THE ECONOMIC IMPACT FOR MANUFACTURING SITES OPERATING TO BRCGS CERTIFICATION

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1.1 PURPOSE OF PAPER

There is a common view that there are benefits to Food Business Operators (FBOs) that are certificated as well as brands or retailers that specify them within their supply chains. While these benefits are well publicised, prior to this study, there has been a lack of hard evidence on the economic and operational benefits to either certificated FBOs or in the wider supply chain.

This research seeks to redress this lack of evidence by using internal and external datasets to identify the value of certification for certified FBOs, the wider supply chain, and on safer food for consumers. This paper will also explore whether certification to BRCGS programmes provides additional value over other standards in terms of food safety, top-line growth, profitability, modernisation and operational efficiency.

This has been carried out through demand-side interviews with large Brands, a review of extant literature on certification and food safety standards, and data from around 450 responses to a survey of Food Business Operators (FBOs).

1.2 SUMMARY OF MAIN OUTCOMES

The empirical evidence indicates that certification to BRCGS standards generates extensive and positive business impacts for suppliers, on a scale greater than might have been expected in the light of previous research. This is more notable as the standards have primarily been developed to ensure the production and distribution of safe food, and not with the objectives of business growth, profitability, operational efficiency and innovation.

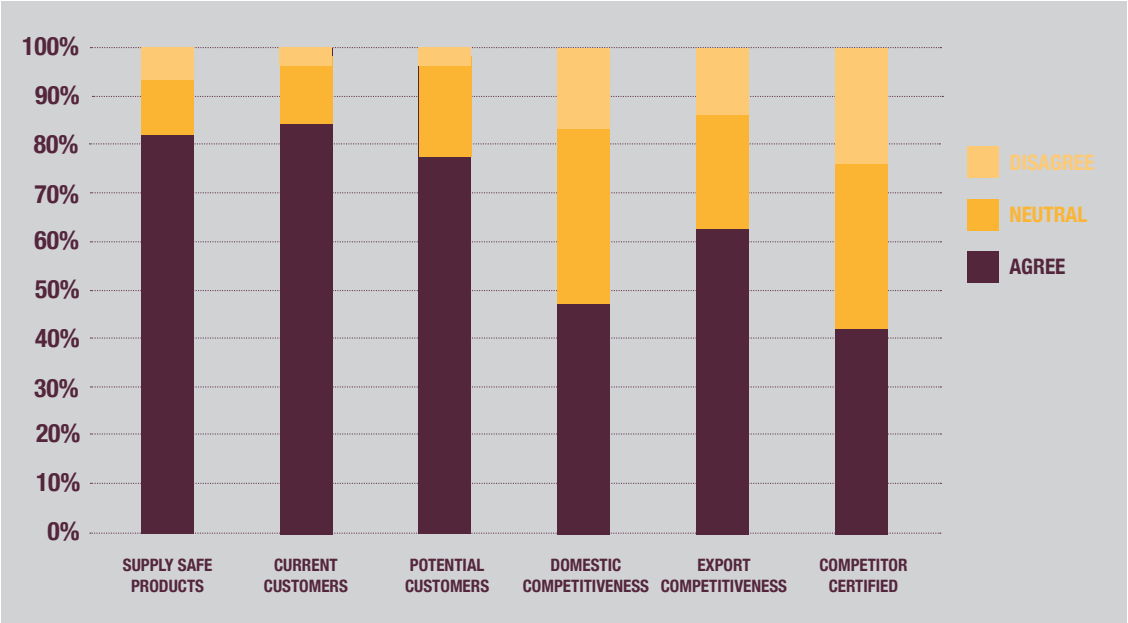
The findings can be categorised under i) motivations/objectives for certification; (ii) the business actions taken to achieve certification and (iii) the major impacts on firm performance of certification and the associated business actions.

Motivations and objectives for BRCGS certification

- In line with previous studies, ensuring the production of safe food is a key driver for seeking certification with 80% of respondents citing this as a primary motive.
- 85% of respondents stated that meeting the needs of existing customers is a major factor. This is a similar aim to meeting the requirements of potential customers.
- Enhancing competitiveness also emerges as a key driver with 50% seeking domestic growth, and 61% growth in overseas markets.
- Responding to competitor certification is seen as an important factor with 40% rating it as highly important.

The empirical evidence indicates that certification to BRCGS standards generates extensive and positive business impacts for suppliers.

70% of respondents stated that changes in production methods had led to efficiencies and greater productivity.



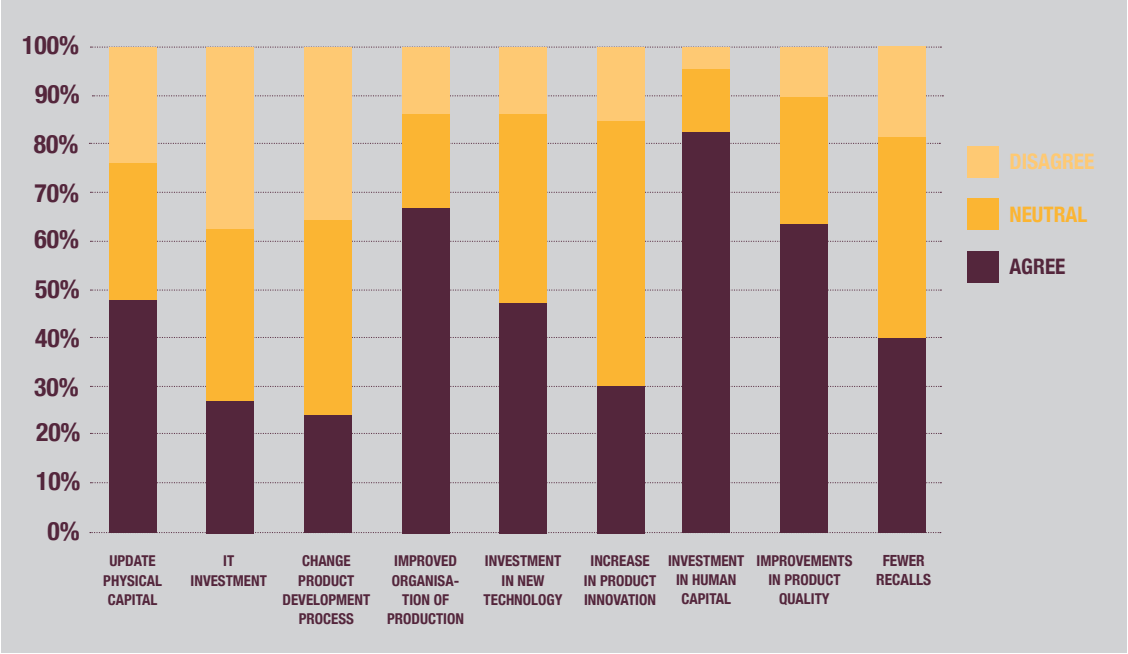
Impacts of BRCGS certification on business operations

- A key finding of the research has shown that BRCGS standards, which do not in themselves include innovation as a purpose, act as a determinant of broad-based innovation. This includes product innovation, operational efficiency and business expansion.

- In order to obtain compliance with BRCGS certification, many businesses reported that they had undertaken changes in business practices or production resources. This modernisation includes improving the stock of physical capital through new or upgraded plant and equipment, which was cited by 50% of respondents, 27% had updated their i information technology, and 28% had updated product development processes. These improvements support the goals of food safety as well as productivity and competitiveness.

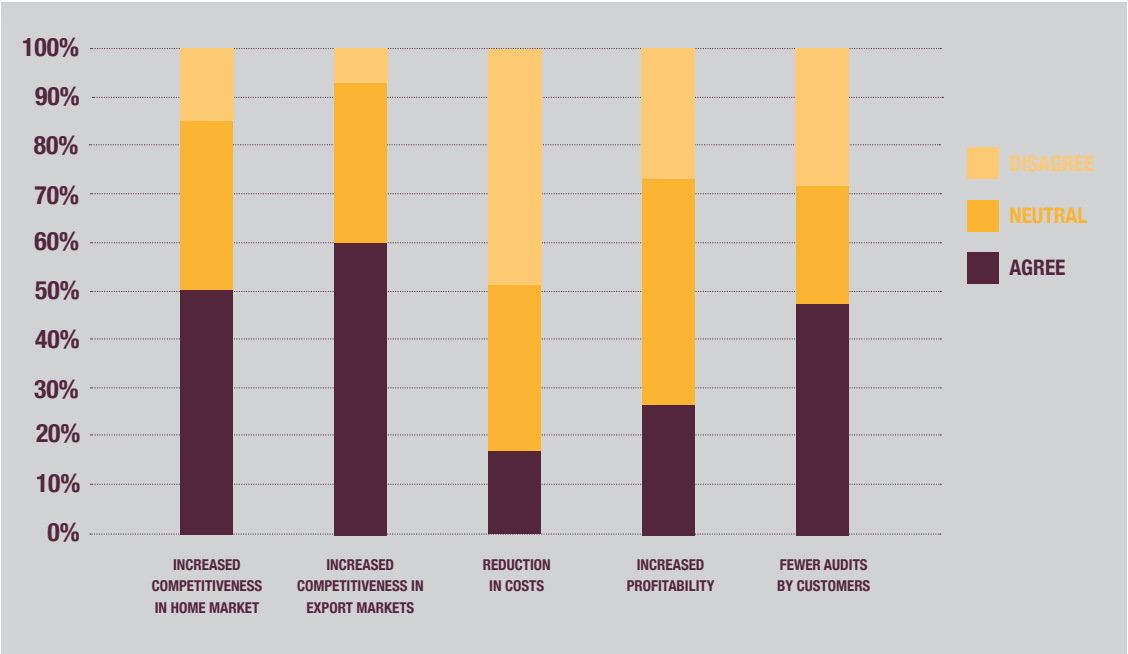
- The data shows that BRCGS certification has been a spur to investment and management changes. 70% of respondents stated that changes in production methods had led to efficiencies and greater productivity. 50% have invested in new technology in order to enable safe and high quality food. While 30% stated that certification has led to product innovation.

- Operational improvements have been achieved through obtaining BRCGS certification, with 63% reporting production improvements. This is evidenced through a 40% reduction in food recalls since achieving certification.



Competitiveness in domestic and export markets

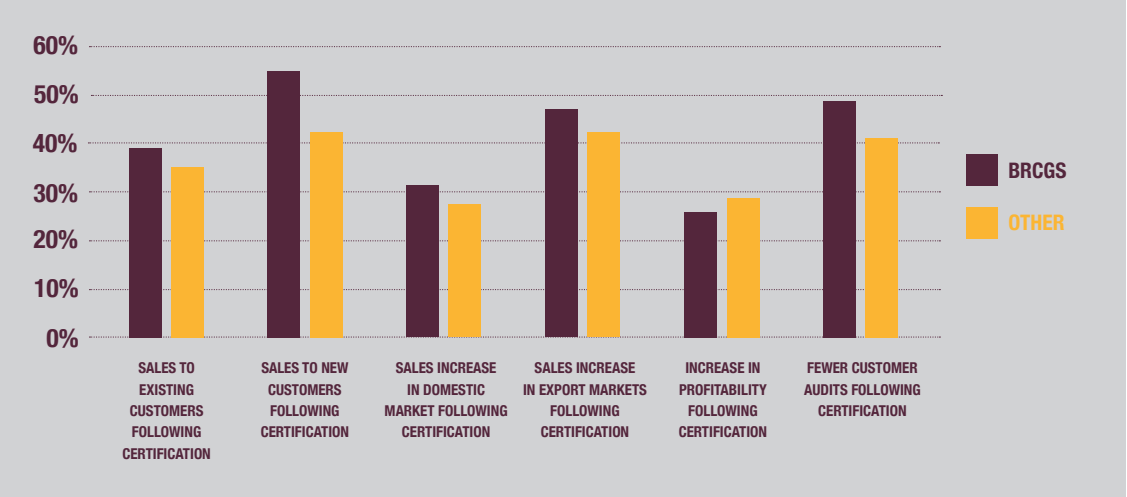
- BRCGS certification is associated with expanded market opportunities and achieved growth, in home and export markets (55%). It helps drive competitiveness for large shares of FBOs, especially in export markets (60%).
- Over one third of respondents quantified their sales growth, averaging around 7.5% (for the reporting group).
- Around one third report increases in profitability resulting from certification and the associated investments and adaptations, averaging around 6% (for the reporting group).
- A small proportion of FBOs reported reduced costs (17%) attributed to certification, however nearly half of respondents find that certification leads to fewer customer audits.



A comparison between BRCGS and other standards

Many respondents are certified to other GFSI and non-GFSI standards and were able provide information about the impact on their business of these standards.

- Around 35% of respondents with certificates to standards in addition to BRCGS reported an increase in sales to existing customers following from certification. This result is similar to, but somewhat lower than, for BRCGS certification.
- 55% of respondents experienced increased sales having gained certification to BRCGS. Only 44% of respondents with other certification standards reported increased sales.
- 26% of respondents agreed that sales in their home market had increased, compared to 30% of BRCGS certificated respondents.
- 46% of respondents with BRCGS certification reported increased sales in export markets, compared with 42% for other certification standards.
- Similarly to the share of BRCGS certified firms, around 28% of respondents agreed that profitability had increased.
- Over 40% of respondents agreed that there are fewer customer audits after certification to another third-party standard. This compares with 48% with BRCGS certification.



55% of respondents experienced increased sales having gained certification to BRCGS.

2 INTRODUCTION

Food safety standards have been developed over the last 20 years to provide a system of assurance that food from any source is safe. Partly a response to some high-profile food scares, but also the globalisation of food sourcing. They provide an externally validated framework for assessing the safety and quality of food production and distribution.

The well-publicised incidents of contaminated or otherwise unsafe foods finding their way to consumers triggered legislation by many governments and the consequent establishment of regulations that seek to ensure food safety. These frameworks of oversight of national and international food chains have impelled major food brands, retailers and the quick-service restaurant industry (collectively referred to hereinafter as "brands") to undertake food safety audits of their suppliers. Since most food manufacturers sell to numerous customers, while brands have multiple suppliers, this minimises risk of interruption to the supply chain.

Direct auditing by brands of supplier quality and safety can be costly for all parties. Another motivation, therefore for the development of private third-party standards was some rationalisation of the number of audits by the major customers of FBOs. Several of the leading standards have been developed under the leadership of consortia of major retailers – BRCGS[1] in the UK, IFS[2] in France, Italy and Germany, and SQF[3] in the US. A further stage has been the formation of the Global Food Safety Initiative[4] (GFSI) to provide benchmarking of the operating criteria for private standards. The International Standards Organisation[5] (ISO) has also published a food safety standard (ISO 22000[6]) building on the general management standard ISO 9001. This was intended to offer an alternative to multiple audits of suppliers by brands. The ISO standard on its own is not compliant with GFSI criteria since it lacks pre-requisite programmes (which are covered by separate ISO standards) but a recently developed variant FSSC 22000[7] does fall under the GFSI umbrella.

Food certification has emerged as a requirement to gain consumer confidence and ensure food safety across various stages in the supply chain. The global food certification market is forecast to grow[8] due to its applicability in a wide range of food products, increased health and ethical consciousness among consumers, and more complex supply chains. As a result, food manufacturers and suppliers are actively seeking ISO 22000, BRCGS, SQF, IFS, and 'free-from' certifications.

BRCGS's food safety standard was the first to be benchmarked. Now in its 8th edition with the 9th edition to be published in 2022, the standard has evolved to meet the needs of industry and to protect the consumer. It was the first standard to be GFSI benchmarked, as well as introduce food safety culture requirements, define food fraud, and reduce audit burden through additional modules. BRCGS applies a compliance programme to ensure consistent audit outcomes and results that brands can rely on.

BRCGS standards are used by over 30,000 sites in 130 countries, and accepted by 70% of the top 10 global retailers, 60% of the top 10 quick-service restaurants, and 50% of the top 25 manufacturers[9]. FSSC 22000 certifications have been adopted by 27,000 sites, IFS in 17,000 sites, and SQF in 10,000. The global food and grocery market size was valued at US$11.7 trillion in 2019[10]. 20% of these sales are placed on the market by manufacturers that are certified to a GFSI certification programme[11]. BRCGS certified FBOs account for 36% of post-farm gate sales, and therefore impact on US$800 billion of product sales[12]. This excludes the significant sales made in the Quick Service Restaurant sector.

[1] https://www.brcgs.com/
[2] https://www.ifs-certification.com/index.php/en/
[3] https://www.sqfi.com/
[4] https://mygfsi.com/
[5] https://www.iso.org/
[6] https://www.iso.org/iso-22000-food-safety-management.html
[7] https://www.fssc22000.com/
[8] Food Certification Market – Global Growth to 2025, MarketsandMarkets, 2020
[9] Source: Deloitte, QSR Magazine
[10] Source: Grand View Research (2019)
[11] Source: GFSI, The Consumer Goods Forum
[12] Source: BRCGS internal calculations

3 SCOPE OF PAPER

There is a common view that there are benefits to FBOs that are certificated as well as brands or retailers that specify them within their supply chains. These benefits are understood to include market access, operational improvement and efficiencies, and greater process control leading to less waste or product recalls. Brands and retailers benefit by relying on 3rd party certification as part of their supplier approval and risk management processes. This allows them to focus their supplier audits on areas of risk and priority.

While these benefits are well publicised, there is a lack of evidence to support the economic and operational benefits to either certificated FBOs or in the wider supply chain. There is some anecdotal evidence and individual case study information, however there is limited evidence to support these claims. The purpose of this research is to use internal and external data sets to identify the value of certification for FBOs, the wider supply chain, and safer food for consumers. This paper also explores whether certification to BRCGS programmes provides additional value over other GFSI and non-GFSI standards in terms of food safety, top-line growth, profitability, modernisation and operational efficiency.

This report contains three main parts:

1. A review of the demand-side based on interviews with large brands;
2. A review of the extant literature on certification and food safety standards;
3. Analysis of results from a survey of around 450 Food Business Operators (FBOs).

Food certification has emerged as a requirement to gain consumer confidence and ensure food safety across various stages in the supply chain.

4 DEMAND SIDE BASED ON BRANDS INTERVIEWS

4.1 BENEFITS OF STANDARDS: THE VALUE TO BRANDS OF THIRD-PARTY STANDARDS

The group of third-party food safety standards were developed in the late 1990s in response to the increasing demand for closer scrutiny of the food supply chain, to reduce the risks of contaminated or dangerous foods finding their way to consumers. Legislation in several countries required brands, including retail, Quick Service Restaurants and producers of branded foods, to exercise due diligence on safety issues when purchasing from an increasingly global supply chain. This included safety audits of their suppliers. In general, suppliers could be selling to several customers, while brands could be sourcing from many suppliers. This level of audit burden imposed substantial costs on suppliers, many of whom are small firms, who could be subject to multiple audits from a proliferation of 2nd party standards. Substantial costs were also incurred by brands in carrying out so many audits, with duplication of work for the manufacturers and expense within the industry, hence the drive for harmonised standards.

So a solution was developed that involved an independent body developing standards, in consultation with stakeholders, and arranging audits and visits on behalf of the brands. This was viewed as a more efficient process. In the UK this was set up under the auspices of the British Retail Consortium[13] a lobbying organisation representing UK retailers. Similar arrangements were later developed in other parts of Europe and in North America.

The main benefits lie in:

- Fewer audits, reducing costs for brands and food manufacturers.
- A published standard which can be developed and revised over time, with input from interested parties, including brands and the certification bodies who carry out the audits. For example, the BRCGS food standard is at version 8, with version 9 due to be published in 2022.
- Food manufacturers who are certified to one or more of the food safety standards thus demonstrate basic competence to actual and potential customers in an objective way. This enables brands themselves to focus their inquiries to suppliers on their own more specific requirements.
- Certification is also a signal to the market that here is a sound supplier, thus enabling competition and supporting international trade by providing information at low cost on the availability of reliable sources.
- Suppliers themselves benefit from the external, expert scrutiny, as they can embed the good practices needed for certification into their own procedures and thus continuously improve the business while supplying safe food to consumers.

4.2 LIMITATIONS OF THIRD-PARTY STANDARDS

Third-party standards provide an overall framework that complements basic Good Manufacturing Practice (GMP) and Hazard Analysis and Critical Control Point (HACCP) principles. First and second-party audits can be more specified and allow for a deeper exploration of any given operational requirement. Brands therefore have greater control in directing the audit process according to their need.

The process for third-party audits is clearly defined and does not permit auditors to provide advice or guidance to manufacturers that might help with improving the safety and the quality of their products and processes. Their role is to assess and report on compliance and non-compliances within the terms of the standard in a consistent way.

While these trade-offs are acceptable, to gain the efficiencies of the third-party standards framework, brands are keen to ensure that certification programme owners (CPOs), such as BRCGS, maintain the competence and effectiveness of the certification bodies and the reliability of the audits they carry out.

It was also reported that brands would still face the structural issues of sourcing reliable audits, even absent the third-party standards framework. In addition, brands may engage in audits and site visits of their own, to supplement the third-party processes and to maintain their own confidence that the third-party standards remain fit for purpose.

4.3. DO BRANDS ONLY ACCEPT CERTIFIED SUPPLIERS?

The broad picture is that brands require that their first-tier – direct suppliers – should be certificated to one of the available third-

[13] https://www.brc.org.uk/

party standards. Some mandate a particular standard while others in principle will accept any pertinent GFSI[14] benchmarked standards, such as BRCGS, FSSC 22000, SQF or IFS.

They may express a preference for one or other of these. While some specifiers require certification further up the supply chain, it is not common, however, but the majority expect their first-tier suppliers themselves to ensure the safety of bought in ingredients. Failures up the supply chain will trigger investigations by the brands themselves and complaints to the CPOs and certification bodies. Retailers require certification of their suppliers of own brand products. Manufacturers of branded goods are responsible for ensuring safe production in their own suppliers.

4.4 ARE THERE PARTICULAR ADVANTAGES AND DISADVANTAGES OF WORKING WITH BRCGS STANDARDS?

There was agreement among the brands interviewed that BRCGS provides many benefits, and BRCGS standards are perceived as an especially good example of a GFSI benchmarked CPO.

The standard is well defined and regularly revised. BRCGS provides training to manufacturers and auditors, useful information and other value-added services. BRCGS is also perceived to be open to ideas and willing to take input from all stakeholders.

The potential downside, of any of the food safety standard, that needs to be carefully scrutinised, is the quality of auditing. BRCGS was widely viewed to be an example of good practice, with training of auditors and a comprehensive compliance programme that systematically reviews audit performance.

4.5 IMPACT OF THIRD-PARTY STANDARDS ON DIRECT AUDITING

Many brands continue to have their own programme of audits and site visits, to ensure that they themselves meet the need for due diligence in managing their sources. The GFSI standards provide a sound baseline. But they cannot cover all the specifics for every brand. Consequently, there are additional inspections that may be based on an assessment of risk, but do not cover the same ground as the GFSI audits, but explore the brands' specific needs, which they would not perhaps wish to "pool" in the third-party standards.

Visits to sites can be more in the nature of overall assessments of manufacturer quality, over and above the factors codified in the third-party standards. They can investigate the manufacturers' facilities and approach to production for a particular brand, which might not be selected for close scrutiny during the general audits against the GFSI standards. They can also include elements of advice and mentoring, supporting suppliers to enhance quality as well as safety, and to therefore grow their business with various brands. However, an understanding of manufacturers' operations can also inform brands' inputs into revisions of the standards.

4.6 IMPACT OF THIRD-PARTY STANDARDS ON FBO COMPETITIVENESS

Certification is perceived as supporting manufacturers' competitiveness. First, by ensuring basic safety, which provides credibility in the marketplace. Second, winning contracts from major brands raises the profile and reputation with other potential customers, and so it is a platform for FBO growth.

4.7 STANDARDS CONVERGENCE AND THE FUTURE OF THIRD-PARTY STANDARDS

Judging by our own interviews with brand owners, there is no apparent expectation of, or enthusiasm for, future convergence to a single standard. Although the diversity of standards might appear to nullify one of the main benefits of the emergence of the third-party framework, that diversity maintains an element of choice for FBOs and brands and competition between CPOs.

The latter stimulates a process of revising the standards on a regular basis. A degree of co-ordination through GFSI benchmarking and their organising of international networking helps to maintain quality. GFSI themselves may not have the resources to develop a single standard, and it is perceived as unlikely that CPOs and brands would support such a development.

Another candidate for a single standard – ISO 22000 – has no pre-requisite programmes. These are defined on the ISO website as "(Prerequisite Programmes - All food business must have in place prerequisite programmes (PRPs). These are good hygiene practices that are the basic conditions and activities necessary to maintain a hygienic environment. FBOs must also consider maintenance of the cold chain and allergen control when putting PRPs in place.)" A GFSI benchmark Certificate Programme Owner– FSSC 22000 - has built on the basic standard by adding Pre-requisite programmes.

[14] GFSI aims for the continuous improvement of food safety management systems to ensure confidence in the delivery of safe food to consumers worldwide. Activities include the definition of requirements for food safety schemes through a benchmarking process.

5 LITERATURE REVIEW

This section is a brief review of some of the published research into the impact of private food standards, including the effects on international trade, food safety and on individual FBOs.

5.1 INTERNATIONAL TRADE

FBOs certified to food safety standards are able to offer their product worldwide with their certificate being accepted as demonstrating safe and good quality food. The standards are thus similar to other technical and measurement standards that are accepted internationally as providing assurance of reliability. They act to reduce non-tariff barriers to international trade, enabling exports by both the countries developing the standards and other nations whose producers are certified to it. An important research question is therefore how they are effective as trade promoters. Research has focussed on relating trade volumes in agricultural and food products to the number of certifications to a standard in the exporting country. Indicators have been the number of certifications for one or other standards, not the aggregate of all such certifications.

The primary results have shown that intensity of certifications does promote exports – there is a reduction in barriers to trade. Some papers have reported that this effect is insignificant or even negative for developing or lower income countries. A study (Mangelsdorf, 2016) of the relationship between the exports of many countries and the number of certificates to the International Featured Standard (IFS) held found that there is in general a positive link – more certificates lead to more exports. This may in part be attributed to knowledge transfer through the certification process. But this positive effect is absent for countries in Africa, interpreted as indicating a lack of knowledge transfer through certification in that continent. Using the same dataset, another paper finds that certification to the IFS standard stimulates trade flows between pairs of higher income countries but can have a negative effect on exports of lower income countries (Ehrich & Mangelsdorf, 2016).

But there may be differences in the effects of certification between agricultural products and manufactured food products. Certification to the Agricultural Products Standard, Global Gap has been reported to stimulate exports of food from less developed countries to Europe (Andersson, 2019). The paper also reports results from research into FBOs in France which found that BRCGS certified firms were more likely to export than non-certified or those with other certificates.

Kim (2021), who uses the number of ISO 22000 certificates as the explanatory variable finds that there is a negative effect on the exports of processed foods, which tend to be more the province of developed economies. But the effect is positive on agricultural exports, which is taken to indicate that developing countries' exports are not discriminated against by the use of food safety standards.

5.2 PRODUCT RECALLS

Some papers published recently have reported increasing numbers of food product recalls, especially in the US (Potter et al., 2012; Page, 2018). These can have significant costs for the producers. One study found that the stock market value of a firm with a recall with potentially serious health consequences fell by an average of 1.15% within 5 days of the announcement (Pozo & Schroeder, 2016). But there was no impact for a recall with only a minor hazard.

The upward trend in recalls has coincided with the increasing availability of food safety standards. Undertaking process reforms to attain certification to one of these standards is an option for food businesses looking to reduce the risk of problems leading to recalls. Research for an MSc thesis (Zhang, 2016) found that the experience of a product recall did lead to a higher probability of seeking certification to a standard. The thesis also reports that a formula for estimating the direct financial costs of a recall (publicity, product retrieval and disposal) has been calculated as (retail price x 3 x volume of product recalled).

A contributory factor to the upward trend has been the rapid development in surveillance systems and capability by regulatory bodies, lower tolerances, better and increased monitoring and reporting, and increased range of hazards that can trigger a recall. Operational rather than biological/chemical hazards, especially undeclared allergens, have become the reason for the majority of recalls (Page, 2018).

5.3 MICRO LEVEL – SURVEYS

There are several examples of research on the experience of businesses of certification to food standards undertaken

through sample surveys. Most of these worked with a relatively small sample, in the range of 40 to 350 responses. The questions were mostly related to motives for seeking certification to a standard, and the constraints or problems in their implementation. There were rather fewer attempts to engage with the enterprise level effects and even less coverage of tangible commercial benefits. Most of the surveys use likert scales to gauge the importance to the respondents of a series of propositions about the various aspects of certification.

5.3.1 OBJECTIVE AND MOTIVATIONS FOR CERTIFICATION

In summary, the highest rated motivations tend to be the core purposes of the third-party food standards system, namely safer food and acceptability or access to major retail customers. Surprisingly, commercial, market motivations and benefits were generally rated lower, although it must be borne in mind that the survey questionnaires tended to offer fewer propositions in these areas.

A small survey in Portugal with 62 respondents certified to ISO 22000 (Teixeira and Sampaio 2013) reported that 3 of the top 4 motivations rated 'Important' or 'Most Important' by the larger shares were Confidence of Consumers, Customer Requirements, Commitment to Product Safety and Market Differentiation, which was the third highest ranked, perhaps pointing to competitive advantage as a conscious objective that was not fully brought out in this study.

A study of an achieved sample of 192 Agri-food businesses in Italy (Spadoni et al. 2014), which were BRCGS certified, with questions using a 7 point likert scales, included motivations, however the paper does not report the results for these. They suggest a theoretical framework for understanding the role of private food standards. This is based on the concept of product characteristics, which include Credence Attributes - asserted by experts or knowledgeable users, and so can be believed by consumers and Potemkin attributes, which can be claimed but are not observable even by external experts[15].

Table 1 shows the four most highly ranked objectives from several surveys of users of food safety standards. These are largely concerned with improving the perception of the business by customers and consumers.

BRCGS (Rincon-Ballesteros et al., 2019)	**BRCGS** (Mensah and Julien 2011)	**ISO 22000** (Teixeira and Sampaio 2013)	**ISO 22000** (Escanciano and Santos-Vijande 2014b)
Product safety and quality	Product quality	Consumer confidence	Improve image in the Market
Consumer welfare	Customer Requirement	Customer requirement	Improve quality and safety
Access foreign markets	Regulatory Requirement	Market differentiation	Achieve customer confidence
Ethical principles	Marketing advantage	Food chain product safety	Future competitive advantage

Table 1: Objectives and motivation for certification to food safety standards

5.3.2 CHALLENGES AND COSTS OF CERTIFICATION TO FOOD SAFETY STANDARDS

The studies reviewed were heavily focussed on the constraints or challenges faced by businesses in implementing the various food standards, perhaps giving an impression slightly biased towards the negative. The direct cost of adopting a standard was frequently cited, (Rincon-Ballesteros et al., 2019; Casolani, Liberatore, and Psomas 2018) particularly for smaller businesses.

Similarly, the burdens of perceived bureaucracy, whose purposes were not well understood, was widely cited (Escanciano and Santos-Vijande 2014a). Some quality managers were concerned about a perceived rigidity of approach by auditors, who did not adapt their assessments to the circumstances of individual FBOs. Also important were some internal constraints on implementing the changes in organisation and business processes needed to achieve certification to one of the standards. These included lack of skills of employees and their resistance to change (Mensah and Julien 2011; Teixeira and Sampaio 2013). The level of employee skills and the costs of training to achieve the required level, together with resistance to changes in practices, were also reported as amongst the main constraints on implementation by Chen et al (2015). However, these barriers were overshadowed by the direct costs - paperwork and process development. Table 2 summarises the main findings on challenges and costs from the literature.

[15] This idea is explained by Becker (1999) as 'placebo effect' or 'potemkin effect' with the example of public regulatory support unlinking the importance of 'country of origin' as an indicator of quality.

BRCGS (Rincon-Ballesteros et al., 2019)	**BRCGS** (Mensah and Julien 2011)	**ISO 22000** (Teixeira and Sampaio 2013)	**ISO 22000** (Escanciano and Santos-Vijande 2014b)	**ISO 22000** (Escanciano and Santos-Vijande 2014b)	**ISO 22000** (Casolani, Liberatore, and Psomas 2018)
Financial constraints	Employee resistance to change	Internal resistance to change	Not a prerequisite for doing business	Excessive demands on time and resources	Cost for certification
Lack of favourable institutional environment	Lack of technical knowledge and skill of employees	Direct costs	ISO 22000 not well known	Excessive formalism	Slows down some procedures
Organisational resistance	Lack of awareness of requirements	Employee skills	High costs of implementation	The volume of documentation required	Lack of international consumer expectations
Lack of information and support (FSMS)	High cost of development and implementation	Take up of employee time	Not required by government	High cost, financial constraints	Not flexible

Table 2: Challenges and costs of certification to food safety standards

5.3.3 OUTCOMES OF CERTIFICATION TO FOOD SAFETY STANDARDS

The most important effects or outcomes for businesses of adopting a food standard reported in the literature have clustered around internal operational improvements (Mensah and Julien 2011; Spadoni et al. 2014) and external reputation and image effects - perceived as a supplier of safe food (Teixeira and Sampaio 2013)[16].

Certification provides assurance that good safety practices are being followed (Escanciano and Santos-Vijande 2014a). Direct market and commercial gains generally have a lower profile but are, by implication, expected to arise from competing on perceived quality.

A paper on the financial performance of Polish small to medium sized businesses (SMEs) (Kafel & Sikora, 2012) found that results were better for those certified to the BRCGS or IFS standards but were better still for those who also hold the ISO 9001[17] management standard, pointing to the scope for complementarity between generic and food safety standards. The study was based on just 30 businesses so cannot be taken as definitive.

Improved business performance was also reported in a paper based on a survey of 210 businesses with Halal Food Certification in Malaysia, which is argued to be strict and comprehensive enough to be equivalent to one of the FSMS standards. Table 3 summarises the main findings on outcomes.

Certification provides assurance that good safety practices are being followed

(Escanciano and Santos-Vijande 2014a)

[16] WHO also report that over 70% of respondents were certified to more than one standard.
[17] https://www.iso.org/iso-9001-quality-management.html

BRCGS (Spadoni et al. 2014)	**BRCGS** (Mensah and Julien 2011)	**ISO 22000** (Casolani, Liberatore, and Psomas 2018)	**ISO 22000** (Teixeira and Sampaio 2013)	**ISO 22000** (Escanciano and Santos-Vijande 2014a)
The HACCP system is more efficient	Increased customer satisfaction	Improving capacity to access domestic and international markets	Improved methodologies and practices	Better management/ control of food hazards
A strong commitment was necessary for the training and qualification of the personnel	Improved internal procedures	Improving product safety	Improved customer satisfaction	Improved image in the market
Intensification and better interpretation of monitoring procedures on chemical and physical contamination, GMO and allergens	Improved product quality	Improving traceability	Improved consumer confidence	Facilitates compliance with food safety legislation
An enhancement of image and an increasing of reputation towards customers occurred	Compliance with regulatory requirements	Demonstration of improved safety	Improved food safety	Better emergency response
Also important: The BRCGS approach is also effective during the public bodies audits				
Internal audit system (as described in the BRCGS standard) has allowed a self-evaluation more effective				

Table 3: Outcomes of certification to food safety standards

5.3.4 DERIVED INDICATORS

Some of the surveyed papers have applied exploratory factor analysis to their data in order to generate summary indicators. These can be interpreted as the more fundamental dimensions of food business' purposes and outcomes from certification.

The specific questions in the surveys can then be understood as the facets or building blocks of these core concepts of the effects of certification to a standard. One example is the derivation of summary indicators by factor analysis from 120 responses to a survey of UK Food Manufacturers (Mensah and Julien 2011).

Nearly all of these were certified to the BRCGS standard. Factor 1 concerns engagement with internal and external stakeholders - employees, government and 'learning centres'. Factor 2 is about upgrading systems and staff and

standard processes and making this a continual part of the business process. Factor 3 includes training of their own staff and supplier management. The final factor is top management commitment, which is suggested to be a precursor to the rest and is an essential part of most of the standards.

Another example of factor analysis was applied to an achieved sample of 192 agri-food businesses in Italy who were BRCGS certified (Spadoni et al. 2014). The survey generated 28 variables, which were reduced to 8 summary variables by using factor analysis. These are labelled by the researchers as:

- Compliance;
- Team involvement;
- Resource management;
- Management of inspection;
- Relationship management;
- Reduced autonomy;
- Audit efficiency.

The last two of these make small contributions to the explanatory effect of the analysis. The paper takes the further step of deriving, by cluster analysis, five groups of businesses with similar patterns of factor scores.

These are interpreted as:

- *Conformers* - The majority (nearly 50%) who adopted the standard as a customer requirement, but felt it to be somewhat of a constraint on their freedom of action.

- *Opportunists* - A group which found benefits mainly in improved external relationships including marketing, but did not consider that the standard had been imposed.

- *Unconcerned* - A third cluster identified as not perceiving significant benefits themselves but obliged by customers to gain certification.

- *Unaware* - A cluster who find the standard enhances team work, supported by training. But they do not seem to have exploited the opportunity thus created to enhance their market position.

- *Consolidated* – A small cluster that find the standard helpful for team involvement, building on existing operating strengths and integrating other quality management systems. This group is composed by companies that in general did not perceive any specific impact of the BRCGS implementation but they strongly agree on the effects of BRCGS in terms of team involvement and audit efficiency.

In summary, these categories imply a relatively passive attitude, with limited use of certification status pro-actively to achieve market or commercial advantage. But the groups identified display a plausible range of attitudes.

A study of 192 food businesses in Spain certified to ISO 22000 (Escanciano and Santos-Vijande 2014) also derived two sets of factors summarising problems and benefits. This is a limiting use of the technique since it maintains the hard and fast distinction underlying the survey questions. Pooling the data from a survey enables the identification of more complex interactions and patterns of commonality across the initial categories.

Problems
- “organizational resistance” including employee attitudes
- “bureaucracy and cost” similarly to studies of implementing other management systems and standards.
- “unfamiliarity” - limited awareness of implications of the standards.

Benefits
- “improved food safety”
- “commercial benefits” especially access to international markets.
- “internal efficiency” involving improved communications and resource management
- “improved competitive position”

- “improved communication”
- “technological improvement” - better premises etc.

There are some, but limited, similarities between the summary indicators derived by these studies, mainly around internal teams and their development, external relationships and management of resources. Communications and improved competitive position also emerged as underlying aspects of certification.

6 EMPIRICAL RESEARCH

A major part of this economic research project is a survey of food companies (FBOs) certified to BRCGS standards. This section presents the main findings from the survey and puts these in the contexts of the other facets of the study, including the review of relevant publications and insights provided by interviews with brand representatives.

Earlier research emphasised the motives for FBOs in seeking third-party certification. As these standards have developed mainly through the leadership of major brands, who are the direct customers of FBOs, it is not surprising that the need to meet the requirements of these customers, enshrined in the standards, has been a primary driver of food companies' adoption of the standards and the certification process that goes with them. These studies did not cite the impacts on sales, costs and profits, and on market access and competitiveness related motivations.

A core objective of this study has therefore been to explore in more detail the market and commercial aspects of third-party standards, including how they enter FBOs' objectives for seeking certification. So, the current survey instruments have focused more on the business dimensions, as well as including food safety aspects.

A total of 451 businesses responded to the survey from a wide range of geographic locations across Europe, North America, South America, Asia Pacific the Middle East and Africa. Respondents covered a wide range of products and standards, including non-food. A full breakdown of territory, business type and size is available in Annex 1.

The findings are set out under the headings of i) motivations/objectives for certification; (ii) the business actions taken to achieve certification and (iii) the major impacts on firm performance of certification and the associated business actions.

6.1 MOTIVATIONS AND OBJECTIVES FOR CERTIFICATION

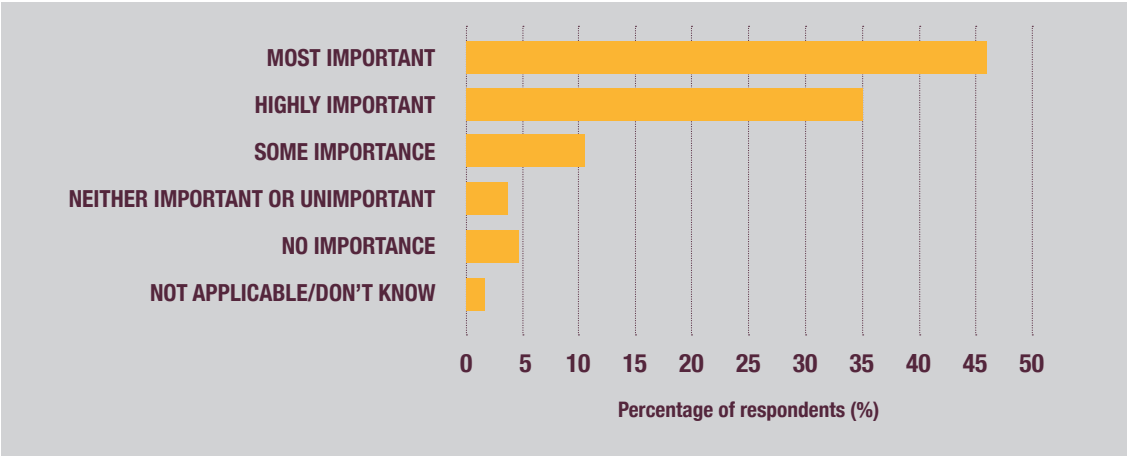


Figure 1: The need to provide safe food as a motivation for certification

Similarly to the results of earlier research, over 80% of respondents see ensuring that their products are safe as a highly important reason for certification.

Over 80% of respondents see ensuring that their products are safe as a highly important reason for certification.

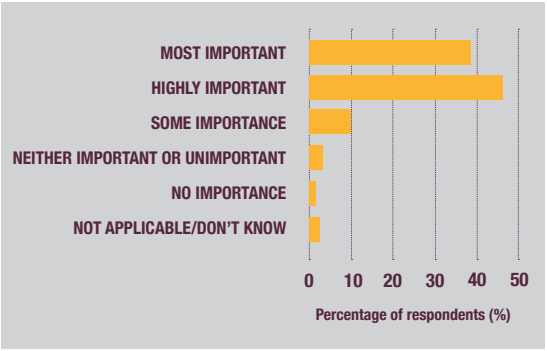


Figure 2: The need to meet existing customer requirements as a motivation for certification

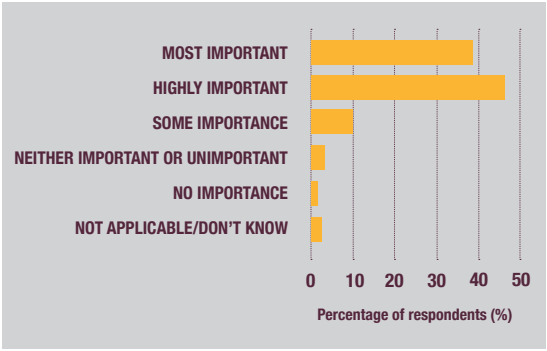


Figure 3: The need to meet potential customer requirements as a motivation for certification

In line with previous studies, over 85% reported the requirements of current customers as highly important motives for certification. A similar number of respondents report the requirements of potential customers as a highly important motivation.

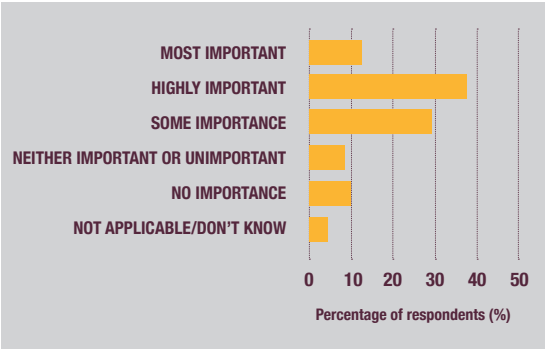


Figure 4: The need to increase competitiveness in the domestic market as a motivation for certification

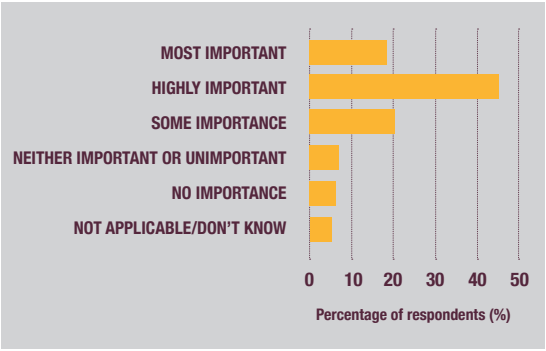


Figure 5: The need to improve competitiveness in export markets as a motivation for certification

Enhancing market competitiveness also emerges as a major driver, with over 50% citing home market competitiveness. 61% of businesses report competitiveness in export markets as a highly important factor in seeking certification. Food companies perceive that certification to a third-party standard acts as a competitive weapon in seeking to widen and deepen their customer base.

Responding to competitors' certification was also a factor for many FBOs but only 40% saw it as highly important.

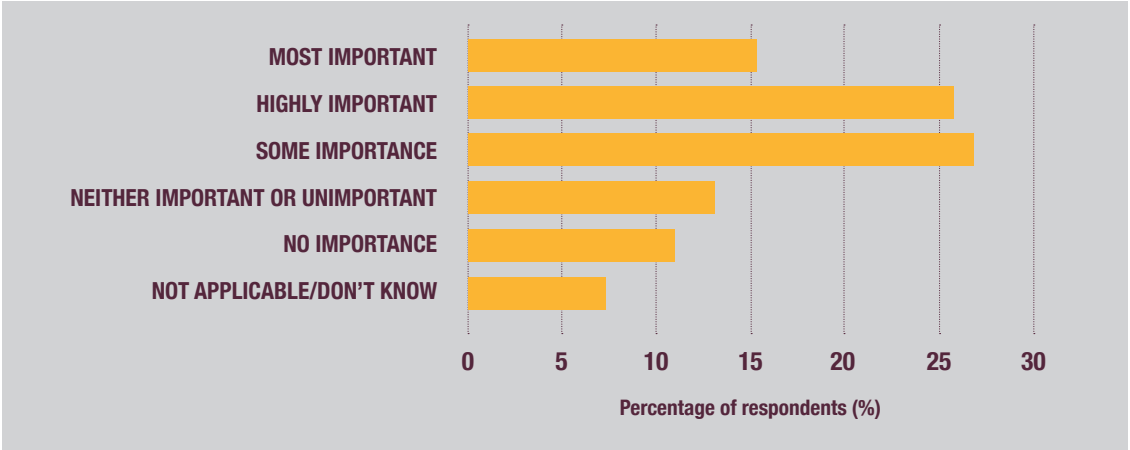


Figure 6: The need to respond to competitor's certification as a motivation for certification

Seeking certification in order to gain competitive advantage can be seen as a pro-active use of the standards system. This is similar to the ways in which technical and other standards published by ISO and national standards bodies are used as knowledge inputs by innovative businesses (eg Temple et al, 2005).

6.2 IMPACTS OF CERTIFICATION ON BUSINESS OPERATIONS

We next turn to the survey data on FBO implementation of business actions to meet the requirements of BRCGS standards. These included expenditure on enhancing the capabilities of the firm's day to day operations, as well as investments in capacity and development to present a more competitive offering to the main current and potential customers. Respondents also reported on their view of the direct costs of acquiring and maintaining their BRCGS standards, and on the costs of paperwork and reporting associated with certification. These too can be regarded as a form of investment in gaining the market credibility that comes with certification to one of the leading food safety standards. The data also includes a set of performance outcomes covering growth in sales, exports and profitability.

The main purpose of food safety certification is to reduce the risks to consumers from unsafe food entering the supply chain. From that perspective, improvements in business performance are in some respects an unanticipated bonus, and the appropriate benchmark for assessing their scale is zero. The extensive and intensive range of impacts reported in the following sections can thus be seen as impressive and as exceptional benefits for BRCGS certified FBOs.

6.2.1 MODERNISATION

As one dimension of the multiple ways of meeting the requirements of the BRCGS standards, a substantial share of the FBOs responding to the survey had undertaken changes in business practice or in their production resources that can best be interpreted as modernisation. Aspects of this have included:

- Improving the stock of physical capital through new or upgraded plant and equipment was cited by 50% of respondents. Better production facilities should contribute to achieving the goals of food safety as well as productivity and competitiveness. Around 27% had updated their information technology.

- Changes to the product development process were reported by 28% of businesses.

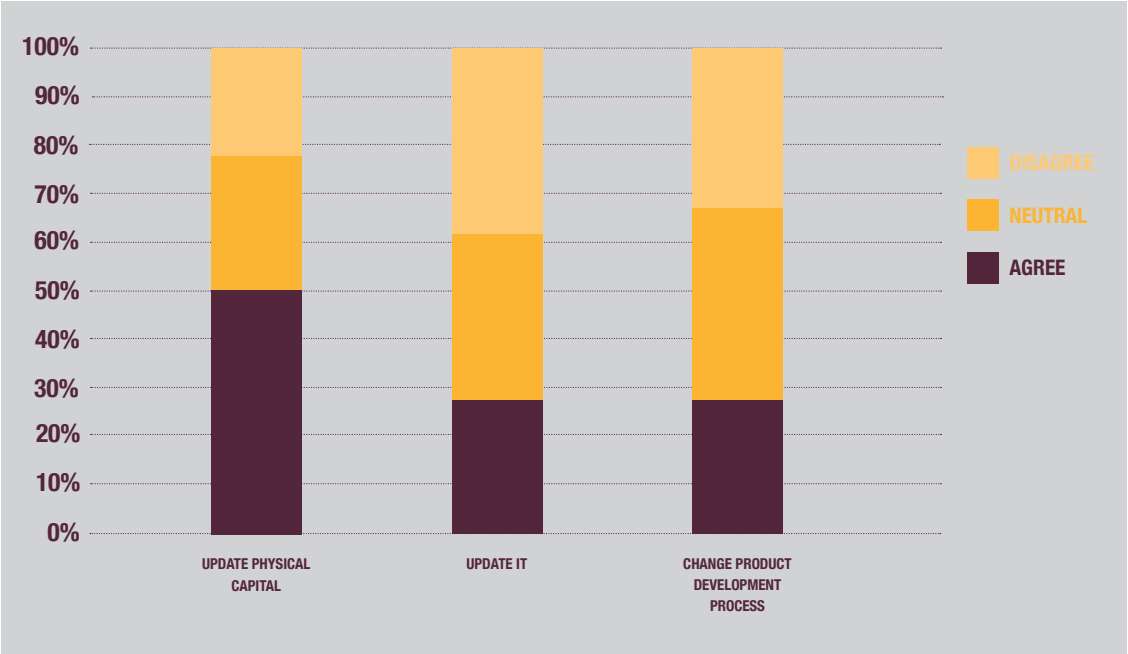


Figure 7: Business modernisation (Source: own calculations)

6.2.2 EFFICIENCY AND INVESTMENT

The certification process has been a spur to a range of investment and managerial changes that are likely to have raised the level of efficiency and opened expansion opportunities. Examples of these include:

- Changes in organisation has been especially widespread, with nearly 70% of respondents in agreement that this was one of the effects. It is plausible that external scrutiny of their operations and the availability of a codified summary of good practice in producing food safely were helpful inputs to FBOs willing to make changes to their operations.

- Nearly 50% of respondents agree that they have invested in new technology, which should further enable consistently safe and high-quality food production and distribution.

- As well as efficiency gains, the certification process has been associated with increases in product innovation for 30% of respondents. This is a striking result as the initiative in new product development might be expected to lie largely with major brands, rather than FBOs.

The majority of those not reporting efficiency and investment gains were neutral, with only low shares being sure that these changes had not occurred in their business.

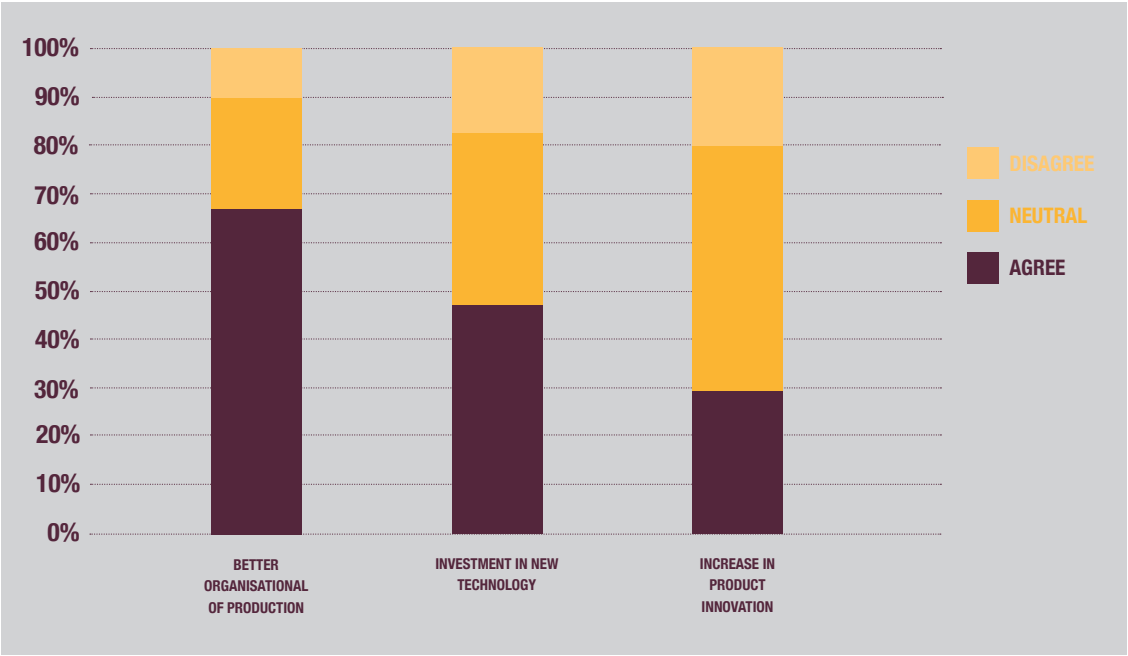


Figure 8: Efficiency and investment (source: own calculations)

6.2.3 OPERATIONS

As well as the investment in capital, IT and organisational change, the vast majority – 85% of respondents have enhanced their employees human capital by investing in training as part of their adoption of BRCGS certification. The skill and commitment of staff is a crucial element in achieving and maintaining high quality production and contributing to an environment that consistently supplies safe food. Training also enhances the future employment prospects of staff and helps to raise the level of skills for the industry as a whole.

Investments in operational change are also associated with better quality products, with more than 63% of respondents reporting improvements, while the effects on food safety are evidenced as around 40% of respondents report fewer product recalls and withdrawals, since achieving BRCGS certification.

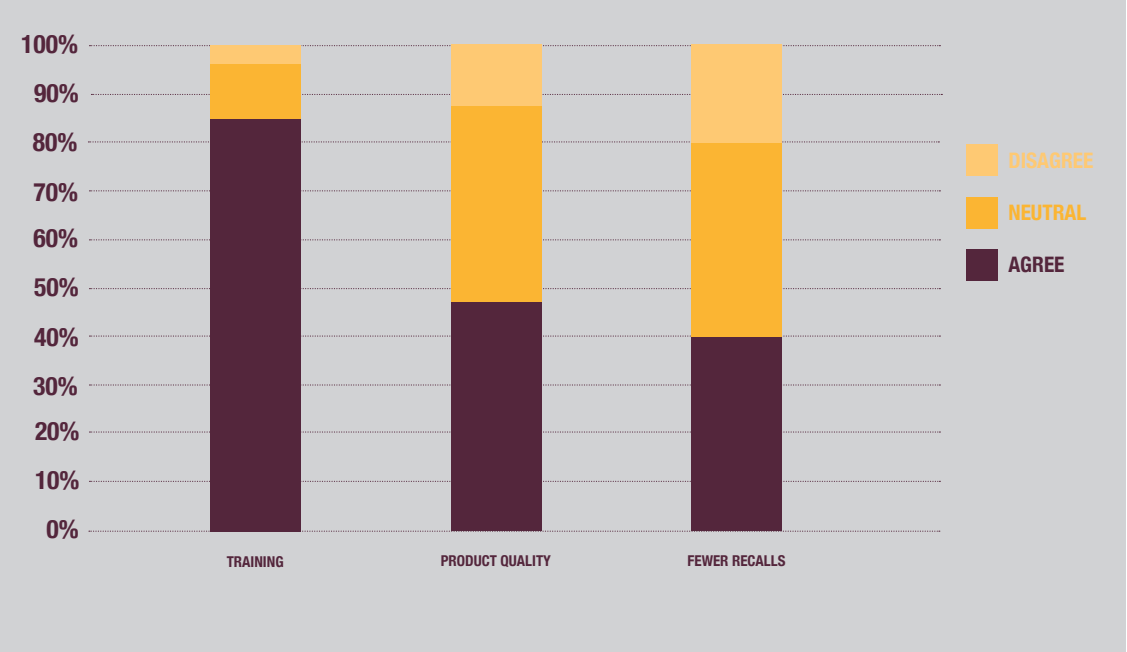


Figure 9: Operations: training, product quality and recalls (Source: own calculations)

6.3 IMPACT ON BUSINESS PERFORMANCE

6.3.1 COMPETITIVENESS

We have seen that enhancing their competitive edge was an important objective for many FBOs. This section reports on the extent to which survey respondents consider that they have achieved improvements in competitiveness in various markets and how these have been translated into growth and profitability.

Over 50% of respondents report an improvement in competitiveness in their home market, while 60% report improved competitiveness in export markets. Taken together, over 70% had increased competitiveness in one or both of home and export markets.

There is evidence from the survey that certification opens market opportunities as it provides a clear and objective indicator of safety in production and in product quality. Similar shares of respondents to those reporting competitiveness gains found that they had access to larger markets both at home and in overseas markets. Again, low shares of respondents were certain that there had not been gains in competitiveness.

Over 70% of respondents had increased competitiveness in one or both of home and export markets.

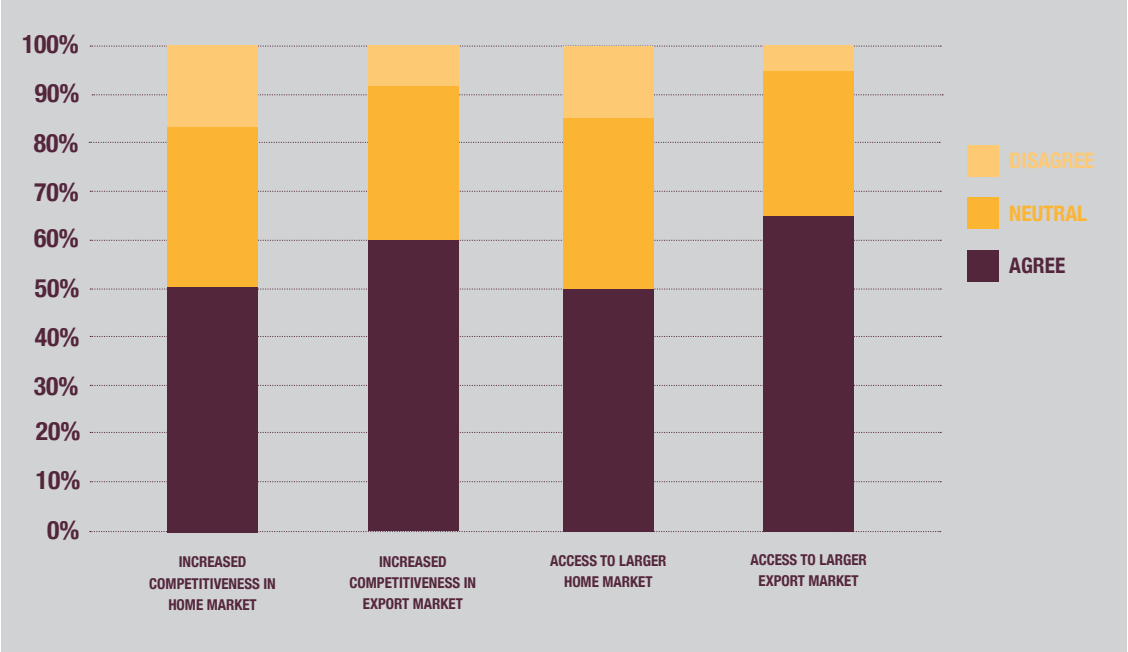


Figure 10: Competitiveness (Source: own calculations)

6.3.2 GROWTH IN SALES IN HOME MARKETS AND ABROAD

Some striking commercial results flowed from the gains in efficiency, operational improvements and competitiveness associated with certification. The results were particularly extensive in gaining new customers and in export markets, with certification providing assurance to potential customers that FBOs can supply safe and high-quality foods.

Growth in sales to their established customer base was experienced by nearly 40% of respondents, while expansion of sales volumes to newly gained customers was reported by 55%. Certification offers current and especially potential customers a higher probability of purchasing safe and higher-quality products and helps FBOs to penetrate new markets.

Similarly, around 55% of respondents agree that they have increased sales in the home or export markets or both.

Somewhat unexpectedly, an impressive share of respondents were able to provide range quantification of sales growth. The ranges in the question were increases in sales of:

- 0-5%
- 5-10%
- Over 10%

It is possible to summarise this data into a single figure on the working assumptions that the ranges can be represented by their mid points. For the upper range of over 10% the assumption used here is that this can be capped at 20%, with a mid-point of 15% following the logic that the top of each range is double the bottom.

- 0-5% = 2.5%
- 5-10% = 7.5%
- Over 10% = 15%

On these assumptions, the weighted mean increase in sales for those (43% of respondents) giving a positive response was **7.5%**.

BRCGS certification has been associated with a wide range of changes in business processes and investments.

6.3.3 INTERNATIONAL TRADE

Some of the research cited in the literature review has found a significant association between the share of food businesses holding certificates from one of the CPOs and the volume of international trade between the nations concerned. Consistently with these results, the present study has found that over 45% of respondents have seen sales growth in export markets, reflecting the gains in international competitiveness noted above. In general, the stimulus to growth of certification to the BRCGS standard is larger for exports than for domestic sales, although the latter are substantial.

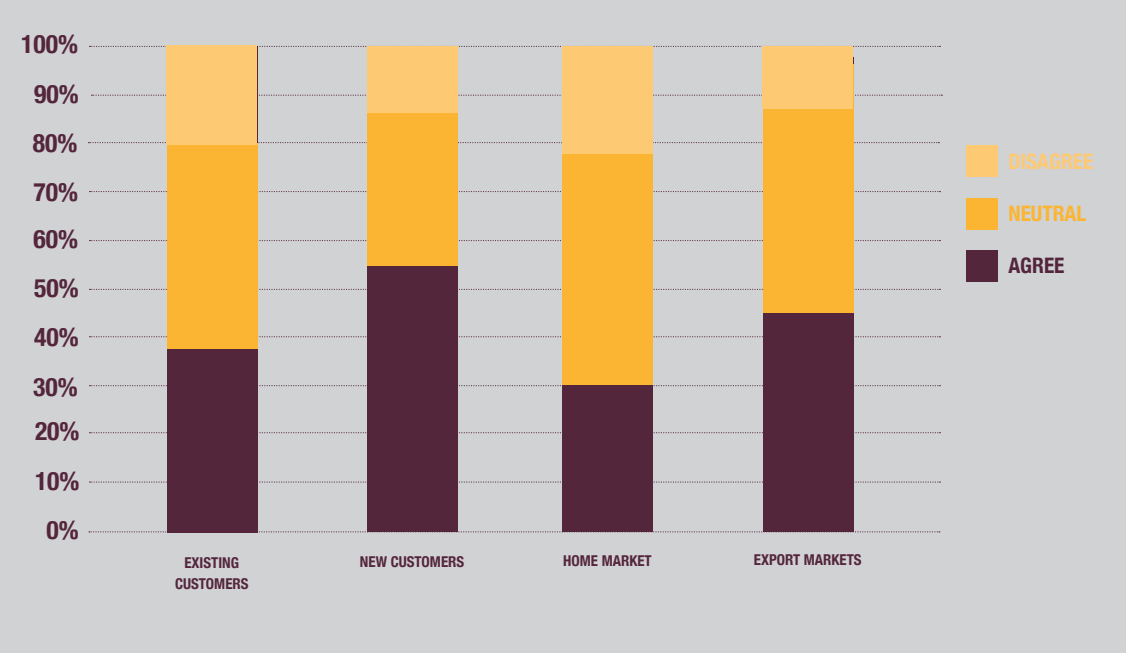


Figure 11: Growth in home markets and abroad (Source: own calculations)

6.3.4 OTHER COMMERCIAL EFFECTS

The survey reported on a range of other commercial impacts from BRCGS certification, namely costs, profitability and number of audits.

Only a small proportion – less than 17%-attribute operating cost reductions to certification, whereas over 50% disagree with this proposition. There is much more of a tendency to incur costs to meet the requirements of the standard, although some of the outlays seem likely to give rise to other business benefits, such as enhanced physical and human capital.

Just under 30% of respondents agree with the idea of increased profitability, but it is perhaps striking that such a substantial share can identify profitability gains.

Interestingly, nearly half of respondents find that certification is associated with fewer audits by their customers – one of the leading rationales for the development of third-party food safety standards. And the interviews with brand representatives suggests that, with the availability of third-party standards, such as those of the BRCGS, their own auditing is more concerned with the underlying capabilities of suppliers and the brands' specific requirements and represent added knowledge for them, and not mainly undertaken as double checking on the third-party audits.

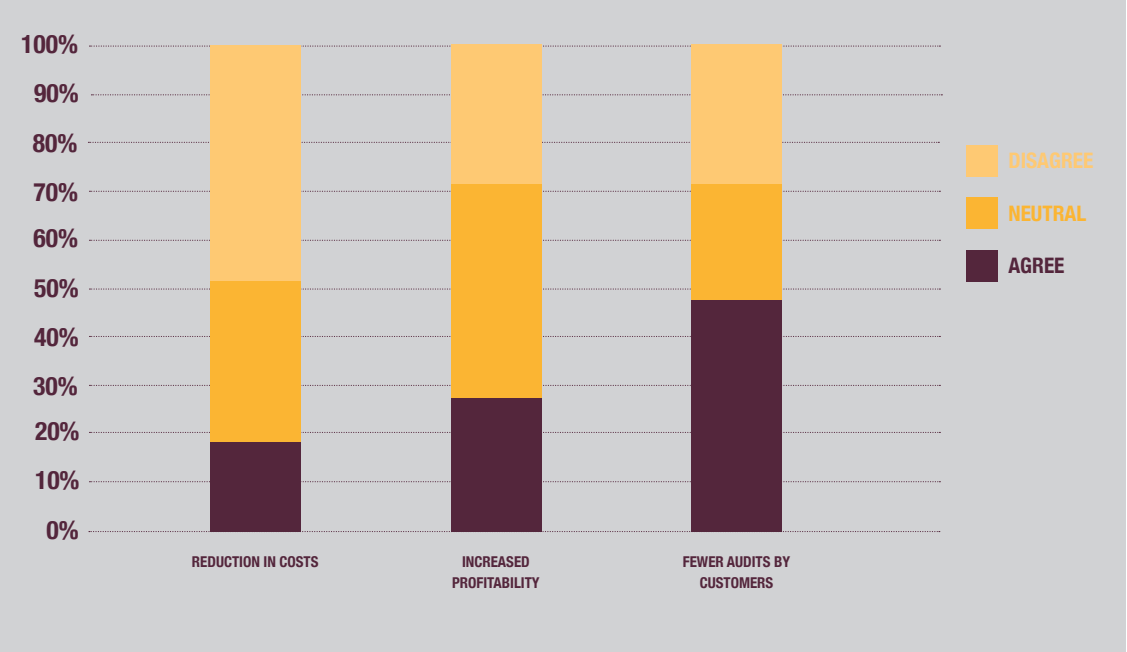


Figure 12: Other commercial effects (Source: own calculations)

6.3.5 PROFITABILITY

Our survey has discovered that acquiring and maintaining BRCGS certification has been associated with a wide range of changes in business processes and investments in the development of resources. In turn, large proportions of FBOs have achieved improvements in business performance, including output growth, especially exports. Compared with the limited evidence on financial impacts of certification found in previous research, our data showed that around one third of respondents were able to report enhanced profitability and were also able to provide some quantification of this.

Although in response to the qualitative question around 27% of respondents agree that BRCGS certification is associated with an increase in profitability, but responding to the question about quantifying profitability increase, over 34% of respondents agree that they have increased profitability in a range from 0 to over 10%.

Somewhat unexpectedly, an impressive share of respondents were able to provide range quantification of profitability growth. The ranges in the question were increases in profitability of:

- 0-5%
- 5-10%
- Over 10%

It is possible to summarise this data into a single figure on the working assumptions that the ranges can be represented by their mid points. For the upper range of over 10% the assumption used here is that this can be capped at 20%, with a mid-point of 15% following the logic that the top of each range is double the bottom.

- 0-5% = 2.5%
- 5-10% = 7.5%
- Over 10% = 15%

On these assumptions, the weighted mean increase in profitability for those (34% of respondents) giving a positive response was **6%**.

Closer analysis indicates a high correlation between the quantified increases in sales and in profitability, which implies that sales growth at a roughly constant margin was the main determinant of higher profitability. This is consistent with the survey data showing that only 17% of respondents agreed that they had achieved cost savings as a result of implementing third party food standards.

6.3.6 CERTIFICATION TO OTHER STANDARDS

The standards offered by BRCGS are benchmarked against several others by the GFSI. As well as this group, food safety standards can be set by individual brands, to ensure that suppliers meet their very specific requirements. Another source is the ISO 22000 standard published by the International Standards Organisation. This is outside the GFSI group as it does not itself entail the use of pre-requisite programmes by food companies. But it is an optional route for them, on its own or alongside GFSI standards.

In order to try to place the BRCGS standards in the wider food standards context, the survey for this project asked a few questions about the impact on food companies of their certification to other standards, in addition to those of BRCGS. In practice, the vast majority of respondents are certified to multiple standards, with 425 of 450 questionnaire returns providing information about the impact on their business of other standards. The extent of multiple certifications is likely to be a result of the need for food companies, even the very small, to diversify their customer base and minimise the risk that losing one customer jeopardises the business. Brands have corresponding imperatives to diversify suppliers, to minimise the risks of dependence on a few. The questionnaire did not request information on which standards, and it is likely that the responses represent a mix of other GFSI and perhaps non-GFSI standards.

The main findings are shown in figure 13.

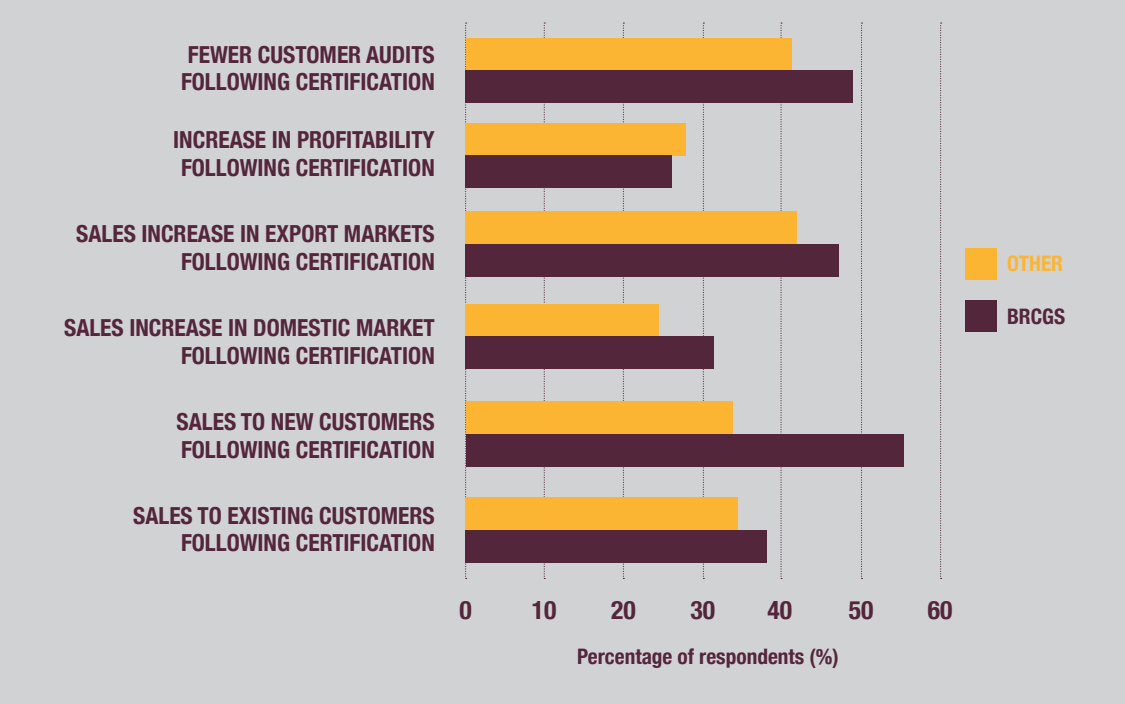


Figure 13: The impact on business performance of BRCGS certification compared to other certification standards

- Around 35% of respondents with certificates to standards in addition to BRCGS reported an increase in sales to existing customers following from certification. This result is similar to, but somewhat lower than, for BRCGS certification.
- 55% of respondents experienced increased sales having gained certification to BRCGS. Only 44% of respondents with other certification standards reported increased sales.
- 26% of respondents agreed that sales in their home market had increased, compared to 30% of BRCGS certificated respondents.
- 46% of respondents with BRCGS certification reported increased sales in export markets, compared with a lower figure of 42% for other certification standards.

- Similarly to BRCGS certified firms, around 29% of respondents agreed that profitability had increased.

- Over 40% of respondents agreed that there are fewer customer audits after certification to another third-party standard. This compares with 48% with BRCGS certification.

The results show that businesses with BRGCS certification experience a modest extent of greater positive impact on performance, across most of the common indicators. It is perhaps not surprising that there is broad similarity of impacts, since the majority of food safety standards are benchmarked by the GFSI in order to ensure similar quality and reliability. And our data comes from businesses who are multiple certified and regularly audited against several standards, so large-scale divergences in the impacts of the various standards seem unlikely.

6.4 RESPONSES BY SUB-GROUP

This section shows the results of comparing the pattern of responses to the questions on business behaviour between the members of sample sub-groups. The sub-groups are: FBOs by geographical location (region); FBOs by size of business (employment); and FBOs grouped according to the length of time the business has been certified to a BRCGS standard. We identified those sub-group variations that are statistically significant, where the test of significance is the probability that there is no relationship, generated by the chi square test, using a 5% threshold. A table of the indicators exhibiting significant variation by sub-groups is in Annex 1. Below we summarise the main findings.

6.4.1 REGION

Responses to the survey exhibit some strong patterns by geographical location. Out of 48 indicators, 30 show significant differences between the regions, with the majority of these driven by higher than expected shares of “agreement” responses in the Middle East or Asia Pacific.

6.4.2 SIZE

We found that 6 indicators showed significant variation by size of business, mostly as a result of a higher than expected share of small firms in agreement with the statements in the survey.

6.4.3 LENGTH OF CERTIFICATION

Only 5 indicators showed significant differences by length of certification, these variations were mainly driven by a higher than expected share of those certificated for 1-5 years in agreement with the statements offered.

6.5 RESPONDENT COMMENTS

The survey questionnaire provided a number of opportunities for respondents to add their own thoughts and comments on individual questions and on the aims of the survey overall.

In summary, these were slight elaborations on the basic questionnaire responses and did not provide major additional insights into the attitudes of respondents.

Overall there were 112 Comments (72 in English). These were spread across the questions, with the majority in the general comments section at the end of the survey. Of those in English, a subjective interpretation and summary of the balance of the comments is as follows.

- 24 were positive, in the sense that they made specific remarks pointing to improvements in the business as a result of adopting the BRCGS standard.

- 20 were negative, in the sense of specifically critical on the BRCGS standards, mainly the direct costs of certification, said to be higher than alternatives.

- 21 were neutral, in the sense they made general remarks about food safety and certification, without a value judgement on BRCGS.

- 7 concerned Customer Audits, with complaints that holding the BRCGS standard did not prevent customers from carrying out their own audits. Overall, around half of respondents indicated that BRCGS certification had led to fewer customer audits. This issue was also highlighted in previous research.

6.6 STORY LINES AND A TYPOLOGY OF CERTIFICATION USE

Some earlier research based on surveys of users of safety standards has developed some typologies based on FBOs' motivations for certification and on the importance they have attached to the reported uses they make and the impacts on them of being certified (e.g. Mensah and Julien, 2011, Spadoni et al. 2013). In this section, we report on similar exercises in modelling the patterns of approaches to obtaining and applying certification to BRCGS standards. In this we have the advantage of a rather larger survey data set than those available to earlier researchers.

The survey of BRCGS customers has generated a large amount of data for around 450 businesses. This data enables the calculation of indicators of how groups of these businesses approach qualifying for the BRCGS standards and using their certification to increase their competitiveness in international markets and developing and improving their products. In this section we report on the results of applying some well-established statistical techniques, known as factor and cluster analysis, to derive a small set of indicators that summarise the large amount of data from the survey. We can think of these as the "story lines" that explain, in succinct terms, how the survey respondents combine the various aspects of their adaptation to and application of the requirements of the BRCGS standards. These indicators can, in turn, be used as explanatory variables in regression equations that predict the quantitative indicators of rate of growth in sales and rate of increase in profitability.

The first stage in the analysis is to estimate a set of "factors" that reduce the wide range of variables from the survey to a few that represent the underlying data but are more approachable and able to be interpreted as strategic level business practices that integrate the variety of more specific activities covered in the survey.

Through the application of this technique, we have identified 5 factors or plausible story lines about the impacts of certification to BRCGS standards. These can be interpreted as the more fundamental dimensions of food firms' purposes and outcomes from certification. The specific questions in the surveys can then be understood as the facets or building blocks of these core concepts of the effects of certification to a standard.

6.6.1 FACTOR ANALYSIS

To arrive at the typology of certification – the story line – we use 39 survey instruments (questions) covering the following broad areas: (i) agreement with the importance of a set of objectives for certification consisting of six individual questions; (ii) agreement with financial costs and other challenges (10 questions), (iii) choice of BRCGS (4 questions); (iv) agreement with a set of operational outcomes (8 questions); (v) agreement with specific market outcomes (4 questions); and (vi) agreement with a set of commercial outcomes (7 questions). The results are presented in Annex 2. The survey responses can usefully be reduced into five factors, types of certification use or FBOs strategic orientations.

- *Type 1 Product and process innovation*. This factor explains the largest share of variation in the data and pulls together issues around improving product quality and product safety, together with investment in training and new technology. It also scores highly on the choice for a BRCGS standard and increased profitability.
- *Type 2 Competitiveness led growth in the home market.* This strategic orientation summarises responses connected with increased sales in the home market linked with increased profitability.
- *Type 3 Competitiveness led growth in export markets.* This strategic orientation pulls together a pattern of responses for export market growth and competitiveness.
- *Type 4 Costs of certification and investment.* Draws together response patterns around the possible costs of attaining and utilising certification.
- *Type 5 Customer requirement for certification.* Brings together all questions related to the pull for certification via customer requirements. This type also draws in costs aspects of the certification process.

Type 1, which we termed "product and process innovation", has considerable similarity to some of the concepts used in measurement of broad innovation – including managerial change – for public policy purposes. Innovation measured in this way has been shown to be significantly stimulated by the availability of technical and managerial standards. (For a short summary of the literature see Swann, G. and Lambert, R. (2017). As far as we know, there is no previous research on how far private food safety standards have such impacts. **The well determined finding from this research project, that BRCGS food safety standards, which do not in themselves include innovation as a purpose, also act as a determinant of broad-based innovation is a particularly unexpected and impressive result.**
From the factors a "score" can be derived for each survey respondent, that is a quantitative indicator of how strongly they favour that factor. These factor scores are used in two further modelling exercises - regression equations and cluster analysis.

6.6.2 REGRESSION

Regression equations are estimated in order to show which of the 5 indicators – factors and strategic orientations – are important in determining the impressive rates of growth in sales and in profitability reported in Section 6.3.

A basic OLS regression and an ordered logit regression reveal that Types 1, 2, 3 and 5 are significant in explaining the quantum of growth in sales; while Types 1, 2 and 3 are also significant in explaining the quantum of increases in profitability.

6.6.3 CLUSTERS

We then use cluster analysis – a technique that groups the FBOs by their similarities and differences across the five types of certification use – by their strategic orientation towards certification. Table 4 lists the five resulting groups of FBOs (clusters) and their characteristics – high or low orientation - with regards to the five types of certification use: product and process innovation; competitiveness led growth in the home market; competitiveness led growth in export markets; costs of certification and investment; and customer requirement for certification.

GROUPS OF FBOS	NO. OF FBOS	PRODUCT AND PROCESS INNOVATION	COMPETITIVENESS LED GROWTH IN THE HOME MARKET	COMPETITIVENESS LED GROWTH IN EXPORT MARKETS	COSTS OF CERTIFICATION AND INVESTMENT	CUSTOMER REQUIREMENT OF CERTIFICATION
1. Export oriented innovators	114	0.4	0.1	0.3	-0.6	-0.8
2. Requirement driven	27	0.3	-1.8	0.2	-0.9	0.9
3. Export oriented modernisers	199	0.0	0.2	0.3	0.6	0.2
4. Home market oriented innovators	40	0.8	-0.3	-2.0	0.3	-0.1
5. Passive Responders	45	-1.9	0.1	-0.5	-0.6	0.7

Table 4 Groupings of FBOs by type of certification use (strategic orientation)
Source: own calculations. Hierarchical cluster analysis using Ward linkages. 5 cluster solution was selected following inspection of the Dendrogram (cluster tree). N=425. The variables feeding into the cluster analysis are the saved standardized factor scores. Therefore, a negative value is indicative of a score below the average on a type and a positive value of a score above average. Scores greater than +/- 1 deviate a lot from the average. Put differently, 68% percent of all observations fall within the interval of [-1; 1].

The characteristics – in terms of their strategic orientation towards certification – of each group of FBOs – Groups 1 to 5 – are in the rows of Table 4.

Group 1 – Export oriented innovators is the second largest cluster containing 114 FBOs and characterised by an above average agreement with the outcome of improved product quality, safety and innovation and a low agreement with having experienced cost or other challenges and low agreement on the requirement of certification by customers.

Group 2 – Requirement driven is the smallest cluster of just under 30 sites. These companies agree that their main objective for certification is customer requirement. This cluster is also experiencing no growth in the home market.

Group 3 – Export oriented modernisers is the largest cluster (199 sites). These FBOs agreed with the incurred costs and other challenges. There is some indication of agreement with growth in home and export markets. So, they are very aware of costs of implementation but also that adapting their resources and business practices is associated with enhanced market opportunities.

Group 4 – Home market oriented innovators is a small group of businesses (40) which show high agreement on the value of certification in product quality, safety and innovation and who at the same time show very low international orientation. But as scoring highly on product quality and innovation they are likely to achieve enhanced profitability.

Group 5 – Passive responders is also a small cluster of sites (45) that do not agree that certification led to an improvement

in product quality and safety or investments. These sites tend to be certified because of key customers' requirements. They differ from group 2 in not perceiving export market benefits from certification and in a low score on innovation.

In the following we compare the characteristics of the five groups of FBOs in terms of size, location, time since certified, their products and type of certificates held.

GROUPS OF FBOS	1-50 EMPLOYEES	51-500	501-1,500	MORE THAN 1,500
1. Export oriented innovators	25	58	13	4
2. Requirement driven	22	56	11	11
3. Export oriented modernisers	33	61	5	2
4. Home market oriented innovators	45	55	0	0
5. Passive responders	47	44	7	2
Total	**33**	**57**	**7**	**3**

Table 5 Groups of FBOs by size
Source: own calculation. Cell content percentages. N=424

Groups 4 and 5, both focussed on their home markets, contain a large proportion of small enterprises. While groups 1 and 2 contain a larger share of large enterprises with 500 and more employees.

There is no significant difference across the groups with reference to the time since FBOs were first certified. No table is presented.

GROUPS OF FBOS	UK	EUROPE	NORTH AMERICA	SOUTH AMERICA	MIDDLE EAST	ASIA PACIFIC
1. Export oriented innovators	2	35	8	7	15	33
2. Requirement driven	4	37	7	4	19	30
3. Export oriented modernisers	14	40	8	10	11	18
4. Home market oriented innovators	18	35	28	3	3	15
5. Passive responders	51	27	9	0	4	9
Total	**14**	**37**	**10**	**7**	**11**	**21**

Table 6 Groups of FBOs by location
Source: own calculation. Cell content percentages. N=424.

Group 5, a smaller group of 45 FBOs, contains proportionally a larger share of UK based FBOs. Group 5 is also most critical in terms of the benefits of certification on product quality, safety, and innovation. Groups 1 and 2 have a higher proportion of FBOs located in the Middle Eastern and Asia Pacific regions. (As with size group 3 is distributed in a similar pattern to all responses).

There is no significant pattern across the product types of FBOs. There is, however, a difference across groups with respect to the certificate type held.

GROUPS OF FBOS	FOOD PROCESSING	PACKAGING	STORAGE AND DISTRIBUTION	AGENTS AND BROKERS	CONSUMER PRODUCTS	OTHER
1. Export oriented innovators	51	27	8	4	6	4
2. Requirement driven	74	15	7	0	0	4
3. Export oriented modernisers	60	28	7	3	2	1
4. Home market oriented innovators	53	20	15	8	3	3
5. Passive responders	22	16	29	29	2	2
Total	**54**	**25**	**10**	**6**	**3**	**2**

Table 7 Groups of FBOs by certificate type
Source: own calculation. Cell content percentages. N=425.

Group 2 contains relative more FBOs certified for food processing. It is the smallest group with only 27 FBOs. Group 5, containing 45 FBOs, has relatively more FBOs certified for storage and distribution, and agents and brokers and fewer businesses with food processing certificates.

GROUPS OF FBOS	SALES GROWTH	GROWTH IN PROFITS
1. Export oriented innovators	60	59
2. Requirement driven	54	50
3. Export oriented modernisers	68	52
4. Home market oriented innovators	35	27
5. Passive responders	35	14
Total	**59**	**48**

Table 8 FBO groups and change in sales and profits
Source: own calculation. Cell content percentages. N=309. Columns 2 and 3 are percentages of FBOs reporting growth in sales and profits.

In the survey 59 percent agreed that their sales grew owing to certification and 48 percent agreed that profits grew owing to certification.

In particular groups 1 and 3 – the export-oriented innovators and modernisers – reported above average sales and profit growths. These two groups of FBOs contain by far the largest number of businesses (313 out of 425 businesses).

7 CONCLUSIONS

This report has built on the evidence and insights from previous research, which mostly focussed on the motivations for food suppliers to become certified, and on the international trade effects of the dissemination of third-party certifications. However, this study has added materially to the evidence base, particularly on FBO performance effects.

Through discussions with representatives of “brands” - the proximate demand side of food markets - and through an extensive survey of certificated users of the BRCGS standards, we have been able to evidence the FBO performance effects of implementing BRCGS certification. These had been suspected but have now been demonstrated and quantified.

This study has demonstrated the widespread effects and reach on multiple aspects of their business operations and performance with nearly all FBO respondents having at least one positive impact from BRCGS certification.

Although often an initial response to a requirement of existing customers, the attainment of BRCGS certification opens up market opportunities, especially in export markets and with new customers.

The study has shown that BRCGS certification drives increased competitiveness via investment and modernisation. It enables increased competitiveness amongst food suppliers by providing incentives to investment in facilities and in human capital and though modernisation of the production organisation and operations.

BRCGS certification also delivers positive “bottom line” effects for many FBOs, which were previously un-observed. These can be calculated as an average of 7.5% sales growth and 6% profitability growth for the 30 to 40% of respondents reporting these quanta.

The study shows that BRCGS standards have similar positive impacts to ISO technical and management standards, in relation to enabling product and process innovation, and thus growth in output and productivity. However, BRCGS certification goes further than these by stimulating modernisation and investment – broad innovation. Broader innovation includes product innovation and new technology as well as changes in business processes and enhanced product quality (including safety).

The study identified how BRCGS certification is placed in the wider food standards context. While there are broad similarities in impact, FBOs with BRCGS certification experience a marginally greater impact on performance across most indicators.

This study has shown the widespread effects of BRCGS certification on multiple aspects of business operations and performance.

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ANNEX 1. BASIC STATISTICS

This annex presents the basic data from the site survey. The format is simple tabulations of the number (frequency), percentage breakdown and cumulative percentages of responses with short bullet notes drawing out the most salient points.

Interesting findings include:

Profile
- Responses cover a range of geographic locations.
- But the number from the UK is relatively low.
- They cover a range of products and standards, including non-foods.
- While the most frequent reasons for seeking certification were the preferences of current and potential customers, improving competitiveness, especially in export markets, was important for around 80%.

Costs
- A fairly modest share of around 50% agreed that BRCGS and Auditor charges were high.
- There has been extensive upgrading of physical equipment and IT while 65% had trained staff. The certification process has stimulated modernisation of businesses' physical and human capital.
- Only 30% reported that staff were resistant to change - this was seen as a more major issue in some academic research.
- Another issue raised in some earlier research was of FBOs in smaller or less developed countries facing local infrastructure limitations, such as access to auditors. But only 20% reported such issues in this survey.
- Over 54% agreed that paperwork costs had been incurred - again perhaps less than expected.

Why BRCGS
- The most frequently reported reason for the choice of a BRCGS standard was larger customer requirement.
- But the BRCGS coverage of the business's operations was also important for over 80%, while there was also extensive satisfaction with the quality of auditing.
- Around 50% agreed that BRCGS provided the best value for money.

Operational Outcomes
- More than 63% of respondents reported improvements in product quality.
- Very high proportions of FBOs had modernised or enhanced their real and human assets with over 70% improving the organisation of production while 80% had invested in staff training.

Market and commercial outcomes
- Implementing BRCGS standards stimulated competitiveness with over 50% of respondents reporting an improvement in their competitiveness in their home market and 60% in export markets.
- A large proportion of firms had achieved sales growth, especially to new customers – nearly 55% – and in export markets.

RESPONDENT PROFILE

Language

USER LANGUAGE	FREQ.	PERCENT	CUM.
English	332	74	74
Spanish	59	13	87
Turkish	26	6	92
Mandarin	34	8	100
Total	**451**	**100**	

Languages - *Summary*
- The great majority completed the survey in English.
- But reasonable numbers took advantage of the opportunity to complete in Mandarin, Spanish or Turkish.

Location

WHERE ARE YOU LOCATED?	FREQ.	PERCENT	CUM.
UK	67	15	15
Europe	162	36	51
North America	44	10	61
South America	31	7	68
Middle East and Africa	49	11	78
Asia Pacific countries	97	22	100
Total	450	100	

Location - *Summary*
- The response rate from the UK is relatively low.
- The largest group are respondents from Europe.
- But other regions show a useful number of responses, notably Asia-Pacific.

Size

HOW MANY EMPLOYEES DOES YOUR SITE HAVE?	FREQ.	PERCENT	CUM.
Less than 50	143	32	32
51-500	261	58	90
501-1,500	33	7	97
More than 1,500	14	3	100
Total	**451**	**100**	

Size - *Summary*
- The majority of respondents (90%) are in the small or medium categories.
- A useful share are though large or very large.

Years certified

HOW LONG HAVE YOU BEEN CERTIFIED?	FREQ.	PERCENT	CUM.
Less than 1 year	61	14	14
1-5 years	140	31	45
6-10 years	128	28	73
11-15 years	79	18	90
More than 15 years	43	10	100
Total	**451**	**100**	

Years Certified- *Summary*
- There is good representation of FBOs with shorter and longer periods certified to BRCGS standards.
- Some 60% have been certified for between 1 and 10 years.

Products certified

CERTIFIED PRODUCTS	FREQ.	PERCENT	CUM.
Bread	34	8	8
Fruit	76	17	24
Dairy	12	3	27
Meat	92	20	48
Non-food	92	20	68
Other	144	32	100
Total	**450**	**100**	

Products certified- *Summary*
- Respondents cover a range of product types, including non-foods.

Certifications

CERTIFICATES HELD	FREQ.	PERCENT	CUM.
Food	242	54	54
Packaging	110	24	78
Storage	47	10	88
Agents	29	6	95
Consumer Products	15	3	98
Other	9	2	100
Total	**452**	**100**	

Certifications- *Summary*
- The largest group of certificates held are for food.
- But packaging and storage are also well represented.

REASONS FOR CERTIFICATION

Current customers

CERTIFICATION IS REQUIRED BY CURRENT CUSTOMERS	FREQ.	PERCENT	CUM.
Not applicable/don't know	7	2	2
No importance	5	1	3
Neither important or unimportant	13	3	6
Some importance	45	10	16
Highly important	207	46	61
Most important	174	39	100
Total	**451**	**100**	

Current customers - *Summary*

- Current customer requirement is important in seeking certification for 95% of respondents
- The vast majority of these regard it as highly or most important

Potential customers

CERTIFICATION IS REQUIRED BY POTENTIAL CUSTOMERS	FREQ.	PERCENT	CUM.
Not applicable/don't know	7	2	2
No importance	7	2	3
Neither important or unimportant	9	2	5
Some importance	72	16	21
Highly important	238	53	74
Most important	118	26	100
Total	**451**	**100**	

Potential customers - *Summary*

- Similarly to existing customers, potential customer requirement for certification are a driver for 95% of respondents.
- This factor is ranked slightly lower in importance than the needs of existing customers.

Domestic competitiveness

INCREASE COMPETITIVENESS IN HOME MARKET	FREQ.	PERCENT	CUM.
Not applicable/don't know	21	5	5
No importance	43	10	14
Neither important or unimportant	36	8	22
Some importance	130	29	51
Highly important	161	36	87
Most important	56	13	100
Total	**447**	**100**	

Domestic competitiveness - *Summary*

- Certification is also important to FBOs because it can be used to promote their offering to domestic customers or potential customers.
- Nearly 80% regard gaining domestic competitiveness as important.
- Close to 50% regard as of high or most importance.

Export competitiveness

INCREASE COMPETITIVENESS IN EXPORT MARKETS	FREQ.	PERCENT	CUM.
Not applicable/don't know	23	5	5
No importance	26	6	11
Neither important or unimportant	28	6	17
Some importance	92	21	38
Highly important	200	45	83
Most important	77	17	100
Total	**446**	**100**	

Export competitiveness - *Summary*

- A slightly higher proportion - 83%, see certification as important for competing in export markets.
- Similarly, a higher share - over 60% - find it of high or most importance.

Safe products

NEED TO SUPPLY SAFE PRODUCTS	FREQ.	PERCENT	CUM.
Not applicable/don't know	4	1	1
No importance	19	4	5
Neither important or unimportant	13	3	8
Some importance	50	11	19
Highly important	157	35	54
Most important	206	46	100
Total	**449**	**100**	

Safe products - *Summary*

- Over 80% of respondents regard safe products as a highly important reason for certification to a standard.
- A further 11% see it as of some importance.

Competitor certified

COMPETITOR HAS CERTIFICATION	FREQ.	PERCENT	CUM.
Not applicable/don't know	33	7	1
No importance	52	12	5
Neither important or unimportant	57	13	8
Some importance	119	27	19
Highly important	115	26	54
Most important	68	15	100
Total	**444**	**100**	

Competitor certified - *Summary*
- Nearly 70% of respondents see some need to match competitors use of certification
- And 40% see it as highly or most important..

COSTS AND CHALLENGES

BRCGS Charges

BRCGS SPECIFIC CHARGES ARE VERY HIGH	FREQ.	PERCENT	CUM.
Not applicable/don't know	13	3	3
Strongly disagree	9	2	5
Disagree	30	7	12
Neither agree or disagree	166	37	48
Agree	179	40	88
Strongly agree	54	12	100
Total	**451**	**100**	

BRCGS Charges - *Summary*
- Over 50% of respondent find BRCGS charges to be very high.
- But 11% disagree
- And 36% are neutral
- The overall balance of responses is close to neutral - perhaps surprisingly.

Auditor charges

AUDIT CHARGES ARE VERY HIGH	FREQ.	PERCENT	CUM.
Not applicable/don't know	8	2	2
Strongly disagree	10	2	4
Disagree	31	7	11
Neither agree or disagree	136	30	41
Agree	205	45	86
Strongly agree	61	14	100
Total	**451**	**100**	

Auditor charges
- A higher proportion of respondents agree that audit charges are high than BRCGS charges.
- But over 40% disagree or are neutral.

Training

COSTS HAVE BEEN INCURRED FOR TRAINING OF STAFF TO MEET CERTIFICATION REQUIREMENT	FREQ.	PERCENT	CUM.
Not applicable/don't know	10	2	2
Strongly disagree	14	3	5
Disagree	47	10	16
Neither agree or disagree	87	19	35
Agree	238	53	88
Strongly agree	54	12	100
Total	**450**	**100**	

Training - *Summary*
- Some 65% of respondents have spent on training.
- Only 15% disagree that they have done so.

Recruitment

COSTS HAVE BEEN INCURRED FOR RECRUITMENT OF STAFF TO MEET CERTIFICATION REQUIREMENT	FREQ.	PERCENT	CUM.
Not applicable/don't know	27	6	6
Strongly disagree	20	4.44	10.44
Disagree	109	24.22	34.67
Neither agree or disagree	106	23.56	58.22
Agree	160	35.56	93.78
Strongly agree	28	6.22	100
Total	**450**	**100**	

Recruitment - *Summary*

- Over 40% of respondents have spent money on recruiting staff to meet the needs of certification.
- But 28% have not had that experience, while 24% are neutral.
- Recruitment of new staff can generate benefits through increased capability and responsiveness to customers and markets.

Employee resistance

EMPLOYEES ARE RESISTANT TO CHANGE	FREQ.	PERCENT	CUM.
Not applicable/don't know	20	4	4
Strongly disagree	51	11	16
Disagree	148	33	49
Neither agree or disagree	99	22	71
Agree	109	24	95
Strongly agree	23	5	100
Total	**450**	**100**	

Employee resistance - *Summary*

- The largest group of respondents - over 44% - disagree that employees are resistant to change.
- Over 20% are neutral.
- Some 30% feel that there is such resistance.
- The balance of responses suggest that this is not an extensive problem.

Modernisation of capital

COSTS HAVE BEEN INCURRED FOR NEW OR UPGRADED MACHINERY AND EQUIPMENT	FREQ.	PERCENT	CUM.
Not applicable/don't know	38	8	8
Strongly disagree	18	4	13
Disagree	89	20	32
Neither agree or disagree	80	18	50
Agree	181	40	91
Strongly agree	42	9	100
Total	**448**	**100**	

Modernisation of capital - *Summary*

- Around 50% of respondents have incurred expenditure on up-dating equipment.
- Only 23% disagree that this action was taken
- While 25% were neutral.
- Modernisation can benefit the business through efficiencies and customers through improved products and services.

Modernisation of IT

COSTS HAVE BEEN INCURRED FOR NEW/UPGRADED IT	FREQ.	PERCENT	CUM.
Not applicable/don't know	42	9	9
Strongly disagree	33	7	17
Disagree	140	32	48
Neither agree or disagree	106	24	72
Agree	111	25	97
Strongly agree	12	3	100
Total	**444**	**100**	

Modernisation of IT - *Summary*

- Over 27% of respondents had spent on modernising their IT.
- But nearly 40% had not.
- Around one third were neutral.
- The balance of responses indicates that upgrading production equipment was more widely adopted than improving IT provision.

Infrastructure

LOCAL INFRASTRUCTURE PROBLEMS SUCH AS ACCESS TO AUDITORS	FREQ.	PERCENT	CUM.
Not applicable/don't know	39	9	9
Strongly disagree	72	16	25
Disagree	170	38	63
Neither agree or disagree	75	17	79
Agree	72	16	96
Strongly agree	20	4	100
Total	**448**	**100**	

Infrastructure - *Summary*

- Only 20% overall of respondents agreed that certification faced local infrastructure problems.
- Over 50% did not see such problems.
- Some 25% were neutral.
- The balance of responses does not indicate widespread infrastructure issues - although particular locations might show a higher incidence.

Product development

COSTS HAVE BEEN INCURRED FOR CHANGES TO PRODUCT DEVELOPMENT	FREQ.	PERCENT	CUM.
Not applicable/don't know	61	14	14
Strongly disagree	24	5	19
Disagree	124	28	47
Neither agree or disagree	113	25	72
Agree	111	25	97
Strongly agree	15	3	100
Total	**448**	**100**	

Product development - *Summary*
- More respondents - 33% disagreed that these costs were incurred.
- Some 28% agreed.
- Over 38% were neutral.

Cost of bureaucracy

COSTS HAVE BEEN INCURRED DUE TO INCREASED PAPERWORK AND DOCUMENTATION	FREQ.	PERCENT	CUM.
Not applicable/don't know	8	2	2
Strongly disagree	29	7	8
Disagree	78	17	26
Neither agree or disagree	93	21	47
Agree	188	42	89
Strongly agree	50	11	100
Total	**446**	**100**	

Cost of bureaucracy - *Summary*
- Around 54% agreed that such costs were incurred.
- Only 24% disagreed.

WHY BRCGS?

Biggest customer

REQUIRED BY BIGGEST EXISTING CUSTOMER	FREQ.	PERCENT	CUM.
Not applicable/don't know	14	3	3
Strongly disagree	2	0	4
Disagree	25	6	9
Neither agree or disagree	63	14	23
Agree	203	45	68
Strongly agree	145	32	100
Total	**452**	**100**	

Biggest customer - *Summary*

- Around 77% of respondents agree that their biggest customer required BRCGS certification.
- Only 6% had some degree of disagreement.
- The balance implies that brands are often the de facto "customer" for Food Safety standards.

Coverage

GOOD COVERAGE OF OUR OPERATIONS	FREQ.	PERCENT	CUM.
Not applicable/don't know	5	1	1
Strongly disagree	4	1	2
Disagree	14	3	5
Neither agree or disagree	49	11	16
Agree	284	63	79
Strongly agree	95	21	100
Total	**451**	**100**	

Coverage - *Summary*

- Over 80% of respondents agree that the coverage of their activities by the BRCGS standard was important in their choice of that source of certification.
- Very few (16%) disagreed or were neutral.

Auditors

HIGH QUALITY OF AUDITORS	FREQ.	PERCENT	CUM.
Not applicable/don't know	2	0	0
Strongly disagree	2	0	1
Disagree	10	2	3
Neither agree or disagree	73	16	19
Agree	285	63	82
Strongly agree	80	18	100
Total	**452**	**100**	

Auditors - *Summary*

- 80% of respondents agreed on the high quality of auditors available to test certification to the BRCGS standard.
- Under 3% disagreed.
- Taken together with their appreciation of the breadth of coverage of the BRCGS standard, this implies a high level of satisfaction with the integrated standards provision and certification system offered by BRCGS.

Value for money

BEST VALUE FOR MONEY	FREQ.	PERCENT	CUM.
Not applicable/don't know	18	4	4
Strongly disagree	7	2	6
Disagree	40	9	14
Neither agree or disagree	187	41	56
Agree	165	37	92
Strongly agree	34	8	100
Total	**451**	**100**	

Value for money - *Summary*

- Less than half of respondents agreed that BRCGS offered the best value for money.
- But only around 10% disagreed.
- Over 45% were neutral.
- So there appears to be a substantial but not overwhelming share who see good value for money from BRCGS.

OUTCOMES

OPERATIONAL OUTCOMES

Food quality and safety

While this is not the main focus of the survey, the responses confirm that food safety and quality has been very substantially enhanced by their BRCGS certification.

Product Recalls

WE HAVE EXPERIENCED FEWER PRODUCT RECALLS/WITHDRAWALS	FREQ.	PERCENT	CUM.
Not applicable/don't know	58	13	13
Strongly disagree	30	7	19
Disagree	58	13	32
Neither agree or disagree	125	28	60
Agree	132	29	89
Strongly agree	49	11	100
Total	**452**	**100**	

Recalls - *Summary*

- Around 40% of respondents report food safety improvements through experiencing fewer product recalls and withdrawals, since achieving BRCGS certification.
- Another 40% were neutral or lacked knowledge on the issue
- Under 20% reported no such effects.

Quality

OUR PRODUCT QUALITY HAS IMPROVED	FREQ.	PERCENT	CUM.
Not applicable/don't know	16	4	4
Strongly disagree	10	2	6
Disagree	42	9	15
Neither agree or disagree	97	21	36
Agree	228	50	86
Strongly agree	63	14	100
Total	**456**	**100**	

Quality - *Summary*

- More than 63% of respondents reported improvements in product quality
- Around 11% were sure of no such improvement
- Some 25% were neutral (not sure or perceiving non change).

Product safety

OUR PRODUCT SAFETY HAS IMPROVED	FREQ.	PERCENT	CUM.
Not applicable/don't know	6	1	1
Strongly disagree	5	1	2
Disagree	20	4	7
Neither agree or disagree	59	13	20
Agree	255	56	76
Strongly agree	110	24	100
Total	**455**	**100**	

Safety - *Summary*

- Some 80% of respondents are confident that BRCGS certification has achieved is primary purpose of enabling safer food production.
- Only 5% disagree.
- Around 15% are neutral on this topic.

Efficiency and Investment

Survey respondents extensively report efficiency gains through organisation of production, often with investment in new technology. Over 80% have invested in staff training. These enhancements of physical and human capital benefit the suppliers and their customers. Product innovation is also reported by some 30%, which seems high, given the importance of customer specifications in the food supply chain.

Organisation of production

WE HAVE ACHIEVED BETTER ORGANISATION OF PRODUCTION	FREQ.	PERCENT	CUM.
Not applicable/don't know	29	6	6
Strongly disagree	11	2	9
Disagree	36	8	17
Neither agree or disagree	68	15	32
Agree	256	57	88
Strongly agree	53	12	100
Total	**453**	**100**	

Organisation of production - *Summary*

- Nearly 70% of respondents report improvements in their organisation of production.
- Only 10% definitely did not experience this effect.
- Slightly more than 20% were not able to give an assessment.

Innovation

PRODUCT INNOVATION HAS INCREASED	FREQ.	PERCENT	CUM.
Not applicable/don't know	51	11	11
Strongly disagree	19	4	15
Disagree	73	16	32
Neither agree or disagree	174	39	70
Agree	111	25	95
Strongly agree	24	5	100
Total	**452**	**100**	

Innovation - *Summary*

- A smaller proportion of respondents - 30% less than for other operational outcomes report increases in product innovation.
- Over 20% are clear that innovation has not been increase by certification.
- Nearly 50% cannot take a view on the matter.

New technology

WE HAVE INVESTED IN NEW TECHNOLOGY	FREQ.	PERCENT	CUM.
Not applicable/don't know	36	8	8
Strongly disagree	8	2	10
Disagree	71	16	25
Neither agree or disagree	121	27	52
Agree	186	41	93
Strongly agree	31	7	100
Total	**453**	**100**	

New technology - *Summary*

- Nearly 50% of respondents agree that they have undertaken investment in new technology, stimulated by certification to the BRCGS standard.
- Over one third are not able to say.
- Around 17% are clear that they have not so invested.

Training

WE HAVE INVESTED IN TRAINING	FREQ.	PERCENT	CUM.
Not applicable/don't know	1	0	0
Strongly disagree	3	1	1
Disagree	16	4	4
Neither agree or disagree	50	11	15
Agree	309	68	84
Strongly agree	73	16	100
Total	**452**	**100**	

Training - *Summary*
- The vast majority - 85% of respondents have invested in training as part of their adoption of BRCGS certification.
- Around 4% have not done so.
- Some 11% are unsure.

Integration with other standards

THERE IS BETTER INTEGRATION WITH OTHER MANAGEMENT STANDARDS (E.G. ISO 9001)	FREQ.	PERCENT	CUM.
Not applicable/don't know	88	19	19
Strongly disagree	6	1	21
Disagree	29	6	27
Neither agree or disagree	102	22	50
Agree	181	40	89
Strongly agree	48	11	100
Total	**454**	**100**	

Integration of standards - *Summary*
- Around 50% of respondents agree that there is better integration with other management standards.
- Some 8% disagree.
- Another 42% are not sure.

MARKET OUTCOMES

For a large proportion of BRCGS customers who responded to the survey, the operational developments, as well as an enhanced market reputation, signalled by gaining certification, have led to improved competitiveness, especially in export markets, while certification status has opened up larger market opportunities. Relatively small shares of respondents have disagreed with the propositions on market outcomes.

Competitiveness in home market

WE HAVE INCREASED COMPETITIVENESS IN THE HOME MARKET	FREQ.	PERCENT	CUM.
Not applicable/don't know	36	8	8
Strongly disagree	20	4	12
Disagree	55	12	24
Neither agree or disagree	114	25	50
Agree	189	42	91
Strongly agree	40	9	100
Total	**454**	**100**	

Competitiveness - *Summary*

- Over 50% of respondents report an improvement in their competitiveness in their home market.
- But 16% do not agree that competitiveness has improved.
- Around one third are neutral/undecided.

Competitiveness in export markets

WE HAVE INCREASED COMPETITIVENESS IN EXPORT MARKETS	FREQ.	PERCENT	CUM.
Not applicable/don't know	41	9	9
Strongly disagree	8	2	11
Disagree	30	7	17
Neither agree or disagree	101	22	40
Agree	207	45	85
Strongly agree	68	15	100
Total	**455**	**100**	

Export competitiveness - *Summary*

- Some 60% of respondents have gained competitiveness in export markets - a higher share than in home markets.
- Only 8% have not found export competitiveness.
- Again, around one third are neutral on the subject.

Access to larger home market

THERE IS ACCESS TO LARGER HOME MARKET	FREQ.	PERCENT	CUM.
Not applicable/don't know	36	8	8
Strongly disagree	16	4	11
Disagree	52	11	23
Neither agree or disagree	122	27	50
Agree	192	42	92
Strongly agree	37	8	100
Total	**455**	**100**	

Larger home market - *Summary*

- Over 50% of respondent find that they have access to a larger home market as a results of BRCGS certification
- Some 15% have not found this.
- The remaining 35% are unsighted on the topic.

Access to larger export market

THERE IS ACCESS TO LARGER EXPORT MARKET	FREQ.	PERCENT	CUM.
Not applicable/don't know	40	9	9
Strongly disagree	4	1	10
Disagree	22	5	15
Neither agree or disagree	93	20	35
Agree	220	48	83
Strongly agree	75	17	100
Total	**454**	**100**	

Larger export market - *Summary*

- Again, access to larger export markets are reported by more respondents - some 65%, than for home markets.
- Just over 5% have not found larger export markets.
- Around 30% are neutral on the subject.

COMMERCIAL OUTCOMES

SALES EFFECTS

BRCGS certification is associated with higher sales to existing customers for nearly 40% of respondents. However, it has helped to gain business with new customers for 55% of respondents, confirming the efficacy of certification in improving competitiveness. The share who have gained sales in export markets is somewhat higher than in home markets, which suggests that certification raises the international profile of BRCGS customers.

Sales to existing customers

INCREASED SALES VOLUMES - EXISTING CUSTOMERS	FREQ.	PERCENT	CUM.
Not applicable/don't know	34	8	8
Strongly disagree	19	4	12
Disagree	72	16	28
Neither agree or disagree	150	34	62
Agree	151	34	96
Strongly agree	20	4	100
Total	**446**	**100**	

Increased sales - *Summary*

- Over 38% of respondents agree that they have achieved increases in their sales to their existing customers, following certification by BRCGS.
- More than 20% do not think that they have achieved higher sales.
- Around 40% are neutral.

Sales - new customers

INCREASED SALES VOLUMES - NEW CUSTOMERS	FREQ.	PERCENT	CUM.
Not applicable/don't know	32	7	7
Strongly disagree	10	2	9
Disagree	49	11	20
Neither agree or disagree	110	25	45
Agree	215	48	93
Strongly agree	29	7	100
Total	**445**	**100**	

Increased sales to new customers - *Summary*

- A higher share of respondents - nearly 55% - report increased sales to new as opposed to existing customers.
- Only 13% are clear that there has not been an increase.
- Again, one third are neutral on the question.

Sales - home market

INCREASED SALES VOLUMES - HOME MARKETS	FREQ.	PERCENT	CUM.
Not applicable/don't know	47	11	11
Strongly disagree	20	5	15
Disagree	81	18	33
Neither agree or disagree	161	36	70
Agree	119	27	97
Strongly agree	15	3	100
Total	**443**	**100**	

Increased sales in home market - *Summary*
- Around 30% of respondents agree that they have increased sales in the home market.
- But over 22% have not found this.
- Some 46% have no view or information on the question.

Sales - export markets

INCREASED SALES VOLUMES -EXPORT MARKETS	FREQ.	PERCENT	CUM.
Not applicable/don't know	57	13	13
Strongly disagree	9	2	15
Disagree	50	11	26
Neither agree or disagree	125	28	54
Agree	169	38	92
Strongly agree	36	8	100
Total	**446**	**100**	

Increased sales in export markets - *Summary*
- Over 45% of respondents agree that they have seen increased sales in export markets, compared to 30% in home markets.
- Around 13% do not agree that export sales have increased.
- 40% of respondents remain neutral on changes in the volume of export sales.

Other commercial effects

Only a small proportion attribute operating cost reductions to certification, whereas 50% definitely disagree with the proposition. Under 30% of respondents agree with the idea of increased profitability, while a very similar proportion disagree. Nearly half of respondents find that certification is associated with fewer audits by their customers - one of the leading rationales for the development of third party food safety standards. However nearly 30% disagree.

Quantification of commercial impacts

Over 40% of respondents were able to estimate the percentage change in sales arising from operating with BRCGS certification. Only 5% indicated a percentage for reductions in sales. On profitability, 35% quantified an increase while 6% quantified some decline.

Cost reduction

REDUCTION IN OPERATING COSTS	FREQ.	PERCENT	CUM.
Not applicable/don't know	25	6	6
Strongly disagree	48	11	16
Disagree	167	38	54
Neither agree or disagree	130	29	83
Agree	66	15	98
Strongly agree	8	2	100
Total	**444**	**100**	

Reduction in costs - *Summary*

- Only 16% of respondents associate BRCGS certification with lower operating costs.
- Nearly 48% are sure that there is no reduction.
- Around 35% are neutral on this question.

Profitability

INCREASE IN PROFITABILITY	FREQ.	PERCENT	CUM.
Not applicable/don't know	32	7	7
Strongly disagree	27	6	13
Disagree	97	22	35
Neither agree or disagree	167	38	73
Agree	107	24	97
Strongly agree	14	3	100
Total	**444**	**100**	

Increase in profitability - *Summary*

- Around 27% of respondents agree that BRCGS certification is associated with an increase in profitability.
- Again around 27% do not agree that profitability is increased.
- Some 42% are neutral.

Fewer audits

A LOWER NUMBER OF CUSTOMER AUDITS	FREQ.	PERCENT	CUM.
Not applicable/don't know	18	4	4
Strongly disagree	45	10	14
Disagree	82	18	33
Neither agree or disagree	87	20	52
Agree	158	36	88
Strongly agree	55	12	100
Total	**445**	**100**	

Fewer customer audits - *Summary*

- Nearly 48% of respondents agree that the experience fewer audits by their customers.
- But 28% do not agree that this is the case.
- Around 23% are neutral.

Quantified sales growth

QUANTIFIED SALES INCREASE	FREQ.	PERCENT	CUM.
More than 10% decline	7	2	2
5 to 10% decline	4	1	2
0 to 5% decline	11	2	5
No change	113	25	30
0 to 5 % increase	82	18	48
5 to 10% increase	65	14	63
Over 10% increase	51	11	74
Don't know	117	26	100
Total	**450**	**100**	

Percent change in sales - *Summary*

- Around 43% of respondents agree they have increased sales in the range 0 to over 10%. This is consistent with the shares reporting some degree of increase in sales in an earlier question.
- Some 5% agree that they have experienced a decline in sales in the range 0 to over 10%.
- Over 25% report no change and a further 25% are unable to estimate.

Quantified profitability increase

PROFITABILITY INCREASE	FREQ.	PERCENT	CUM.
More than 10% decline	6	1	1
5 to 10% decline	4	1	2
0 to 5% decline	19	4	6
No change	132	30	36
0 to 5 % increase	87	19	55
5 to 10% increase	37	8	64
Over 10% increase	30	7	70
Don't know	132	29.53	100
Total	**447**	**100**	

Percentage change in profitability - *Summary*

- Over 34% of respondents agree that they have increased profitability in a range from 0 to over 10%.
- Some 6% consider that there has been a decline in profitability in a range from 0 to over 10%.
- Nearly 30% are unable to say while a further 30% report no change in profitability.

Comment:

The share reporting positive rates of profitability increase here does not seem fully consistent with answers to the broader question of whether profitability has increased , where 27 % agreed that there had been some increase in profitability. The divergence is largely due (numerically) to 38 respondents who answered "Neither Agree nor Disagree" to the general question on profitability but "0 to 5%" to percentage change in profitability. A further 12 indicated "5 to 10%" increase.

OTHER FOOD SAFETY STANDARDS

The survey repeated a few of the commercial outcome questions but addressed to FBOs who were applying other food safety standards in their operations. This was aimed at providing some elements of a broader context for the information gathered on those certificated to the BRCGS standard. The question did not specify what sorts of standard to include, eg not specifically GFSI benchmarked standards. So respondents could be thinking of ISO 22000 or possibly some customer specific standards. The majority of survey respondents (425 of 450) completed these questions, suggesting that most suppliers are operating in compliance with more than one food safety standard.

In broad terms, the pattern of responses were similar to those concerned with BRCGS standards only. Relatively large differences though occurred for:
"Increased sales to new customers" where 55% of BRCGS certified FBOs agreed against 43% of those responding on "Other food safety standards."
"Reduction in customer audits" confirmed by 47% of BRCGS certified respondents against 40% of those also using other standards.

Sales - existing customers

INCREASED SALES VOLUMES -EXISTING CUSTOMERS	FREQ.	PERCENT	CUM.
Not applicable/don't know	77	18	18
Strongly disagree	11	3	21
Disagree	53	12	33
Neither agree or disagree	133	31	64
Agree	137	32	97
Strongly agree	14	3	100
Total	**425**	**100**	

Increased sales to existing customers - *Summary*

- Around 35% of respondents with certificates to standards in addition to BRCGS reported an increase in sales to existing customers. (This result is similar to but somewhat lower than for BRCGS certification.)
- Some 15% did not agree that there was an increase.
- The remaining 50% were neutral. (A much higher proportion than in the case of BRCGS standards, where 40% were neutral.)

Sales - new customers

INCREASED SALES VOLUMES - NEW CUSTOMERS	FREQ.	PERCENT	CUM.
Not applicable/don't know	76	18	18
Strongly disagree	7	2	19
Disagree	39	9	29
Neither agree or disagree	118	28	56
Agree	164	39	95
Strongly agree	22	5	100
Total	**426**	**100**	

Increased sales to new customers - *Summary*

- Over 43% agreed that they experienced increased sales to new customers. (This is markedly lower than the 55% of BRCGS certificated respondents.)
- Just 11% disagreed with the proposition.
- 45% were neutral.

Sales - home market

INCREASED SALES VOLUMES - HOME MARKETS	FREQ.	PERCENT	CUM.
Not applicable/don't know	92	22	22
Strongly disagree	19	4	26
Disagree	60	14	40
Neither agree or disagree	143	34	74
Agree	99	23	97
Strongly agree	11	3	100
Total	**424**	**100**	

Increased sales in home market - *Summary*

- Some 26% of respondents agrees that sales in their home market had increased. (Slightly lower than the 30% of BRCGS certificated respondents.)
- Around 15% disagreed with the proposition of higher domestic sales.
- The larger share - 55% - were neutral.

Sales - export markets

INCREASED SALES VOLUMES - EXPORT MARKETS	FREQ.	PERCENT	CUM.
Not applicable/don't know	87	21	22
Strongly disagree	9	2	26
Disagree	35	8	40
Neither agree or disagree	113	27	74
Agree	149	35	97
Strongly agree	31	7	100
Total	**424**	**100**	

Increased sales in export markets - *Summary*

- More than 42% of respondents experienced increased sales in export markets (slightly less than the 46% of BRCGS certificated respondents).
- Some 10% disagreed with the idea of increases in export sales.
- While 47% were neutral.

Cost reduction

REDUCTION IN OPERATING COSTS	FREQ.	PERCENT	CUM.
Not applicable/don't know	71	17	22
Strongly disagree	32	8	26
Disagree	135	32	40
Neither agree or disagree	112	26	74
Agree	59	14	97
Strongly agree	14	3	100
Total	**423**	**100**	

Cost reduction - *Summary*
- Just 17% of respondents agreed that certification to another standard led to lower operating costs.
- But 39% disagreed.
- While 43% were neutral.

Profitability

INCREASE IN PROFITABILITY	FREQ.	PERCENT	CUM.
Not applicable/don't know	81	19	19
Strongly disagree	15	4	23
Disagree	74	17	40
Neither agree or disagree	133	31	72
Agree	109	26	97
Strongly agree	11	3	100
Total	**423**	**100**	

Increase in profitability - *Summary*
- Around 29% of respondents agree that profitability has increased.
- However 21% disagree.
- But over 50% are neutral on profitability.

This pattern of responses is very similar to those for BRCGS certification.

Customer audits

A LOWER NUMBER OF CUSTOMER AUDITS	FREQ.	PERCENT	CUM.
Not applicable/don't know	56	13	13
Strongly disagree	30	7	20
Disagree	76	18	38
Neither agree or disagree	88	21	59
Agree	139	33	92
Strongly agree	35	8	100
Total	**424**	**100**	

Fewer customer audits - *Summary*

- Over 40% of respondents agree that there are fewer customer audits after certification to another third-party standard. This compares with 47% on BRCGS certification.
- Some 25% disagree on this impact.
- While 44% are neutral.

RESPONSES BY SUB-GROUPS

The following tables report on the test of statistical significance across sub-groups of FBOs: by region; size; and time certified.

By region

Export competitiveness	Pearson chi2(25) = 86.6229 Pr = 0.000	UK low importance, Europe high importance
Competitor certified	Pearson chi2(25) = 50.9086 Pr = 0.002	
Employee resistance	Pearson chi2(10) = 18.1847 Pr = 0.052	
Upgrade physical capital	Pearson chi2(10) = 19.9154 Pr = 0.030	
Coverage of operations	Pearson chi2(10) = 19.7933 Pr = 0.031	
Best value for money	Pearson chi2(10) = 47.8302 Pr = 0.000	
Product recalls	Pearson chi2(10) = 44.9076 Pr = 0.000	
Organisation	Pearson chi2(10) = 41.4187 Pr = 0.000	
Export competitiveness	Pearson chi2(10) = 70.8166 Pr = 0.000	
Sales to existing customers	Pearson chi2(10) = 24.1012 Pr = 0.007	

By size

BRCGS charges	Pearson chi2(6) = 13.0886 Pr = 0.042	1-50 high agree
Coverage of operations	Pearson chi2(6) = 13.9317 Pr = 0.030	
Best value for money	Pearson chi2(6) = 15.1187 Pr = 0.019	501-1500 morel likely to agree
Home competitiveness	Pearson chi2(6) = 17.8515 Pr = 0.007	
Customer audits	Pearson chi2(6) = 15.1756 Pr = 0.019	1-50 more likely to agree

By time certified

Export competitiveness	Pearson chi2(20) = 33.5231 Pr = 0.030	
Recruitment	Pearson chi2(8) = 16.1911 Pr = 0.040	1-5years have higher than average agreement
Home competitiveness	Pearson chi2(8) = 17.1027 Pr = 0.029	1-5 year high agree
Profitability	Pearson chi2(8) = 20.9139 Pr = 0.007	1-5 years high agree, over 11 years low agree
Customer audits	Pearson chi2(8) = 32.9498 Pr = 0.000	1-5 years high agree, over 15 years low agree

ANNEX 2. FACTOR, REGRESSION AND CLUSTER ANALYSES

FACTOR ANALYSIS

To arrive at the typology of certification we use 39 survey instruments (questions) covering the following broad areas: (i) agreement with the importance of a set of objectives for certification consisting of six individual questions; (ii) agreement with financial costs and other challenges (10 questions), (iii) choice of BRCGS (4 questions); (iv) agreement with a set of operational outcomes (8 questions); (v) agreement with specific market outcomes (4 questions); and (vi) agreement with a set of commercial outcomes (7 questions). The results are presented in the Appendix. The survey responses can usefully be reduced into five factors or types of certification use.

- *Type 1 Product and process innovation.* This factor explains the largest share of variation in the data and pulls together issues around improving product quality and product safety, together with investment in training and new technology. It also scores highly on the choice for a BRCGS standard and increased profitability.
- *Type 2 Competitiveness led growth in the home market.* This typology summarises responses connected with increased sales in the home market as well as increased profitability.
- *Type 3 Competitiveness led growth in export markets.* This typology pulls together the pattern of responses for export market growth and competitiveness.
- *Type 4 Costs of certification and investment.* Draws together response patterns around the possible costs of attaining and utilising certification.
- T*ype 5 Customer requirement for certification.* Brings together all questions related to the pull for certification via customer requirements. This type also draws in costs aspects of the certification process.

Going across the top of the table the typology of certification use. Determining the rows of the able are the 39 individual survey questions that are summarised into the five types. The name of each typology is our own interpretation based on the values in the table. Each cell in the table shows how strongly a specific survey question correlates with or loads up onto a specific typology and how much it contributes to its meaning.

SURVEY CATEGORY	SURVEY QUESTION	PRODUCT AND PROCESS INNOVATION	COMPETITIVENESS LED GROWTH IN THE HOME MARKET	COMPETITIVENESS LED GROWTH IN EXPORT MARKETS	COSTS OF CERTIFICATION AND INVESTMENT	CUSTOMER REQUIREMENT OF CERTIFICATION	UNIQUENESS
IMPORTANCE OF OBJECTIVES FOR CERTIFICATION	Certification is required by current customers					0.5	0.6
	Certification is required by potential customers					0.5	0.6
	Increase competitiveness in home market		0.5				0.6
	Increase competitiveness in export markets.			0.6			0.5
	Need to supply safe products	0.3					0.8
	Competitor has certification			0.3			0.8
FINANCIAL COSTS AND OTHER CHALLENGES	BRCGS specific charges are very high				0.4	0.4	0.6
	Audit charges are very high				0.4	0.4	0.6
	Costs have been incurred for training of staff to meet certification requirements				0.6		0.6
	Costs have been incurred for recruitment of staff to meet certification requirements				0.6		0.6
	Employees are resistant to change						0.9
	Costs have been incurred for new or upgraded machinery and equipment				0.5		0.6
	Local Infrastructure problems such as access to auditors				0.4		0.8
	Costs have been incurred for new/upgraded IT				0.6		0.6
	Costs have been incurred due to increased paperwork and documentation				0.5		0.6
	Costs have been incurred for changes to product development				0.5		0.6
CHOICE OF BRCGS	Required by biggest existing customer					0.4	0.8
	Good coverage of our operations	0.4					0.7
	High quality of auditors	0.4					0.7
	Best value for money	0.4					0.7
OPERATIONAL OUTCOMES	We have experienced fewer product recalls/withdrawals	0.5					0.7
	We have achieved better organisation of production	0.7					0.4
	Our product quality has improved	0.7					0.4
	Our product safety has improved	0.6					0.6
	Product innovation has increased	0.6					0.5
	We have invested in new technology	0.6					0.6
	We have invested in training	0.5					0.7
	There is better Integration with other management standards (e.g. ISO 9001)	0.3		0.3			0.8
MARKET OUTCOMES	We have increased competitiveness in the home market		0.7				0.5
	We have increased competitiveness in export markets			0.8			0.3
	There is access to larger home market		0.7				0.5
	There is access to larger export market			0.8			0.3
COMMERCIAL OUTCOMES	Increased sales volumes - existing customers		0.6	0.4			0.4
	Increased sales volumes - new customers		0.5	0.5			0.5
	Increased sales volumes - home markets		0.8				0.3
	Increase sales volumes - export markets			0.7			0.3
	Reduction in operating costs	0.4	0.4				0.6
	Increase in profitability	0.4	0.4				0.6
	A lower number of customer audits						0.9

Table 1. Factor analysis
Source: own calculations. N=425.

Methodology for the factor analysis

The factor analysis is performed using a Spearman rank correlation matrix. All variables feeding into the analysis are measured on a 5-point likert scale ranging from strongly disagree to strongly agree. Rotation method varimax. Factor loadings below 0.3 are not shown. 5 factors with eigenvalues greater than 1 are retained. All factors taken together explain 87% of variation in the data. The resulting factor scores are saved using a regression method.

REGRESSION ANALYSIS

We performed a linear regression to look at correlations between the factors and changes in sales and profits.

VARIABLES	(1) CHANGE IN PROFITS	(2) CHANGE IN SALES
Product and process innovation	0.25*** (0.06)	0.21*** (0.07)
Competitiveness led growth in the home market	0.22*** (0.06)	0.28*** (0.06)
Competitiveness led growth in export markets	0.22*** (0.05)	0.27*** (0.06)
Costs of certification and investment	-0.10* (0.06)	0.02 (0.06)
Customer requirement of certification	-0.02 (0.07)	0.27*** (0.08)
Constant	2.67*** (0.64)	0.56 (0.67)
Observations	297	314
F-test	10.17***	13.36***
R-squared	0.15	0.18
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 Regression methods: OLS		

Table 2 Regression results for types of certification and outcomes – profits and sales

And an order logit regression which shoes highly similar correlations.

VARIABLES	(1) CHANGE IN PROFITS	(2) CHANGE IN SALES
Product and process innovation	0.47***	0.37***
	(0.11)	(0.10)
Competitiveness led growth in the home market	0.46***	0.50***
	(0.10)	(0.10)
Competitiveness led growth in export markets	0.43***	0.50***
	(0.09)	(0.09)
Costs of certification and investment	-0.19*	0.02
	(0.11)	(0.10)
Customer requirement of certification	-0.09	0.39***
	(0.13)	(0.12)
/cut1	-0.50	2.98***
	(1.15)	(1.08)
/cut2	0.03	3.46***
	(1.12)	(1.06)
/cut3	1.19	4.16***
	(1.09)	(1.05)
/cut4	3.85***	6.83***
	(1.12)	(1.10)
/cut5	5.36***	8.01***
	(1.13)	(1.12)
/cut6	6.41***	9.25***
	(1.15)	(1.14)
LR chi2(5)	63.81***	77.46***
Pseudo R2	0.07	0.08
Observations	297	314

Table 3 Regression results for types of certification and outcomes – profits and sales

CLUSTER ANALYSIS

We then use cluster analysis – a technique that groups the FBOs by their similarities and differences across the five types of certification use. The table below lists the five resulting groups (clusters) and their characteristics with regards to the five factors: Product and process innovation; competitiveness led growth in the home market; competitiveness led growth in export markets; costs of certification and investment; and customer requirement for certification.

CLUSTERS	NO. OF FBOS	PRODUCT AND PROCESS INNOVATION	COMPETITIVENESS LED GROWTH IN THE HOME MARKET	COMPETITIVENESS LED GROWTH IN EXPORT MARKETS	COSTS OF CERTIFICATION AND INVESTMENT	CUSTOMER REQUIREMENT OF CERTIFICATION
Group 1	114	0.4	0.1	0.3	-0.6	-0.8
Group 2	27	0.3	-1.8	0.2	-0.9	0.9
Group 3	199	0.0	0.2	0.3	0.6	0.2
Group 4	40	0.8	-0.3	-2.0	0.3	-0.1
Group 5	45	-1.9	0.1	-0.5	-0.6	0.7

Table 3. Groupings of FBOs by typology of certification use
Source: own calculations.

The variables feeding into the cluster analysis are the saved standardized factor scores. Therefore, a negative value is indicative of a score below the average on a type and a positive value of a score above average. Scores greater than +/- 1 deviate a lot from the average. Put differently, 68% percent of all observations fall within the interval of [-1; 1].

Methodology for the cluster analysis

The cluster analysis used is hierarchical cluster analysis using Ward linkages. 5 cluster solution was selected following inspection of the cluster tree below. N=425.

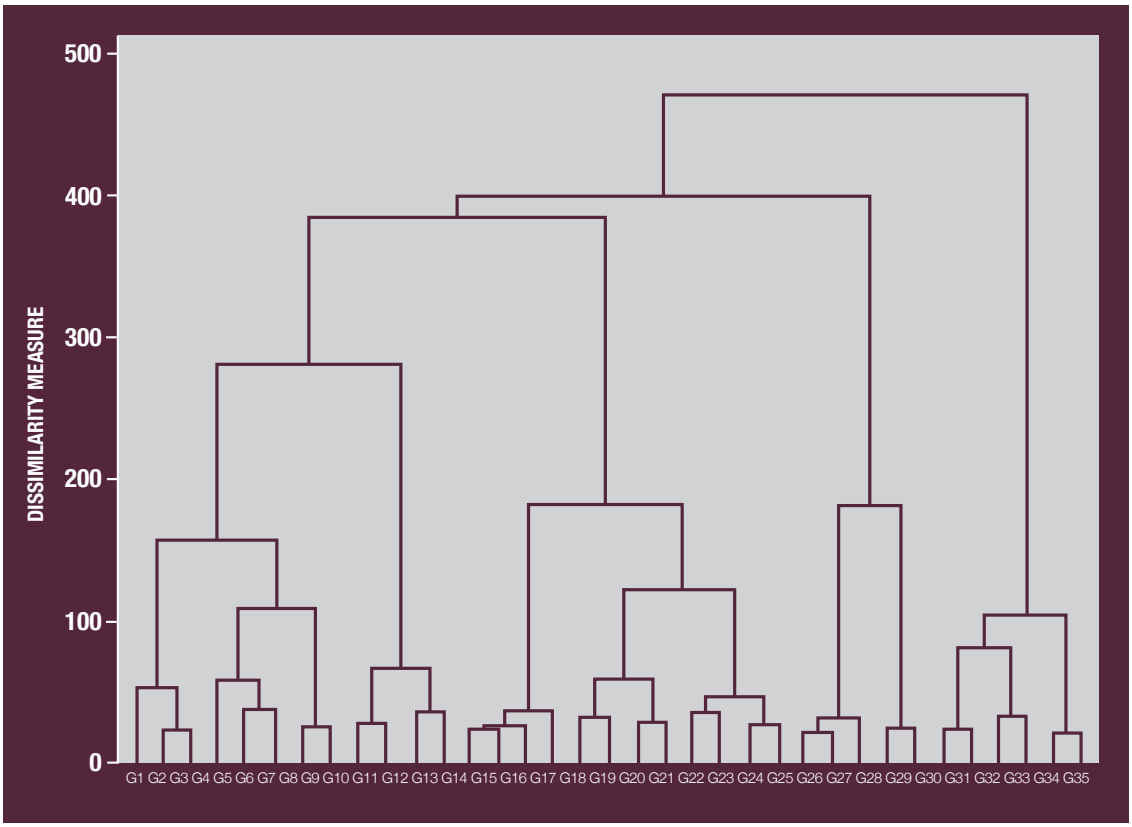

Figure 1. Cluster tree