Understanding the barriers to food safety scheme certification in the food and drink manufacturing industry in Wales, UK.

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Abstract:

It is increasingly essential for food manufacturers to have food safety certification. Little is known about certification in the Welsh food industry. This study aimed to explore perceptions of Welsh manufacturers regarding the drivers, benefits and barriers to obtaining certification. Focus groups with manufacturers and stakeholders (*n*=68) were conducted. 'Customer requirement' and 'product safety' were drivers for obtaining certification. Benefits related to 'food safety culture', 'supply chain security', 'brand protection', due diligence', 'business growth' and 'job security'. Barriers were complex, often interrelated and were broadly defines as, 'knowledge and skills', 'time, cost and resources', and 'communication and access to information'. The research identifies the need to explore requirements for support to enable food manufacturers in Wales to overcome identified barriers. Such data may inform the design and development of support mechanisms to increase uptake of food safety certification and accelerate food sector growth in-line with Welsh Government aspirations.

Keywords:

Perceptions, Barriers, Drivers, Benefits, Certification, Food Manufacturing,

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Main introduction.

Food safety schemes are essential to the food and drink industry. Food safety schemes provide the framework for compliance within the industry to assist in the production of safe and legal food (BRC 2018). Schemes aim to fulfil legal compliance and maintain both brand and consumer protection (Manning and Baines 2004). Food safety schemes are differentiated by having their own criteria for food safety, quality and operational control. The leading schemes aim to define the standards that food and drink manufacturing businesses should meet. Over time, these schemes intend to raise standards to improve the overall performance of the entire food and drink industry.

Globalization of the food supply means that compliance with privately operated schemes is often a prerequisite to supply (Manning and Baines 2004). Globalization of the food supply and the increased trend towards privatization of market governance are all key factors in the increase in private schemes (Henson and Humphrey 2009). These schemes are produced by stakeholders such as the British Retail Consortium (BRC) (Manning and Baines 2004). A trend has been observed over the last 15 years, which suggests that a number of food manufacturers in the UK, have moved away from generic ISO certification, towards bespoke 3rd Party certification standards. Such alternative 3rd Party certification schemes are voluntary, and are said to have been developed in a response to the need for such standards to closely match the requirements of the industry and the need to rationalize retailer-specific compliance schemes (Grigg and McAlinden 2001).

Food Safety Management Systems (FSMS) give certainty that effective food safety controls are implemented, such systems are certified by an independent third party organisation, which are accredited by a national accreditation body (such as the United Kingdom Accreditation Services (UKAS) in the UK) (Mensah and Julien 2011).

Swoffer (2005) describes a ‘retail revolution’ in the UK, in which UK retailers are the main drivers of the development of FSMS in Europe, they have been proactively involved with the development of FSMS such as Assured Farm Schemes, GlobalGAP and the BRC Global Standard

for Food Safety it is said that these Standards have become widespread in use and have been used as the framework for other Standards (Swoffer 2005).

One of the key market drivers in the level of penetration of schemes is the retailer's need to meet their due diligence requirements. There is also an added business benefit in reducing the cost of the retailers own involvement in the inspection of their immediate suppliers and previous suppliers in the food supply chain (Manning and Baines 2004). Indeed, Manning outlines that the three key stakeholder drivers are legislation, the development of private FSMS and the protection of the product brand (Manning 2007). Furthermore, it is discussed that effective FSMS must be at the core of organizational strategy. Holleran et al. (1999) separate FSMS into three groups, these are: International standards (ISO 9000); National assurance standards (line marks, assured produce), and proprietary quality assurance systems (defined by retailers and stakeholders, such as BRC) (Holleran et al. 1999).

There are several key factors that have resulted in the proliferation and evolution of private standards. Key factors include continued reforms in schemes (as a response to real and/or perceived risks, and the need to include more stringent requirements), a greater emphasis on control of the processes by which food is brought to market and a greater emphasis on the responsibility of private sector food manufacturers in ensuring that food is safe for consumers. The Elliott Review into the integrity and assurance of food supply networks in the UK recommended that the value of audit and assurance regimes must be recognized in identifying the risk of food crime in supply chains (Elliott 2014).

It is suggested that there is a need to develop a consistent set of reliable and valid measures to explore perceived barriers and benefits from the implementation of 3rd Party certified FSMS (Qijun and Batt 2016). Research suggests that food manufacturers with limited knowledge of the process of FSMS certification are largely unaware of the high costs and paperwork required to obtain certification (Qijun and Batt 2016). Research conducted in the USA determined that the most common reasons for becoming compliant was to meet customers' requirements. Enhancing food

safety and remaining competitive were other reasons given for becoming compliant (Crandall et al. 2012), however given that such data on UK food manufacturers and particularly those in Wales are limited, there is a need for research with food manufacturers in Wales to identify the drivers, barriers and benefits of food safety scheme compliance.

The Welsh Government Action Plan for the Food and Drink Industry 2014-2020 (Welsh Government 2014) demonstrates a clear commitment to promote and support the uptake of recognized food safety schemes of food, drink and feed businesses in Wales. Although data is limited, it is anticipated that less than a fifth of food manufacturers in Wales have certification against a third party certification scheme such as BRC or SALSA (Safe and Local Supplier Approval, a UK based food safety assurance certification for small and micro businesses) (Ellis et al. 2016).

There is limited UK data detailing the factors associated with obtaining compliance to schemes, for this reason, there is a need to obtain an in-depth understanding of the barriers that exist to food manufacturers, particularly in Wales to obtaining and maintaining food safety schemes. Such data may inform the development of support mechanisms to enable increased certification and accelerate food sector growth in line with Welsh Government aspirations (Welsh Government 2014).

Materials and methods.

Design and development.

A thorough literature review was conducted to obtain insight of UK and international food safety schemes and to collate data regarding perceptions of the food industry regarding food safety schemes. The findings from the desk-based review were used in the development of documentation to conduct focus groups and interviews. Key topics for the focus groups included the perceived drivers, benefits, and barriers for food manufacturers in Wales to obtain and maintain certification.

Recruitment.

The ***[institution name removed]***, Welsh food and drink producers' directory was utilized to identify

manufacturing businesses of varying sizes, both with and without certification in Wales (*n*=403). Project invitations with participant information sheets were sent to managing directors, technical managers and owners of identified food manufacturers. Retail representatives and stakeholders were contacted via personal communications with industry contacts of the ***[institution name removed]*** technical team. Project invitations were also sent to local authority environmental health teams and the national procurement service. No monetary incentives were provided for participation in the study.

Data collection.

All participants were provided with a participant information sheet and the opportunity to ask questions prior to participation. Consent for participation in focus groups was obtained by completion of a participant consent form. Consent for participation in telephone interviews was recorded by means of both completion of a consent form and audio-recorded verbal consent prior to commencement of the telephone interview. Focus groups and interviews were digitally audio recorded using two Dictaphones (Olympus VN-733PC Digital Voice Recorder, Tokyo, Japan) and completion took up to 60 minutes.

Focus groups (*n*=7) were conducted at ZERO2FIVE Food Industry Centre in Cardiff and the Welsh Government office in Llandudno Junction to enable involvement of food manufacturers from across Wales. Each focus group was conducted with a facilitator and a moderator. The focus group participants included; auditors and mentors (*n*=9, in one focus group), manufacturers (*n*=37, in four focus groups), and food safety scheme stakeholder (*n*=19, in two focus groups). Additionally, one-to-one telephone interviews were conducted with retail representatives from major supermarkets in the UK (*n*=3) utilising the same discussion points as the focus groups, this method was utilised as national retail representatives were unable to participate in a focus group.

Three main open-ended discussion points for the focus groups were included in the question guide, which included “What are the driving factor to obtain food safety scheme certification?”, “What are the benefits of having food safety scheme certification?” and “In your experience, what

are the barriers in achieving requirements to obtain (and maintain) food safety certification?", relevant probing questions were asked thereafter to explore the areas further.

Data analysis.

Audio files of focus groups and telephone interviews were transcribed into a word processor document (Microsoft Word, 2010; Microsoft Corporation, Redmond WA), and thematic analysis was conducted using NVivo 10 (QSR International, Cambridge, MA) to determine common trends and to identify the benefits, drivers, barriers and potential support mechanisms. Two researchers were responsible for transcribing the audio files and coding the transcriptions. Codes for responses to the three discussion areas were identified by one analyst, the second analyst reviewed to ensure agreement. This was conducted for all seven focus groups, with the analysts alternating roles on each. Codes that were identified as being similar were aggregated to form major themes. Identified themes were discussed with the facilitators of the focus groups.

Ethical approval.

Ethical approval for the project and all associated documentation was sought and obtained from the School Research and Ethics Committee at Cardiff Metropolitan University (SREC reference number: 7720).

Results and discussion.

The research involved a total of 68 participants; which included BRC and SALSA auditors and mentors (*n*=9), representatives from major UK food retailers (*n*=3), stakeholders (*n*= 19) manufacturers with food safety certification (*n*=20) and manufacturers without food safety scheme certification (*n*=17). Of the manufacturing participants (*n*=37), as indicated in Table 1, 43% were owners, 43% were technical mangers/supervisors and 14% were managers. The majority represented micro (38%, fewer than 10 staff) and small businesses 35% (fewer than 50 staff) medium (<250 staff large 250+ the majority (41%) were from the bakery sector 16% were manufacturers of chilled and/or frozen ready-to-eat and ready-to-heat food products and 11% were manufacturers of raw

prepared products (meat and vegetarian). A third (32%) of the manufacturing participants had BRC certification (seven having grade AA, one with grade A+, three with grade A and one with grade B), a further 34% had SALSA certification (Safe and Local Supplier Approval, a UK based food safety assurance certification for small and micro businesses).

Stakeholder participants included representatives from local authority environmental health teams (*n*=7), national procurement service (*n*=3) Welsh Government and non-ministerial Government departments (*n*=6) and food safety scheme owners (*n*=3).

Perceived drivers for obtaining food safety certification in Wales.

Two clear key factors were identified as drivers for obtaining compliance to food safety schemes, which were internal and external drivers, including customer requirements and product safety. A number of respondents identified customer pressure and customer pre-requisites as drivers for obtaining certification. It was identified that if customers did not require compliance to a food safety scheme, it would be unlikely that many manufacturers would work towards it. *"Customer requirement is the main thing. If they didn't insist on it, would we do it all?"* (Participant 15, technical manager, manufacturer with food safety certification). *"I think that the biggest one is that it's the customers that drive it, not the food processing facility"* (Participant 05, mentor). Although some suggested that compliance to a standard was initially used as a marketing benefit for businesses. However, in recent years, this view has changed and it has become a customer requirement, *"It's almost becoming the industry standard then, if you haven't got it, you can't trade"* (Participant 45, director of an SME bakery, without certification). Having certification has become a prerequisite to trade; *"From our brand perspective, we have in our 'Requirements for Trade' that obtaining BRC certification for all food is the technical entry level to supply"* (Participant 66, retail representative).

Ensuring product safety was the second major driver for manufacturers in Wales to obtain compliance to a food safety scheme *"You know that the product being sold is safe"* (Participant 35, co-owner of a micro-business producing bakery items, without certification). Food safety in

particular, ensuring due diligence was the perceived driver among auditors and retail representatives alike. *"The key legal one, which is of course that this will generate an efficient due diligence defence scheme for people should they ever need to call up on it"* (Participant 02, scheme auditor/mentor). *"Due diligence in place, if something goes wrong the companies have the processes and systems in place to complete a withdrawal or recall – to produce a consistent, safe, legal, quality product"* (Participant 68, retail representative). Findings from this study relate to previous research that suggest businesses implement third party certified FSMS because they are required to do so by their customers (Taylor 2001; Karipidis et al. 2009; Qijun and Batt 2016) and that implementing FSMS improves product quality and safety (Macheka et al. 2013).

Perceived benefits to Welsh food manufacturing businesses from obtaining food safety certification.

Multiple factors were identified during the focus groups as benefits of obtaining food safety certification. As indicated in Figure 1, these related to culture, business growth, due diligence, brand protection, and supply chain security. Company 'culture' may be improved when businesses comply with a food safety scheme. *"Food safety can initially be seen as just something the technical team own or have to deliver, whereas when a company embarks on a project to obtain certification, I think the awareness of food safety, when it is done properly in the business, becomes much more than just a technical responsibility. I think this awareness can really benefit the whole business"* (Participant 66, retail representative).

Business growth was a major benefit identified by many. Discussions highlighted that obtaining certification can result in staff upskilling, increased confidence, improved morale and job security. Appropriately trained staff positively benefit the performance of a business by strengthening the organization. *"Allows staff to build up and acquire higher established jobs"* (Participant 65, food inspector). It was suggested that certification, can retain business, therefore securing jobs, "*You're maintaining those high level standards, so people keep their jobs, the factory doesn't shut"* (Participant 39, head of technical, gluten-free manufacturer without certification),

which is particularly important in rural areas of Wales *"Securing jobs as well, for the local environment and the local areas"* (Participant 46, Director of a manufacturer without certification). Compliance can facilitate trade by opening opportunity to supply to new markets, and 'confidence for suppliers' was a major benefit; *"Obtaining certification against a food safety scheme does show that suppliers have met the basic requirements of a scheme. Which allows our brand to focus on aspects which can deliver competitive advantage, rather than having to do audits that focus on what our brand would consider to be the basic requirements to meet food safety"* (Participant 66, retail representative). Participants also perceived that the reputation, profile and profitability of the business was improved by gaining certification. "*You'll probably be more likely to grow and attract more customers*" (Participant 37, operations manager of processing business without certification). *"The food safety system will improve the profitability of the business"* (Participant 02, food safety scheme auditor and mentor).

Certification ensures systems are in place to maintain full product traceability, which is a legal requirement and supports the food supply chain in providing transparency and food security. The requirements of schemes reportedly helped improve the robustness of traceability and FSMS. Participants identified 'accountability' as a big benefit of certification, adding that the FSMS documentation provides the structure to their due diligence defence. *"Protects the supply chain… …a retailer has confidence"* (Participant 31, owner, biscuit manufacturer without food safety certification). This has a significant impact on the credibility of the business with customers, supply chain and stakeholders. *"Accountability side of thing, its great having records... That's another driver that if you are a large manufacturer supplying then you don't have a law suit on your hands"* (Participant 14, managing director, cake manufacturer with food safety certification).

Multiple factors including; improving legal issues, increasing client trust/customer confidence, improve quality of management, improve company image, increasing food quality and safety and the potential competitive advantages, have all previously been identified as potential benefits of implementing FSMS (Karaman et al. 2012; Fernando et al. 2014; Qijun and Batt 2016).

Few studies have discussed the potential impact of maintaining FSMS upon local employment. This may be a unique focus factor among Welsh food manufacturers, given the unique transition in rural areas of Wales from previously relying on heavy industries, such as mining and smelting for employment, to vast employment in the food sector in recent years.

Perceived barriers to obtaining food safety certification in Welsh food manufacturing businesses.

Discussions relating to barriers were more in-depth and complicated than in relation to the drivers and benefits. The words most frequently used in relation to the barriers included 'time, 'people', 'cost', 'management', and 'technical' (Figure 2). Further to this, thematic analysis of the focus group transcripts identified three areas perceived to be barriers to food safety scheme compliance, these included; (i) time, cost and resources allocation from management; (ii) knowledge and skills of employees; and (iii) communication and access to food safety scheme information from scheme owners. However, it must be noted that a number of factors, such as food safety culture and training within these areas relate to each other. Furthermore, some participants suggested that there may be differences between the barriers faced to achieve compliance and the barriers faced to maintain compliance; *"There are barriers to achieving accreditation and there are barriers to maintaining. Achieving you've got your initial set up costs your resources, human and financial. For maintaining, I can put the procedures in and train them and do it, but because we are not like a production line… It's two separate things"* (Participant 44, technical manager, catering butcher). The literature suggests that barriers to implementing certified FSMS can differ according to multiple factors including company size and product category (Taylor 2001). Many of the barriers identified in this study, related to previous international research exploring the potential barriers to businesses implementing FSMS (Panisello and Quantick 2001; Baş et al. 2007; Herath and Henson 2010; Karaman et al. 2012; Macheka et al. 2013; Mortlock 2014; Qijun and Batt 2016).

(i) Time, cost and resources allocation from management as barriers.

Manufacturers of all sizes, both with and without certification identified 'time' as a major barrier to obtaining certification. Documentation processes such as design, implementation, verification and review of FSMS was described as being 'time consuming'. *"Running the business takes up a lot of my time, and the time that's left goes towards putting effort into my accreditation"* (Participant 43, owner, confectionary business without certification). Along with 'time', 'money' was perceived to be a significant barrier to obtaining certification *"I can put it down to two basic things. Time and money… it's down to that, the time, and the cost, I can't afford to get a technical person in, so it's on my shoulders"* (Participant 43, owner, confectionary business without certification). Indeed 'time' and 'cost' were often interrelated. "*It's the money and the resource, for the people that do it, there's also for smaller companies the cost of actually having the audit, but for the big boys it's the actual resource, people to actually input the standard"* (Participant 01, SALSA Auditor). Concerns relating to 'money' related to the cost of design, implementation (changes to structure, equipment, and external resource for technical knowledge and support), maintenance and the supporting mechanisms such as recruitment, training and education. Significant investment is required in people, processes, products, equipment and the manufacturing environment in order to achieve certification. *"I think cost is obviously the biggest barrier. To achieve certain accreditations, there are certain requirements businesses need that sometimes their business size will not allow them to have. The obvious example being with the BRC standard for a high-risk factory. If you do not have positive air flow or a metal detector, both of which are very expensive investments, you cannot get your BRC accreditation"* (Participant 66, Retail representative).

Training and education costs are also a concern for larger businesses. The cost of releasing staff for external activities incurs both training costs and loss of staff from the work place. *"We often have one or two key people needing to go on a course but you need them on the factory floor so you can't afford to release them"* (Participant 39, head of technical gluten-free manufacturer without certification). "*Small businesses can't afford for their staff to be away for a prolonged period of*

time" (Participant 65, food inspector). Having more technical staff members would make it easier for businesses to manage the time allowed for audits and for gaining certification. It was suggested that duration of inspections or audits can often be lengthy and it can be problematic for micro and small businesses to accommodate, and may not be flexible to the working pattern or production of the business, *"It takes time to be audit ready"* (Participant 13, technical manager, food service provider). Technical activities such as food safety documentation completion, GMP audits and daily checks to ensure compliance with schemes can slow down or stop production which in turn may cause conflict within an organization. It was also noted that certification is not suitable for micro/small businesses where the standards expect 'independent internal audits' for example. Maintaining paperwork obligations of scheme can be time-consuming for businesses. Comments regarding food safety documentation included the abundance of the paperwork. Some participants felt that in smaller production sites, the relevance of some documentation had not been considered by the scheme owners. Frequently, businesses are producing the same documentation in more than one format to meet with multiple schemes.

The attitudes and commitment of senior management were also discussed to be a barrier to support and achieve certification and the impact management commitment can have on culture. Technical staff realize that without management commitment to the scheme, they do not get support from other involved departments such as finance or food handlers in production. It was suggested that in businesses whereby senior management commitment is evident, a stronger, fully-committed more confident team is apparent. Education, training and effective communication will directly impact the culture of an organization. Therefore, in order to drive continuous improvement to obtain certification, leadership, communication, education and training strategies need to be implemented by businesses, *"Management commitment is another big one, and that the management are committed to the investment to the time, committed to basically meeting customer requirements"* (Participant 04, SALSA auditor Mentor). *"From my experiences, it's the all-round 'food safety culture', I think the management team need to understand that you're working together as a single*

entity, so you need to be able to communicate from the bottom right to the very top" (Participant 36, business development manager, processing business without certification).

Previous research detailing the beliefs of food handlers' suggest that 'personnel', 'time' and 'cost and resource' issues were most frequently identified as potential barriers to conducting food safety actions (Clayton et al. 2002). Similarly, the cost of food safety programs was one of the main barriers to implementation of FSMS among the Turkish dairy industry (Karaman et al. 2012) and predominant barriers in Ontario were associated with finance such as internal budgetary constraints, problems of obtaining external funding, and other investments considered more important (Herath and Henson 2010).. The lack of external funding, the high cost of FSMS implementation, the high costs of certification and the lack of financial resources were principal component barriers to the adoption FSMS in the food processing sector in Shanghai, China (Qijun and Batt 2016).

(ii) Knowledge and skills of employees as barriers.

A number of businesses indicated they are unable to recruit skilled staff with relevant experience. Potential candidates often lack the knowledge and skills required to operate effectively in a food manufacturing environment. Such issues leads to increased costs in training, education and development of new employees. Employees in the sector are low paid and the industry does not attract the calibre of staff businesses require. Numerous participants commented on the industry shortage of qualified technical staff. The lack of technical expertise, which is essential for all businesses to obtain food safety certification was discussed at length and expanded to how the food industry should be more desirable for school leavers. *"The food industry on the whole has got a shortage of qualified technical staff, there is a general shortage"* (Participant 02, SALSA auditor/mentor), *"We've not got enough people coming through the right sort of courses to take the right sort of jobs to enable them to actually put these schemes in place, and they do exist"* (Participant 05, SALSA auditor/mentor). The focus groups established the lack of food graduates, and lack of qualified people as a potential barriers to food safety compliance. Suggestions were made in order to address this, *"There needs to be a concerted effort to get school children to understand*

what careers are out there, there is a perception that the food industry is all about working in kitchens" (Participant 49, national procurement representative).

It was suggested that trained staff were more likely to make competent decisions relating to food safety, legality and quality. *"Training is a key one. People don't know what they are expected to do"* (Participant 13, technical manager, food service provider). As a result, effective staff training will reduce the overall risk of a food safety incident within the industry. Consideration should be given to how Welsh businesses can access effective, relevant and affordable staff training. The potential costs associated with training, were deemed to be potential barriers, which have been discussed elsewhere. Recruiting the 'right person in the right job' was essential to maintain compliance to food safety schemes. *"We don't have a technical manager. And so to get a BRC, I believe we would need a technical manager… an overhead of forty thousand pound on top of a small firm is a very big cost"* (Participant 37, operations manager, processing business without certification). Businesses need support to identify the key personal attributes and qualifications required by potential new employees in order to recruit the optimal candidate who will add value to the business. Difficulties finding well-qualified staff and insufficient training were also identified barriers for olive producers in Turkey to implementing FSMS (Tunalioglu et al. 2012), similarly it is suggested that finding experienced and technically qualified staff to be one of the most important factors that can influence the successful implementation of FSMS (Taylor 2001).

(iii) Communication and access to food safety scheme information as a barrier.

Participants perceived there to be too many food safety certification schemes and that businesses find it difficult to know which scheme to work towards due to the lack of communication regarding schemes. Discussions indicated that selecting a suitable scheme could be a barrier as indicated in an excerpt of discussion between two stakeholders; *"The fact that there are multiple standards out there, and always there's one that isn't recognized and different customers want different standards"* (Participant 59), *"There's so many different accreditations, that you don't know them all"* (Participant 64), *"So maybe one of the barriers is knowing which standard is appropriate for your*

business" (Participant 59), this may suggest the need for greater communication to businesses regarding available and suitable schemes. Miscommunication regarding the need for food safety certification was an identified barrier with businesses being encouraged to obtain certification; *"I think there's confusion as well sometimes from a higher level, buyers are saying 'you need to get SALSA you need to get BRC' for businesses that it's not appropriate for. This confusion is fed from that level, and goes directly again into the suppliers and they are not quite sure where to go… there's a need for clarity to say which is appropriate for which type of business I think"* (Participant 61, environmental health officer). *"I think sometimes the buyer will be putting an unnecessary pressure on suppliers. If we can get buyers and procurement into a better understanding of the standards then they will put less burden on the suppliers"* (Participant 49, trading standards officer). Often businesses are required by customers to meet more than one scheme, which complicates the business obligations to compliance. It was highlighted that schemes can vary and may require different documentation to evidence the same action or activity. Participants would prefer schemes to be consolidated, so FSMS designed and implemented would satisfy all scheme owners' requirements.

The lack of awareness regarding food safety schemes and the need for information signposting were discussed; *"If we would have known about SALSA we would have tried to get it two years before"* (Participant 40, co-owner of ready-to-eat manufacturer without certification). *"Businesses need to be signposted to ask where the next step is. For smaller businesses, they are so busy doing what they are doing that they can't see what to do next"* (Participant 48, trading standards officer). Participants perceived a need for greater communication to manufacturers regarding the appropriateness of available schemes and the potential benefits from scheme holders. The questionable appropriateness of FSMS have previously been identified as a dominant barrier in some businesses to the implementation of FSMS (Herath and Henson 2010).

Limitations.

Potential limitations of the study include that data presented may not be indicative or representative of the entire food manufacturing sector, however this study gives a novel snapshot of the perceptions of food manufacturers in Wales.

Although this study has obtained qualitative data, there is a need to conduct quantitative research, such as a survey, to expand our understanding of the true number of manufacturers in Wales that obtain different types of food safety certification standards, and explore non-conformance audit data to explore specific issues faced in the food manufacturing sector in Wales. To facilitate support in obtaining certification, there is a need to explore the food safety scheme clauses which businesses obtain non-conformances against.

Further research is also required to explore the perceived barriers from the perspective of food handling production workers in the Welsh food industry, this would give an informative comparison to the perceptions of managerial staff, and may give insight to organizational subcultures in relation to attitudes towards food safety certification.

Conclusion.

Information detailing the issues faced by Welsh food manufacturing businesses to obtain food safety certification was lacking. Consequently, completion of this study has facilitated identification of the perceived barriers faced by businesses in obtaining food safety certification. Furthermore, the perceived drivers and benefits of certification have also been determined.

In addition to the food safety culture of organizations that may influence multiple factors in progressing towards certification, the potential barriers to obtain certification related to; (i) the time, cost and resources required to develop food safety management systems, the limited (ii) availability of skilled staff that are knowledgeable and technically experienced, and (iii) the lack of information regarding food safety certification schemes..

To increase the number of food manufacturers in Wales with food safety certification will contribute towards continued legal compliance, security of the food supply chain and will help

safeguard both brand and consumer protection. Given that less than a third of manufacturers in Wales have certification (BRC Global Standard or SALSA Standard), there is an opportunity for further growth in the proportion of businesses achieving certification. However, having identified potential barriers in this study, the research has also recognized the need for further research to explore what enabling processes and tools are required in the future to support and assist Welsh manufacturers to overcome identified barriers to obtaining certification. Although findings from this study may suggests a need for support mechanisms to assist with the development of skills and knowledge; improve information and communication, and facilitate access to financial support (as illustrated in figure 1); there is a need to identify the mechanisms that are perceived to be most appropriate, acceptable and effective by food manufacturers to overcome barriers to certification.

Such data may inform the design and development of bespoke support mechanisms to enable increased uptake of food safety certification and accelerate food sector growth in line with Welsh Government aspirations. Although literature suggest the need for governments to provide financial support to businesses to establish FSMS (Karaman et al. 2012), there is a need to explore what specific support mechanisms food manufacturers in Wales perceive to be necessary to overcome the barriers identified in this study.

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Figures

Figure 1 Identification of drivers, barriers and benefits of obtaining food safety certification and the need to identify support mechanisms to overcome barriers.

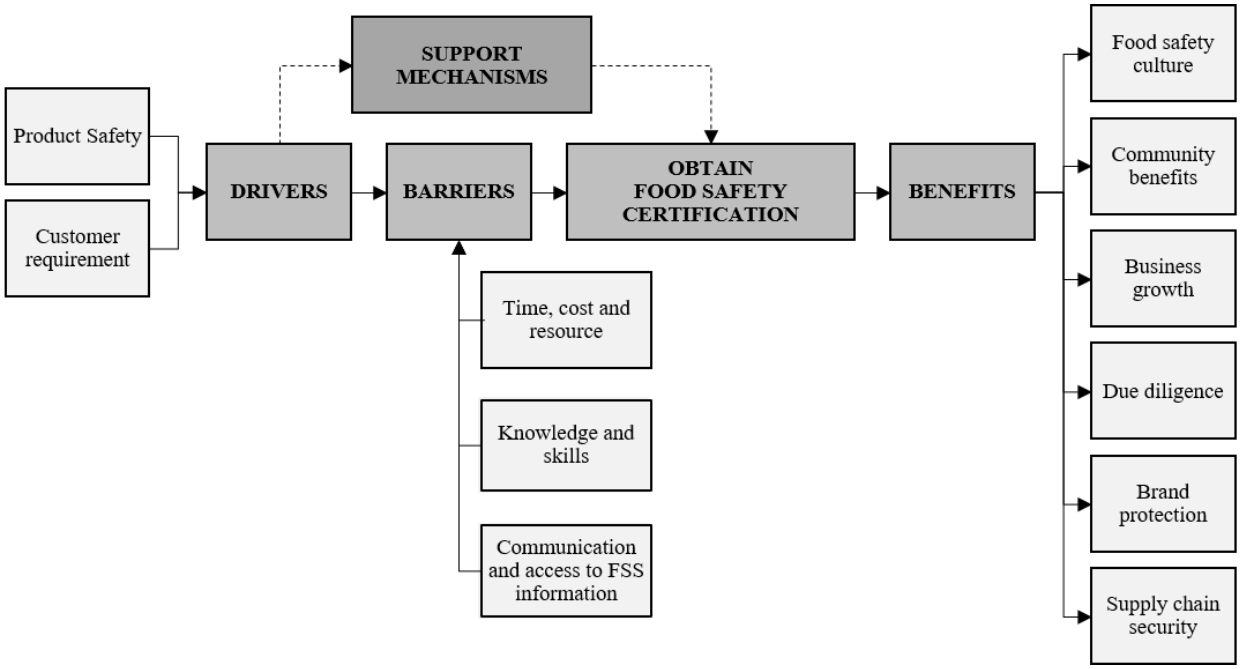

Figure 2 Word cloud indicating most frequently used words when discussing barriers to obtaining food safety certification.

Tables

Table 1 Demographic characteristics of manufacturing participants (n=37)

Demographic characteristics of manufacturing participants	**n**	**%**
Participant job role		
Manager	5	14
Owner	16	43
Technical	16	43
According to business size		
Large (>250 employees)	2	5
Medium (<250 employees)	8	22
Small (<50 employees)	13	35
Micro (<10 employees)	14	38
Certification held		
SALSA	9	24
BRC	12	32
BRC grade awarded		
AA+	1	3
AA	7	19
A	3	8
B	1	3
According to product categories		
Ambient stable food	3	8
Bakery Products	15	41
Confectionery	2	5
Dairy, liquid egg	2	5
Dried foods and ingredients	2	5
Fruits, vegetables and nuts	2	5
Low/high acid in cans/glass	1	3
Raw prepared products (meat and vegetarian)	4	11
Ready to Eat or Heat - Chilled or frozen	6	16
Storage and distribution	1	3