool-kit incremental approach has utility and can help smooth the path to achieving HACCP for the small business.

2.4.2. *Documentation*

The tool-kit provided structured documentation in an attempt to reduce the tendency to over-document. It was noticeable that as businesses were guided through the HACCP process they naturally developed appropriate and relevant documents as and when needed. The simplified templates provided were superseded by system specific documents as their confidence in their own understanding of HACCP increased. This confirmed the stage 1 finding that documentation problems were symptomatic of lack of understanding of HACCP, and that minimum necessary documentation can be achieved if the CCP's identified are only those related to specific and significant safety issues.

2.4.3. *Pre-requisite GHP*

The SMEs found the separation of GHP and HACCP in the toolkit forced them to focus on their current controls on food safety. The activity of documenting GHP proved less onerous than the businesses at first expected, and was often achieved by simply collating documents they already possessed. This had high value for the SMEs in providing a solid foundation for further development. Also, an increasing clarification of the role of GHP in food safety lead directly to an increasingly sophisticated understanding of HACCP. This reduced the number of CCP's dramatically by identifying correctly the few real critical control points.

2.4.4. *Computer software*

The provision of flow-charting software was enthusiastically adopted by the businesses in order to make their hand-written charts more 'professional'. The interactive nature of the specialist software enabled them to produce the required complex diagrams with a minimum of effort.

A range of proprietary HACCP software was available, but proved of very little use to the participants, who felt (a) the time required to achieve familiarity was unacceptable; (b) it lead to confusion through the production of unnecessary documentation (c) it could not automate the HACCP decision making process.

2.4.5. *Hazard analysis*

Hazard analysis proved to be the most significant stumbling block for the participants. Despite training in basic microbiology the participants needed extensive one-to-one guidance to undertake any competent assess-

ment of microbial risk. The available generic HACCP guides (produced by governmental and trade bodies), were of limited utility for undertaking hazard analysis.

2.4.6. Validation and verification

Guidance was provided on the need for validating and verifying the participants' HACCP plans. Yet, even after training and support they could not accept that verification or validation was their responsibility. The EHO was frequently cited as responsible for these activities.

2.4.7. Management tools

The participants were positively responsive to these tools, particularly as they were of value in other areas of their operation. They recognised the importance of involving employees in the HACCP process and ways of improving team-building activities were eagerly adopted by many businesses, especially those with more than ten staff.

2.4.8. Constraints on the success of the 'tool-kit' model

Having the motivation to achieve HACCP has been identified as a principle factor in actually developing the system, given the constraints of time and resources. Despite a written 'affidavit' of commitment, however, almost one third of those participants who began the project stopped after the induction day. Follow up interviews revealed that they believed joining the project would provide them with an 'off the shelf' HACCP system requiring no further work!

Even with problems of motivation overcome, the model of minimum documentation can only be achieved if the CCP's identified are those related to significant safety issues. The observed use of the HACCP system for multiple purposes such as controlling quality and customer requirements are therefore major constraints on the success of model. This again directs the use of the model in the small business sector, which is in greater need of support and less likely to be influenced by the demands of customers.

3. Conclusion and recommendations

3.1. HACCP: it can work for SMEs

The investigation of the burden of HACCP in SMEs uncovered a plethora of problems that combine to confound simplistic attempts to improve uptake of HACCP. However, when SMEs were fully versed in the principles of HACCP (Stage 2 sites) they had the confidence to (a) make decisions about the level and type of documents required for the safety of their product and (b) negotiate with external parties in order to maintain the integrity of their system. It is concluded

that HACCP implementation problems can be partially helped by providing simplified documents or streamlined verification methods, but only in an overall context of training and support that addresses the primary problem—that of the SME's basic lack of understanding of the HACCP approach.

This research has identified a notable difference between small and medium sized businesses. On almost all parameters the medium business more closely resembles a large concern than a small one (see Fig. 3). Whilst it is acknowledged that companies of all sizes have problems with HACCP it is recommended that *resources are focused on the small and less developed companies where there is greatest need*. It is proposed that further research and development work should concentrate on the small business sector, and it is for this sector in particular that the following recommendations are put forward.

3.2. Recommendation one: support and guidance

To ensure the necessary high quality guidance and support the following initiatives are suggested:

3.2.1. HACCP resource centres

The provision of 'Resource Centres' where SMEs can access data, software, research information and advice on HACCP are recommended. These centres need to be geographically accessible and supported by central funding. A diagrammatic view of the nature of the centres is shown below in Fig. 4.

3.2.2. Beacon SMEs

Lacking a clear vision of what HACCP 'looks like' is a major barrier to successful implementation. *Technology transfer could be effectively promoted by the identification of exemplary SME's who could act as 'beacons' of good practice.* As in other settings (e.g. education and the health service) there would need to be financial incentives for companies willing to open their doors and share knowledge and experience of the HACCP process.

3.2.3. Operation specific guides (OSG's)

The inability of most SMEs to competently undertake hazard analysis limits the usefulness of generic models. *Operation Specific Guides are required which address the diversity of operations within each sector of the food industry.*

3.2.4. Management 'Tool-kits'

Step-by-step instructions on project managing the HACCP process, using teams/involvement successfully, solving problems and, most importantly, managing change would be of considerable benefit to SMEs. Indeed, in this way, HACCP could provide a cost-effective way of

	SMALL	MEDIUM
ADVANTAGES	<ul style="list-style-type: none"> • Involvement of management & staff. • Commitment. • Tangible sense of responsibility to the consumer/customer. • Strong organisational culture. • Low labour turnover. 	<ul style="list-style-type: none"> • Technical expertise • Money • Management skills • Clear organisational structure • Ability to operate internal verification scheme
DISADVANTAGES	<ul style="list-style-type: none"> • Lack of technical expertise. • Lack of money. • Lack of time. • Lack of management skills. • No clear management structure 	<ul style="list-style-type: none"> • Lack of involvement • 3rd party audit driven • Distance from customer/consumer

Fig. 3. A comparison of small and medium sized food companies.

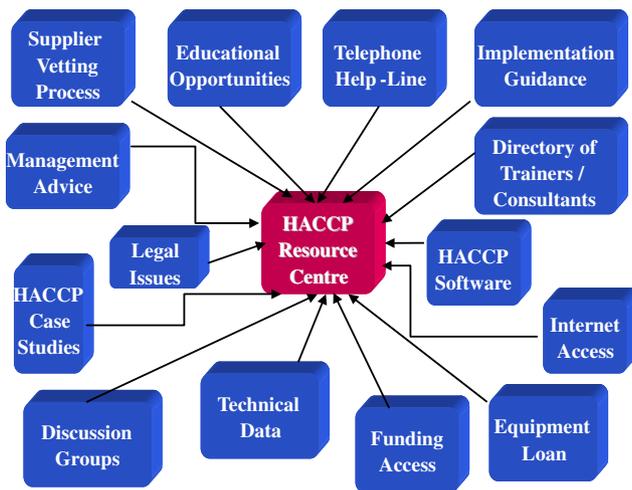


Fig. 4. The nature of the HACCP resource centre.

introducing modern management techniques into such companies.

3.2.5. *Certificated expertise*

Evidence from this project indicates that reliance on market forces to produce competent consultants and auditors has been a failure. *A certification system is needed which will require all those offering HACCP services to have appropriate levels of knowledge, training and experience of HACCP.*

Underpinning a certification system would be *the provision of training and education that would produce such high calibre specialists.* This would ideally be based in tertiary level education where there is rigorous quality control.

3.2.6. *Rewards and sanctions*

SMEs make rational judgements about the relative costs and benefits of undertaking HAM, and for many it is not worthwhile progressing. *Consideration needs to be paid to the development of suitable sanctions and rewards that would encourage targeted uptake amongst SMEs.*

3.3. *Recommendation two: consensus*

The context for successful initiatives, as described above, needs to be one of more general agreement amongst retailers, Third party auditors, enforcement officers and policy makers concerning HACCP. *It is recommended that the government facilitate a drive toward consensus of how HACCP should be implemented in the SME sector.* An issue that requires particular focus is that of *who is to validate and verify the SMEs HACCP plans,* as these activities are beyond the competence of most SMEs at the moment.

3.4. *Recommendation three: research*

More research is needed to identify how to encourage SMEs to undertake HACCP. In particular, there is a need to identify the specific hurdles that companies face at each step of the HACCP process and to develop successful intervention strategies. Practitioner-led research is necessary to develop functional Operation Specific Guides (OSG's) and on-going, independent evaluation is recommended for any other HACCP initiatives.

4. Update

In 2001, the Food Standards Agency delivered a HACCP implementation paper to a public FSA Board meeting. Many of the recommendations made in this paper have been adopted within this strategy, and Professor Taylor is currently working on secondment with the FSA to assist in their application.

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