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Heterogeneity in the Evaluation of Quality Assurance Systems: The International Food Standard (IFS) in European Agribusiness

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Abstract

Due to the growing demands of customers and several food crises, quality assurance schemes have become increasingly popular in agribusiness. With this trend in mind, it seems worthwhile to take a closer look at the satisfaction of participating European companies. The study focuses on the IFS, which has gained much relevance in the food industry. A questionnaire concerned with perceptions of the advantages and disadvantages of the IFS was answered by 389 companies. The results indicate that the overall evaluation of the IFS is primarily affected by the perceived usefulness of the catalogue of requirements and its evaluation. Furthermore, a cluster analysis was conducted and three clusters were identified, representing heterogeneous evaluations of the IFS.

Keywords: evaluation, quality assurance systems, International Food Standard, agribusiness

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Introduction

Over the past few years, certification schemes in the agribusiness sector have gained great importance as an instrument of quality assurance. Various certification standards have been established to serve as an instrument of quality assurance within the food supply chain; these standards diverge according to their focus, target groups and goals (Deaton 2004; Fulponi 2006; Theuvsen et al. 2007). Within this context, certification is defined as “the (voluntary) assessment and approval by an (accredited) party on an (accredited) standard” (Meuwissen et al. 2003). A key feature of a certification system is the fact that inspections are carried out by independent bodies (third-party certification) beholden to standards laid down by external organisations (Luning et al. 2002).

Especially in Europe, large parts of the agrifood sector have already been certified. Driving forces for the implementation of these standards are players in the private sector, such as retailers and food processors (Jensen/Hayes 2006). Their main objective for the establishment of certification systems is the overcoming of information asymmetries (Akerlof 1970) in the supply chain and, hence, the reduction of risks linked to product liability and safeguarding of due diligence (Holleran et al. 1999; Jahn et al. 2005). Certification schemes are established in order to guarantee that product characteristics are met and/or production processes are persistent (Holleran et al. 1999).

These days, European agribusiness has to face up to various assurance systems (European Communities 2006; Sodano 2006). The implementation of these standards remains controversial in theory and especially in practice. As a consequence, many companies do not participate voluntarily but rather have been pressured to do so by powerful customers, such as large processors or retailers (Beck/Walgenbach 2002; Walgenbach 2007).

Whereas previous research primarily focused on the motivation of the companies to implement ISO 9001 and on the evaluation of the generic ISO 9001 standard by companies of various sectors (Calisir et al. 2001), the number of in-depth analyses of the efficiency and effectiveness as well as of the proper design of quality assurance and certification schemes in agribusiness is comparatively low—though rising (Canavari/Spadoni 2004; Jahn et al. 2005; Theuvsen/Peupert 2004; Lazo et al. 2006; Schulze et al. 2007). However, none of these contributions investigates the companies' assessments of sector-specific quality assurance schemes, such as GLOBALGAP (the former EurepGap), the BRC Global Standard or the International Food Standard (IFS). Against this background, it seems worthwhile to take a closer look at the overall evaluation of companies with quality assurance systems in the agribusiness sector. For this reason, the following study provides a conceptual framework and empirical data which analyse heterogeneity in the evaluation of the IFS. All in all, three research objectives have been formulated: (1)

analysis of the overall evaluation of the IFS by certified companies, (2) identification of the influencing factors on the overall evaluation of the standard and (3) differentiation of the companies into various groups with regard to their evaluation of the IFS.

We first present a general overview of the various standards within the agribusiness sector with a special focus on the International Food Standard. Next, since studies on the evaluation of sector-specific schemes are very rare, we offer a broad literature review on motivations for implementing ISO 9001 as well as on its cost/benefits ratio and the main drivers for the adoption of ISO 9001. As most agribusiness standards are based on the ISO 9001 and the standard is common within the agrifood industry, it seems worthwhile to study ISO 9001 literature in order to find information on the evaluation of the scheme and corporate satisfaction with it. Subsequently, we provide insight into the sparse literature focusing especially on QAS in the agribusiness sector. The research framework includes the constructs applied, which were derived from the literature review, the data collection and measurements. Finally, we describe and discuss the results of our analysis and draw some conclusions.

Certification Approaches in Agribusiness

Certification Standards: ISO 9001 and Specific Agrifood Quality Schemes

In times of increasing globalization, E-procurement and just-in-time production, earlier systems for incoming goods inspections have become insufficient. In these globalized markets, standards like the ISO 9001 serve as an assurance accepted by companies all over the world (Gunnlaugsdóttir 2002). Whereas, in the beginning, certification systems emphasized pure product control, these days such systems seek to establish comprehensive quality management. One main reason for this is product liability legislation, which defines a producer as any person who labels a product with a name, trademark or any other distinguishing mark. With regard to this, purchasers wish to safeguard against compensation for loss.

ISO 9001 certification is widely spread in companies all over the world (Walgenbach 2007). Its value is amplified by an emphasis on quality and economic competitiveness (Gunnlaugsdóttir 2002). ISO 9001 is constructed as an intersectoral generic management system guaranteeing that production processes consistently meet a certain standard of quality; consequently, the focus is on organisational structures rather than on the product itself. However, one should not neglect the fact that the aim of the ISO 9001 standard is quality control systems in general; these include processes from product design to after-sales services (Singels et al. 2001). Hence, only essential minimum characteristics of such a system can be standardized (Chow-Chua et al. 2003).

Since it is an internationally recognized scheme, agribusiness companies are also sometimes certified according to ISO 9001 (Zaibet/Bredahl 1997; Unnevehr et al. 1999; Briz et al. 2005). The ISO 9001 standard is most common in downstream agribusiness branches, whereas it has almost no relevance at the farm level. Nevertheless, the implementation of ISO 9001 is criticized, especially in agribusiness. Besides the traditional criticism that ISO 9001 is “generic, procedurally-oriented, expensive and burdensome” (Grigg/McAlinden 2001), the agrifood sector has to face the problem that ISO 9001 was not originally designed for these industries. In consequence, great “translation problems” have occurred (Walgenbach 2007: 30). Holt and Henson (2000) highlight two main tensions between the ISO 9001 requirements and the food industry: Firstly, auditors are unfamiliar with the industry, and, secondly, the procedures that comply with ISO certification do not always guarantee product safety and do not meet the due diligence defence in food safety cases. Hence, the primary reason why agribusiness companies should adopt ISO 9001 is not food safety but “those aspects of the production process that increase the value of the product” (Unnevehr et al. 1999: 1098).

However, product safety has been a major concern for agrifood firms since the 1990s, when the European agribusiness sector was afflicted by a number of crises and scandals that revealed an information asymmetry between suppliers/retailers and consumers (Tuncer 2001). As a consequence, consumer confidence in the ability and capacity of traditional governmental regulators to deal with the safety and quality issues of food products and processes declined. Today there is high consumer demand for information about food production and for a guarantee of food safety and quality (Hatanaka et al. 2005; Fulponi 2006). Hence, especially in the agrifood sector, quality assurance takes on a special position: Most foodstuffs are characterized by process traits that are hardly detectable by the end consumer. In the absence of an antagonist market, the consequence would be failure (Akerlof 1970; Nelson 1970).

Because ISO 9001 is not able to handle these fundamental agribusiness problems satisfactorily (Grigg/McAlinden 2001), many European countries, especially the private sector, have launched specific initiatives in response to the crises and scandals to implement quality assurance standards. Consequently, various sector-specific schemes have been established (Jahn et al. 2005; Sodano 2006; European Communities 2006) that contribute to overcoming information asymmetries (Auriol/Schilizzi 2002) and better meet the food safety requirements of the branch.

Most of these agrifood systems are small or have a more-or-less regional focus (Label Rouge or Gepruefte Qualitaet Bayern, for instance); however, there are a handful of certification schemes that already cover substantial areas and are widely known within the business (European Communities 2006). In Germany, for example, the national Quality and Safety (QS) system has already conducted more

than 110,000 audits, mainly in the meat industry, covering about 85 % of all German fattening pigs (EMA 2006). The animal feed industry and all important German slaughterhouses have also been covered. Additionally, about 14,900 retail stores have been audited since 2001 (QS 2006). IFS, BRC and GLOBALGAP are also widely used certification schemes developed by large retailers. Currently, more than 6,000 food producers all over the world are certified according to the IFS, approx. 96 % of these in Europe (Tromp et al. 2007; IFS 2006). In addition, the BRC Standard is the counterpart of IFS for food producers supplying retail branded goods to the United Kingdom (BRC 2008). GLOBALGAP focuses on primary producers, directly delivering to retailers. More than 51,000 certificates have been issued by GLOBALGAP in the fruit and vegetable sector in more than sixty countries, covering an area of more than two million acres (830,000 hectares) (EurepGap 2005).

In order to systematize the rather large number of different standards, the following criteria can be applied (Theuvsen/Spiller 2007):

- Focus: product characteristics (e.g., Protected Designation of Origin (PDO), Protected Geographical Indication (PGI)); process characteristics (e.g., environment-friendly, welfare standards); system characteristics (IFS);
- Target group: consumer-oriented schemes (e.g., organic farming, Fairtrade); business-to-business standards (e.g., IFS, GLOBALGAP, BRC Global Standard);
- Goal: guarantee of legal minimum requirements in a mass market (e.g., IFS, IKB in the Netherlands, QS in Germany); product differentiation (e.g., organic farming schemes);
- Contents: product quality (e.g., PDO schemes); process quality (e.g., organic farming standards); product safety (e.g., IKB);
- Standard owner: state-run systems (e.g., organic farming in Denmark), international standardization organisations (e.g., ISO 9001 and 22000), stakeholder approaches (e.g., Fairtrade), producer schemes (e.g., farmers' associations in the case of the British Assured Farm Standard), private inspection bodies (e.g., Vitacert by the German Technical Monitoring Institution/TÜV); retailer driven schemes (e.g., BRC Global Standard and IFS);
- Area of application: local (e.g., Geprüfte Qualitaet Bayern in Germany); national (e.g., Danske Slagterier in Denmark); international (e.g., IFS, ISO 22000);
- Number of stages involved along the food supply chain: single-stage systems (e.g., IFS, GLOBALGAP); multi-stage approaches (e.g., the German QS System covers the whole supply chain).

The IFS Certification Approach in the Food Industry

In 2002 German retailers working together in the quality assurance board of the EHI Retail Institute developed the IFS. Since then, because major retailers have subscribed to the system, the IFS has gained a good deal of relevance in international business relations and especially in the European food industry. After its initial development in Germany, most of the retailers requested that their suppliers adopt the IFS, and the majority of these retailers no longer accept suppliers who have no IFS certificate. Consequently, the IFS became one of the most important quality assurance schemes. In view of the IFS' increasing acceptance in 2003 the French Fédération des Entreprises du Commerce et de la Distribution (FCD) joined the effort and produced an updated version of the standard. Thus, today the property rights are shared by the Hauptverband des deutschen Einzelhandels (HDE) and the FCD.

One of the main reasons for the continuous proliferation and development of the IFS has been the rising number of retailer-owned private labels in the European food industry. Product liability legislation defines a producer as any person who labels a product with a name, trademark or other distinguishing mark. Because of this, retailers with private labels have been directly affected by product liability laws and have introduced a growing number of external audits of their private label suppliers. Since many suppliers deliver to several retailers, unnecessary double-checks took place, contributing to the growing costs of quality assurance in the food sector. The IFS provided a neutral instrument based on third-party audits that could decrease costs and improve quality at the same time (Buhlmann et al. 2004). For this reason, the standard has achieved broad acceptance in the German and French retail sectors and moved towards setting a certification standard—not only for private labels but also for manufacturers' brands. By 2007 some 6,000 certificates had been issued (Tromp et al. 2007). Therefore, the IFS has largely replaced the ISO standard in the European food industry.

The International Food Standard is divided into four parts: the IFS Protocol, the Catalogue of Requirements, the Requirements for Certification Bodies and Auditors and the IFS Report. The main chapter, called the “Catalogue of Requirements”, is based on the structure of the ISO 9001; the main technical chapters are quality system management, management responsibility, resource management and product realization, measurements, analyses and improvements. The similarity between the IFS and the ISO 9001 was one of the main considerations in the development of the new standard. Furthermore, the IFS depends, for the most part, on the evaluation system and structure of the BRC, which also refers to the ISO 9001.

Nevertheless, a closer look reveals that the two standards—ISO 9001 and IFS—are also characterized by a remarkable difference. Unlike the ISO standard, the IFS is

distinguished by several industry-specific regulations, for instance, the introduction of various food product categories and regulations particularly important for the food industry (medical examinations, staff hygiene, potable water analysis, pest control and so forth). Furthermore, the standard includes various K.O. criteria mainly important for food safety. These criteria must be fulfilled; otherwise, a certificate cannot be assigned. By meeting the requirements of the standards, a company can be certified at the foundation level or the higher level (Buhlmann et al. 2004).

Bearing in mind the fact that the IFS strongly parallels the structure of the ISO 9001 and that it includes several appendages of such management systems, the literature review also refers to studies based on the costs and benefits and, moreover, the advantages and disadvantages of the ISO 9001.

Literature review: Motivation, Benefits and Drivers for Implementing a Quality Assurance System

Empirical Evidence for ISO 9001 Implementation in International Business

Whereas many managers refer to ISO 9001 as a “paper tiger”, others believe that this approach can generate an efficient operational quality management system (Curkovic/Pagell 1999). The following broad literature review analyses studies dealing with the motivations for implementing ISO 9001 as well as with the evaluation of the advantages and disadvantages of the standard (Table 1, see appendix).

The reasons for implementing a quality assurance scheme are diverse. On the one hand, companies participate in such schemes primarily because of internal motivation, as reported by Gotzamani/Tsiotras (2002) for Greek companies and Skrabec et al. (1997) for US firms. These enterprises expect to reap the benefits of such a system by improving the productivity and efficiency of the organisation (Singels et al. 2001, Jones et al. 1997). By identifying inefficient processes, cost reductions can be achieved and the cost/benefit ratio improved (Walgenbach 2007). In contrast, Gunnlaugsdóttir (2002) and Terziovski et al. (2003) identify predominantly external reasons, such as customer demands or access to markets, as motivating factors for adopting ISO 9001 certification. Besides, Jones et al. (1997) report on a large number of firms that named both internal and external reasons for implementing ISO 9001.

Walgenbach (2007) extracted another dimension of motivation from his qualitative interviews. Besides the internal motivation to enhance business processes and external pressure by customers or public authorities, social forces were identified as drivers of QAS adoptions. This can be described as peer pressure, management fashion or “herd instinct”. One of the interviewees stated that “at the time when the

ISO descended on Germany like a cloud, when everybody talked about ISO, and nobody knew what it was, and you need two years to implement it—or three or five or even more [...] suddenly you were doing it [...]”. It becomes obvious that, during this initial phase of ISO 9001, implementation of the standard was a kind of competition between the companies or, rather, the competitors in the market (Walgenbach 2007: 35).

Evidence can be found that the implementation of the ISO quality system is associated with a number of benefits but also with a number of disadvantages (Brown/van der Wiele 1995; McLachlan 1996; Jones et al. 1997; Dick 2000; Casadesus/Gimenez 2000; Singels et al. 2001; Gotzamani/Tsiotras 2002; Santos/Escanciano 2002; Chow-Chua et al. 2003; Walgenbach 2007). Singels et al. (2001) differentiated between internal and external benefits. Internal benefits refer to the realization of a continuous improvement process seeking to advance the company’s activities and firm structure. External benefits evolve from the relationship between the company and third parties¹. Casadesus/Gimenez (2000) reported that 65 % of Spanish ISO-certified organisations achieved a high level of internal as well as external and financial benefits. The same is ascertained by Kaye (2000) and Chow-Chua et al. (2003), who reported that firms experienced external benefits, such as rising market shares, as well as internal benefits, such as cost and waste reduction, better documentation procedures, higher perceived quality of products or services and more effective communication (Brecka 1994; Adanur/Allen 1995; Buttle 1997; Häversjö 2000). This contrasts with Terziovski et al. (1997) and Aarts/Vos (2001), who detected primarily internal rather than external dimensions, such as an increase in market share. These inconsistent results show that the extent and occurrence of the various benefits differ among the great number of studies (Skrabec et al. 1997; Buttle 1997). Chow-Chua et al. (2003: 938) explained this discrepancy as a result of differing firm sizes within the samples investigated; another explanation is differing evaluations of the benefit “gaining customer” (Skrabec et al. 1997).

In addition to these advantages, negative effects of ISO 9001 certification are also broadly discussed in the literature (Tsiotras/Gotzamani 1996; Buttle 1997; Jones et al. 1997). Disadvantages are mentioned mainly in conjunction with additional costs for obtaining the standard, “increase in paper workload, no attention to development of personnel, little attention to the support functions in an organisation” and the reduction of independent reflective thinking due to constriction caused by standardized and detailed (working) procedures and regulations (Singels et al. 2001: 63). Furthermore, missing product specification, general loss of flexibility and increased bureaucratic effort is criticized.

¹ For a detailed list of detected “motivations, drivers and benefits of ISO 9000 certification” see Chow-Chua et al. (2003: 939).

Empirical Evidence for the Implementation of Quality Assurance Systems in the Agrifood Chain

ISO 9001 Certification in the Agrifood Industry

The following table presents the results of a literature review on the motivation, benefits and drivers for ISO 9001 implementation in the agrifood industry. Generally, the research relating to ISO 9001 certification in agribusiness is very limited (Capmany et al. 2000).

Table 1: Empirical Studies of ISO 9001 in the Agrifood Industry

Author	Year*	Objectives	Method	Sample Size	Main Results
- Zaibet, L.; Bredahl, M.	- 1997 - (1994)	- Costs of achieving ISO certification - Cost reduction due to ISO implementation	- Qualitative interviews	- four firms in the UK meat sector	- Cost of achieving certification is not so high that it represents a constraint. - Costs are mainly imputable to training and acquisition of new equipment for calibration. - Primary gain is achieved in reduced production costs: management costs were reduced by 7 % and control costs by 20 %.
- Capmany, C.; Hooker, N. H.; Ozuna, T.; van Tilburg, A.	- 2000	- Determine <i>ex ante</i> and <i>ex post</i> perspectives of the QMS - Compare the results with those of firms from other industries - Ascertain the level of satisfaction with the QMS - Reasons for attaining certification	- t-tests	- 197 firms in the United States; - 11 agribusiness firms	- Decision to become certified was generated internally (within the agribusiness firm) in all cases, although six firms also mentioned external forces. - Costs accrued during the ISO 9000 certification process and its maintenance seem to be offset by the benefits. - Reasonably high level of satisfaction with ISO certification among agribusiness firms.
- Turner, C. R.; Ortmann, G. F.; Lyne, M. C.	- 2000 - (1998)	- Establish the extent of adoption of ISO 9000 quality assurance standards - Reasons for certification - Costs and benefits of adoption	- Discriminant analysis	- 92 South African agribusiness firms	- Desire to improve customer service and the need to improve operational efficiency (reduce wastage) were the most important factors influencing certification. - Financial, managerial and production benefits followed certification. - ISO 9000-certified firms tended to be larger, established firms with parent company affiliation exporting to developed countries. - Most important variable distinguishing ISO 9000 adopters from non-adopters was firm size.
- Grigg/ McAlinden	- 2001 - (1997/1998)	- Examine trends in the uptake of ISO 9001 standards - Assess the attitudes of industry managers towards ISO 9001	- Quantitative data - Qualitative interviews	- 71 firms - 14 food & drink firms in Britain	- 40% had worked on an ISO 9001 certification. - Implementation varied according to company size and specialty. - ISO 9001 was not adopted due to upstream pressure. - Alternative sector-specific standards (BRC, EFSIS) are more important.

Author	Year*	Objectives	Method	Sample Size	Main Results
- Mumma, G.A.; - Albert, J.A.; - Warren, C.; - Abdulkadri, A.; - Mugalla, C.I.	- 2002 - (1999)	- Impact of ISO 9001 on internal benefits - How the benefits relate to the reasons for registering for the standards	- Regression analysis	- 117 US Agri-business firms	- Highest ranked reason for seeking ISO 9001 certification was to improve internal operational efficiency. - Second was to access new markets, and third was customer requirements. - ISO's primary goal is to facilitate international trade.
- Böcker, A.; - Bredahl, M. E.; - Northen, J.	- 2004 - (1999)	- Investigation of whether motivation for certification affects firm performance	- Factor and regression analysis	- 27 British agri-business firms	- Main motivations: future demand, improved documentation, quality, efficiency, increased flexibility and customer demand - Gains of certification are positive. - Four factors: Immediate gains in competitiveness, improved documentation, expansion, quality and customer orientation - Immediate gains in competitiveness and quality orientation explain differences in the judgement of the impact of certification on performance.
- Maza, M. T.; - Ramírez, V.	- 2004 - (1998)	- Examination of the results obtained in relation to the main achievements and modifications that occur after certification	- Principal component analysis (PCA)	- 95 Spanish agri-business firms	- Main achievements following implementation: maximised quality and profits - Main achievements after implementation: changes in staff attitude and in mentality
- Canavari, M.; - Spadoni, R.	- 2004	- Investigation of whether firms that had implemented a quality management system in compliance with ISO 9000 standards registered improvements in several areas of their business	- Factor and cluster analysis	- 71 agri-food firms in Italy	- Three motivation factors: Efficiency, customer satisfaction, market pressure - Three clusters: "Unwilling" (less convinced of the utility to reach quality objectives, but useful attribute for the firm), "Quality control" (concentrated on the internal quality objectives, while generally neglecting the role of QMS on customers), "Total quality" (wider range of objectives)
- Briz, J.; Arribas, N.; - Garcia, M.; - Briz, T.; de Felipe, I.	- 2005 - (2002)	- Determination of the major costs of implementing and operating ISO 9001 - Major problems in the implementation phase - Major perceived benefits	- Factor analysis	- 199 firms in the Spanish food and drink industry	- Net benefits outweigh the costs - Time required to gain ISO certificate depended on in-house capability in quality management. - Small firms hired external consultants to achieve certification. - Three factors for seeking ISO 9001: competitive advantage, operational efficiency, regulation driven

*Year of paper (year of survey, if reported)

Source: authors' representations

The results of the studies dealing with ISO 9001 certification in agribusiness imply that these firms respond to the standard in almost the same way as other firms (Capmany et al. 2000). Therefore, the findings of nonagribusiness contributions are

applicable to the agrifood business. Internal and external benefits and even shortcomings corresponded with those reported by companies in other branches (Holleran et al. 1999; Casewell et al. 1998; Grigg/McAlinden 2001; Mumma et al. 2002), although some differences occurred due to the special characteristics and heterogeneity of the agrifood sector.

In order to facilitate exports, it is predominantly companies belonging to the food and beverages industry that implement the standard and, only to a lesser extent, companies in other agribusiness sectors (Zaibet/Bredahl 1997; Unnevehr et al. 1999; Maza/Ramírez 2004; Briz et al. 2005). Therefore, the external factors “staying in business” and “foreign market access” are of great importance in a highly competitive international market marked by great retailer power (Zaibet/Bredahl 1997; Turner et al. 2000; Briz et al. 2005). For this reason, responding to customer demands turned out to be a key determinant for “staying in business” and thus the motivation for adoption. Conversely, Böcker et al. (2004) rank these factors, and especially the variable “foreign market access”, as the least important motives. However, Capmany et al. (2000) confirm in an *ex ante* query that market-oriented benefits (“provide a marketing/competitive advantage”) are primary incentives for seeking certification. At the same time, the results indicate that “competitive advantage” as a motive for certification will become less important with time since only “early adopters” can achieve a market benefit.

In line with the empirical results presented above, further findings indicate that small firms in particular have little motivation to pursue ISO 9001 certification. Especially against the background that, for some agribusiness firms, customers do not perceive ISO 9001 as necessary and it does not efficiently meet the business's needs, companies are now concentrating on implementing industry-specific quality standards (Grigg/McAlinden 2001).

Reasons for Adopting Agrifood Standards

The benefits of ISO 9001 certification are surpassed by those of industry-specific standards. Besides common gains, such as market entry or enhancement of process quality, agrifood standards can directly advance product quality and traceability, reduce a firm's environmental impact and even have positive socioeconomic effects. However, these advantages greatly depend on the respective standard and its objectives.

Most literature dealing with the reasons and benefits for adopting agrifood standards focus on developing countries. Very little research is carried out on reasons for adopting QAS in Europe and its performance outcomes here. The following table presents an overview of current research.

Table 2: Empirical Studies Analyzing Reasons for Adopting QAS and Performance Outcomes in the Agrifood Industry

Author	Year*	Objectives	Method	Sample Size	Main Results
Zuhair, A. H.; Green, R.; Herath, D.	2006 (1998)	- Analyse the relationships between the degree of adoption of food safety and quality practices and establishments' characteristics - Associations between the adoption and market performances of food processing enterprises	Regression analysis	854 food processing companies in Canada	- Adoption intensity is very closely linked to establishments' characteristics/activities. - Size, country of control and innovativeness have great influence. - Adoption intensity is positively associated with the market share and productivity level.
Jayasinghe-Mudalige, U. K.; Henson, S.	2006 (2003)	- Economic incentives for firms to adopt food safety controls - Impact of a number of firm- and market-specific characteristics	- Quantitative research (Factor analysis) - Qualitative interviews	251 red meat and poultry processing plants in Canada	- Market-based incentives have a greater impact than government regulatory actions. - Firm reputation and "right thing to do" are strong motivating factors. - Firm and market characteristics influence the food safety responsiveness of firms.
Kleinwechter, U.; Grethe, H.	2006 (2004/ 2005)	- Analyse the adoption of EurepGap	Qualitative interviews	28 EurepGap certified and 33 non-EurepGap certified Mango producers in Peru	- Access of information is an important factor in adoption. - Implementation costs are 3.8 % of the product price. - Factors influencing the costs: starting point, target level and involvement of exporter - Exporters are the key factors for implementation.
Gawron, J.- C.; Theuvsen, L.	2006 (2005)	- Analyse the perceived advantages and disadvantages of the IFS	- Cluster analysis - Case study	65 food manufacturers in Germany	- High standard deviations show a broad spectrum of perceived benefits. - Advantages: high reputation among the customers, improved product safety, improvement of business processes, comprehensible structure of IFS requirements and improved transparency - Disadvantages: lack of reasonability and comprehensibility of requirements, low action orientation, low managerial practicability
Chemnitz, C.	2006	- Analyse the reasons for compliance with EurepGap	Semi-structured interviews	63 Moroccan tomato producers	- Most important motivation for certification is the fear of losing market share. - Compliance costs are only weakly correlated with firm size.
Fouayzi, H.; Caswell, J. A.; Hooker, N. H.	2006 (2003)	- Motivation to adopt QAS - Effects of implementation and the relationship with suppliers and customers	Bivariate analysis	38 US-Members of the international fresh-cut farmers association	- QAS adoption affected intra-firm (improved management and efficiency) and inter-firm (improvements in trade) factors. - 90 % of the firms reported they were somewhat or very satisfied with their QAS.

Author	Year*	Objectives	Method	Sample Size	Main Results
Schulze, H.; Jahn, G.; Spiller, A.	2007 (2005)	- Investigation of the acceptance of the German organic certification system	Partial Least Squares (PLS)	126 organic growers	- Perceived effectiveness is less important for the evaluation than the operational management and bureaucratic costs. - Risk perception and the motivation to produce organic food do not influence reputation, but they influence satisfaction. - The most important factor for enhancement of the effectiveness of the system is improvement of the thoroughness of the auditor. - Neither farm size nor years in organic business have a high influence on perceived costs .
Enneking, U.; Obersojer, T.; Kratzmair, M.	2007 (2004)	- Measuring satisfaction with three different QAS - Analysing the differences in satisfaction among the three schemes	Regression analysis	315 Bavarian hops producer	- Overall evaluation of the three systems is not very different. - Differences occur with regard to motivation for adoption, internal management improvements and extra earnings. - Perceived benefits are primarily conveyed by improved image, sales and managerial efficiency. - Personal or firm characteristics have no influence on satisfaction. - Costs have a lower influence on satisfaction than benefits.
Herath, D.; Hassan, Z.; Henson, S.	2007 (1998)	- Exploration of the association between the adoption of food safety and quality assurance practices and firm characteristics	Regression analysis	854 food processing firms in Canada	- Adoption of food safety and quality practices varies widely among individual firms. - Reasons for variations: firm size, country of ownership and control, level of innovativeness, level of export orientation, forms of food safety inspection and subsector. - Incentive of being able to access foreign markets plays an important role in influencing adoption. - Firm size and subsector are the most important indicators for the probability of adopting HACCP.

*Year of paper (year of survey, if reported)
Source: authors' representations

In the food business in general, higher transparency, traceability and positive effects on performance and cost structures are identified as strengths of quality systems (Jatib 2003; Fouayzi et al. 2006). Through QAS adoption, reductions in product failures, recalls, customer complaints and warranty claims were achieved. The main external benefits were the attraction and maintaining of customers as well as satisfaction with sales and market share (Fouayzi et al. 2006). Larger companies in particular expect an effective saving potential; smaller firms, in contrast, hope to gain a competitive advantage (Caswell et al. 1998).

One of the most common complaints is that standards offer few advantages for day-to-day operations in the agrifood sector but result in a huge bureaucratic workload (Jahn et al. 2003; Canavari/Spadoni 2004; Gawron/Theuvsen 2006). Many companies feel incapacitated by the strict regulations imposed by quality assurance schemes. In particular, certification standards that impose the same requirements on all products and their production processes often negatively affect companies' performance.

Costs differ among the various agrifood standards since they have different objectives. However, costs are associated mainly with training staff to establish and

maintain the system, record keeping and the implementation of monitoring procedures, laboratory work and assumed process modifications (Antle 1999; Fouayzi et al. 2006).

Kleinwechter and Grethe (2006) identify access to information and lack of knowledge as major difficulties in implementing GLOBALGAP. Especially for farmers in developing countries, the costs of compliance can create a substantial economic burden and, therefore, represent the most relevant stumbling block to adoption. Since these problems can be solved with the assistance of export companies, vertical integration in developing countries would appear to be a key factor in the adoption of GLOBALGAP. Producers stated that the decision for gaining certification was highly influenced by exporters (Chemnitz 2006).

Research Framework

Research Concept: Procedures and Constructs

Despite the large number of studies analysing the performance of and motivations for adopting ISO 9001 in diverse businesses and, to a smaller extent, also in agribusiness, only a few studies (Calisir et al. 2001; Calisir 2007 and partially Terziovski et al. 2003) focus on the overall evaluation of the standards analysed. Therefore, these questions still remain unanswered: How do companies in agribusiness evaluate quality assurance schemes in general, and which key factors affect this evaluation?

Furthermore, inconsistencies among the empirical results of earlier studies hint at a large heterogeneity between and even within the samples analysed (Casadesús/Giménez 2000). There is evidence that these inconsistencies result from the use of different research questions and methodologies (Chow-Chua et al. 2003; Terziovski et al. 2003) or from an erroneously applied methodology (Häversjö 2000). However, it seems that various company characteristics are also relevant (Gawron/Theuvsen 2006; Casadesús/Giménez 2000; Rayner/Porter 1999). Most studies were conducted in diverse countries and in diverse industries, as well as on companies at different stages in quality awareness and on organisations of different sizes (Häversjö 2000). All in all, it has to be assumed that different groups within the samples may evaluate different elements of the standards in different ways. However, influencing factors on the assessments of standards have not yet been analysed for different companies/groups within the sample.

It is against the background of these inconsistencies that the research concept of this study was designed. Its main goal is to identify groups that are internally similar regarding evaluation of IFS performance elements but, at the same time, different from other groups in their evaluation (exploratory analysis).

First of all, it is necessary to identify the factors influencing the overall evaluation of the IFS through a confirmatory analysis. For this reason, all constructs, which are, for the most part, derived from the literature, are explained in the following.

The first construct “**perceived cost/benefit ratio**” was broadly applied in early research. The studies indicate that certification generally entails benefits for most companies; however, due to heterogeneity, the extent to which this is true differs widely (Skrabec et al. 1997; Buttle 1997; Häversjö 2000). The main benefits for agribusiness companies concern competitive advantage in the market (Briz et al. 2005). Nevertheless, in an *ex post* analysis of the advantages of ISO 9001 for agribusiness customer satisfaction, Capmany et al. (2000) identify product traceability, information quality and sales as the most important improvements. Brecka (1994) reports greater benefits with regard to lower operating costs, and Gunnlaugsdóttir (2002: 42f.) generally states that the “time, cost and effort of obtaining certification of the quality system is substantial”, but that most companies, nevertheless, consider the standard “to be of great value” and “well worth the cost”.

The “**perceived costs of certification**” construct is defined as the effort to comply with the formal requirements for certification as perceived by a company. This includes, for instance, the costs of documentation, process modification or organisational adaptation. A large number of agribusiness companies indicate that the costs are low or moderate (Capmany et al. 2000; Briz et al. 2005). However, Briz et al. (2005) and Gawron and Theuvsen (2006) report different perceptions of certification costs. Generally these costs are dependent on the size of the company and a company’s prior experience with the implementation of quality standards (Holleran et al. 1999; Böcker et al. 2004).

Although the standards are generally nonmandatory, most customers demand they be implemented by their suppliers. Therefore, today most schemes have the status of a “licence to operate” in most businesses. Correspondingly, in the literature it is assumed that the implementation of QAS is often due to perceived pressures from the external environment, for instance, large customers such as Aldi, Carrefour or Tesco in the food business (Singels et al. 2001; Gunnlaugsdóttir 2002; Walgenbach 2007). Since external reasons predominated in many studies (Casadesús/Giménez 2000; Grigg/McAlinden 2001; Gunnlaugsdóttir 2002; Terziovski et al. 2003), “**perceived external pressure**” seems to be another important variable.

The “**perceived effectiveness of the auditor**” construct refers to the control performance of the auditor. We define this construct as the degree to which a respondent believes that the auditor is reliable enough to detect noncompliance with regulations. Beyond single case studies, anecdotal information or rumours,

statistical analysis clearly indicates the threat of weak auditing procedures in quality certification systems (Schulze et al. 2006).

Terziovski et al. (2003) assume that the effectiveness of certification further depends on determinants such as the style of the auditor. The latter impacts appraisal of the certification because there is evidence that some auditors have no experience with their client's industry, its quality system or its procedures or products/services. This results in poor audit quality and has a negative influence on the QAS as a whole. Therefore, since the auditor's skills play an important role, we introduced **“perceived expertise of the auditor”** as a further construct.

The **“perceived quality of the IFS compared to other QAS”** adverts to the evaluation of various quality standards regarding aspects like transparency, efficiency, relevance or bureaucratic accomplishment. Standards such as the BRC and the IFS target the same industry and, therefore, compete against each other.

Another important construct is the **“evaluation of the catalogue of requirements”** of the QAS. Meeting the requirements of the QAS catalogue can incur high costs because some requirements are difficult to implement or even considered unnecessary. This can lead to poor overall evaluation of the standard. The **“perceived communication of the standard owner”** is also important. By making practical information available, requirements can be explained, advantages and disadvantages can be visualised and, thus, the implementation of QAS can be expediently supported.

Moreover some descriptive variables play a major role.

Holleran et al. (1999) allude to the fact that the costs and benefits of a QAS implementation are firm-specific and partially refer to already existing quality schemes. Hence, the **“number of other QAS”** (Enneking et al. 2007) in a company adverts to the experiences gained during the implementation process and day-to-day operations with such standards. In line with Kleinwechter/Grethe (2006), Holleran et al. (1999: 678) state that “firms lacking a quality assurance system may experience higher costs from adopting ISO 9000, but may realize greater benefits”. Juran (1999: 30) points out that “...companies that are at the beginning stages of their quality journeys find that the ISO 9000 series of standards provides them with a guide for implementing a basic quality system. But for companies with good quality systems, the standard often just adds costs, delays and burdensome documentation, rather than providing any competitive advantage”.

In addition, there is evidence that small firms evaluate the motivations, benefits and drivers of QAS in a different way from larger ones (Skrabec et al. 1997; Gotzamani/Tsiotras 2002; Chow-Chua et al. 2003). Since smaller firms generally possess a more immature quality system, combination effects are possible. Skrabec

et al. (1997) found that it is mainly these firms that enjoy the highest benefits from ISO 9001 implementation. This corresponds to findings by Gotzamani and Tsiotras (2002) and Juran (1999). In their survey of small and medium-sized firms, Rayner and Porter (1999) reported that small companies implement ISO 9001 without any further knowledge of its benefits or even the personnel and time investments it requires. However, in their survey of US fresh-cut producers, Fouayzi et al. (2006), surprisingly, found no significant relation between size and satisfaction with quality management systems (QMS) or number of QAS. To measure such economies of scale, the references “**number of employees**” (see Casadesús/Giménez 2000; Böcker et al. 2004) and membership in a “**larger production group**” are included.

The last aspect considered is the “**country**” a company is located in; this construct deals with the different quality awareness and the different experiences with quality management systems in different countries. As Quazi and Padibjo (1998) stated in their study of small firms in Singapore, the majority of companies implementing ISO 9001 were from foreign countries; hence they demand support from the government by creating a quality culture.

The factors mentioned above serve as a starting point for identifying different groups with the help of a cluster analysis. Therefore, only those factors are used in a prior step (regression analysis) that have significant influence on the overall evaluation of the IFS. Up to now, such an analysis—combining exploratory and confirmatory methods—has been lacking, and it can be considered a new approach. Thus, this study contributes to the growing body of quantitative studies on QAS (e.g., Chow et al. 2003; Singles et al. 2001; Calisir et al. 2001; Calisir 2007) that has gradually replaced the case and qualitative studies (e.g., Quazi/Padibjo 1998) dominant at the beginning of QAS research.

Data Collection

In February 2006, all firms that at that time were certified according to the fourth version of the IFS (1,799) were questioned using an online survey. Due to the Europe-wide character of the study, the questionnaire was translated into German, English and French and sent to companies all over Europe. A total of 389 valid questionnaires were returned (21.6 % of all certified companies). The average interview took 64 minutes. The target group of the survey was the respective quality assurance manager (62.7 %) or quality assurance staff (14.6 %). Respondents were located mainly in Germany (55.0 %), France (9.3 %), Italy (6.9 %) and Austria (6.4 %). On average, 346 employees work in the companies and 38.8 % of the companies are part of a larger production group. The companies represent eighteen different subsectors of the food-processing industry: beverages (20.7 %), agricultural/horticultural produce (16.1 %), meat products (incl. preparations; 13.2 %), dried goods (12.9 %) and dairy products (12.1 %). The percentage of

retailer-branded food products in relation to the total food production volume is between 31 and 40 %.

Since all European companies which were certified according to the IFS were included in the survey and 21.6 % of these firms responded, our sample can be regarded as representative. In order to assure that a nonresponse bias did not significantly influence the results, independent sample t-tests comparing the mean responses of early respondents and late respondents were conducted for each of the variables. This Armstrong-Overton test for nonresponse bias determined that the nonresponse bias was not significant (Armstrong/Overton 1977).

Measurements

With regard to the empirical results identified by the meta-analysis, different measurement scales that had been partly tested in previous surveys were combined. All constructs were measured by means of Likert-scaled or semantic differential items (-3 to +3). The overall evaluation of the IFS was indicated by asking respondents about their general opinion of the IFS (scale from +3 = totally satisfied to -3 = totally dissatisfied).

Descriptive statistics and a confirmatory factor analysis were used to analyse the sample. After minor modifications, a principal component analysis was applied for data reduction and to build up factors according to the hypothetical constructs based on the literature review. These constructs were tested with Cronbach's alpha (α). Additionally, to exclude any problems of multicollinearity between the factors, an item-to-item correlation analysis was conducted.

The analysis of the data is divided into four parts. First, we present selective descriptive data of the companies' attitudes towards the IFS, followed by a factor analysis to capture the dimensions of the potentially influential aspects. Multiple linear regression analysis is conducted to measure the impact of the factors identified on the overall evaluation of the IFS. Lastly, cluster analysis is applied to differentiate the companies into various groups with regard to their evaluation of the IFS by using the significant variables of the regression analysis.

Results

The descriptive results for the exogenous variables provide first impressions of company attitudes towards the certification scheme. All in all, the companies evaluated the IFS positively; 74.6 % of the companies are generally satisfied with the standard. This is a very positive evaluation compared to studies analyzing the acceptance of other schemes (Fitzgerald et al. 1999; Böcker et al. 2004). However, only 32.7 % would have implemented the IFS, even in the absence of any retailer requirements.

Regarding the benefits of the IFS, 70.6 % of the companies emphasized that the advantages of the IFS outweigh any disadvantages, 82.2 % said that the IFS provides some useful input for the operational management, and 51.3 % reported that the IFS improved their relationship with customers. Furthermore, 56.2 % of the companies agreed that the IFS has essentially contributed to increasing food safety, and 64.3 % noted that the IFS improved food safety management. With regard to the costs of the IFS, the amount of time the companies spent on the certification process is generally considered the most important factor, with 77.0 % agreeing with this statement. However, only 43.0 % of the corporations believed the operational expenses were justified by the benefits (cost/benefit ratio). A larger

Table 3: Results of the Factor Analysis

Construct	Mean	Standard Deviation	Factor Loading
Perceived cost/benefit ratio ¹ , Cronbach's alpha = .883			
Would you agree that the IFS has improved your food safety management?	0.97	1.39	0.804
The administrative effort is justified by the benefits of the IFS.	0.22	1.41	0.753
The IFS has essentially contributed to increasing the safety of our food production.	0.63	1.56	0.747
The IFS makes our business processes more transparent.	0.29	1.58	0.742
The advantages of the IFS outweigh any disadvantages.	1.10	1.39	0.725
Would you agree that the IFS has improved relations with your customer?	0.49	1.59	0.677
The operational expenses of implementing the IFS are justified by its benefits.	0.34	1.38	0.666
Implementation of the IFS provides us with some useful input for our operational management.	1.64	1.11	0.579
Perceived quality of the IFS compared to other QAS ¹ , Cronbach's alpha = .864			
Compared with other certification standards, the IFS is more transparent.	0.26	1.48	0.891
Compared with other certification standards, the IFS is more efficient.	0.21	1.42	0.871
Compared with other certification standards, the IFS is more relevant.	0.26	1.48	0.807
Compared with other certification standards, the IFS is less bureaucratic.	-0.10	1.61	0.759
Perceived communication of the standard owner ² , Cronbach's alpha = .862			
With the information provided by the IFS offices, I am...	0.35	1.14	0.899
With communication with the IFS offices I am ...	0.48	1.17	0.862
With the information available on the Internet I am ...	0.57	1.02	0.772
Regarding the information on IFS, I am ...	0.76	0.95	0.701
Perceived expertise of the auditor ¹ , Cronbach's alpha = .708			
What was your level of satisfaction with the work performed by the auditor during your most recent audit?	1.64	1.02	0.796
I was completely satisfied with the IFS auditor's expertise.	1.59	1.21	0.754
The IFS auditor really had no clue about the evaluation.	-2.02	1.11	-0.691
The IFS auditor made a number of useful suggestions informally.	1.44	1.32	0.584
Perceived costs of the certification ¹ , Cronbach's alpha = .538			
We had to provide additional staff for the IFS certification process.	0.16	1.95	0.790
The amount of time we had to spend on the certification process was high.	1.63	1.29	0.789
Perceived effectiveness of the auditor ¹ , Cronbach's alpha = .565			
'Black sheep' will be singled out by the audit.	0.82	1.51	0.743
The IFS auditor really tried to point out weaknesses.	1.56	1.19	0.657
The IFS auditor was very exact.	1.95	0.94	0.521

KMO = 0.826; explained variance = 63.50 %; ¹ = Scale from +3 = totally agree to -3 = totally disagree; ² = scale from +3 = totally satisfied to -3 = totally dissatisfied

Source: authors' calculation

proportion (44.8 %) of the companies had to provide additional staff for the certification process. Regarding the reliability of the control system, 57.6 % of the companies anticipated that “black sheep” would be discovered during the audit.

Next, 25 theoretically derived statements concerning exogenous factors were reduced by means of a factor analysis. After minor modifications for double loading and nonloading items, the measures demonstrated acceptable levels of fit and reliability (KMO = 0.826; explained variance = 64 %). All constructs revealed reliability, that is, an α greater than 0.70 (Nunnally 1978). Only the two constructs “perceived costs of the certification” (0.54) and “perceived effectiveness of the auditor” (0.57) had a low reliability score. Due to the research concept, we did not eliminate these constructs.

Six factors were extracted: “perceived cost/benefit ratio”, “perceived quality of the IFS compared to other QAS”, “perceived communication of the standard owner”, “perceived expertise of the auditor”, “perceived costs of the certification” and “perceived effectiveness of the auditor”.

The impact of the exogenous factors (using the factor scores for the extracted constructs and further selected variables that refer to the presented constructs) on the overall evaluation of the IFS was measured applying a stepwise least-squares model using ordinary least squares (OLS) as the estimation procedure. The model was highly significant (F-value = 80.72) and 54 % (= adj. R square; R = 0.74) of the overall evaluation is explained by the regression equation.

Table 4: Results of the Regression Analysis

Independent Variables	Coefficient	Std. Error	Beta value	T value
c	0.859	0.040		21.245***
Perceived cost/benefit ratio ¹	0.346	0.038	0.396	9.052***
Evaluation of the IFS catalogue of requirements ²	0.275	0.043	0.294	6.380***
Perceived communication of the standard owner ¹	0.203	0.033	0.235	6.181***
Perceived expertise of the auditor ¹	0.195	0.032	0.227	6.173***
Perceived costs of the certification ¹	-0.099	0.032	-0.117	-3.077**

Dependent variable = “overall evaluation of the IFS”³; F-value = 80.72***; Std. Error = 0.586; adj. R² = 0.54; R = 0.74; *** = p<0.001, ** = p<0.01, * = p<0.05; c = constant; ¹ = factor values; ² = scale from +3 = totally agree to -3 = totally disagree; ³ = scale from +3 = totally satisfied to -3 = totally dissatisfied; independent variables (not significant): “perceived quality of the IFS compared to other QAS”¹, “perceived effectiveness of the auditor”¹, “perceived external pressure” (= We would have implemented the IFS even in the absence of any retailer requirements)², “country” (= Germany, France), “number of other QAS” (= BRC, ISO 9001), “number of employees”, “larger production group”.

Source: authors' calculation

The interpretation of the results shows that certification costs are not as relevant as expected. Instead, the factor "perceived cost/benefit ratio" turned out to be the most important one. Furthermore, the companies' evaluation of the IFS catalogue of requirements, the communication and information of the standard owner and the

perceived expertise of the auditor are more important for the evaluation of the certification standard than the perceived costs of the certification.

The main feature of our investigation was a cluster analysis using significant variables in the regression analysis to differentiate between the companies with regard to their heterogeneity in evaluating the IFS. The cluster analysis was conducted in several steps. We first identified outliers using the single-linkage method and removed them from the dataset (five cases). Then, the optimal number of clusters and the respective cluster means were identified using Ward's method. A three-cluster solution was chosen based on a scree test, a dendrogram and plausibility considerations. In order to refine this solution, a k-means cluster analysis was conducted.

Several criteria suggest that the three-cluster solution we obtained is of high quality. F-values are smaller than 1 for all cluster-building variables in each cluster (excluding two variables in cluster 3), indicating that the clusters are very homogeneous (Table 5). Furthermore, $\eta^2 = 0.77$ on average implies that the cluster-building variables are significantly different and that within-cluster variance is low. In addition, $\eta^2 = 0.59$ shows that 59 % of the variance among the cluster-building variables can be attributed to differences between clusters on average. The stability of the cluster solution is high. Cross tabulation indicates that 258 objects,

Table 5: Results of the Cluster Analysis: Active Variables

Factor/Item	Cluster 1	Cluster 2	Cluster 3	Total
	(29.1 %)	(40.7 %)	(30.2 %)	
	μ	μ	μ	μ
	f	f	f	f*
	t	t	t	p
Perceived cost/benefit ratio ¹	-0.22	0.82	-0.83	0.02
	0.50	0.31	0.70	204.47
	-0.24	0.82	-0.87	0.00
Evaluation of the IFS catalogue of requirements ²	0.70	1.14	-0.18	0.61
	0.58	0.65	0.56	125.63
	0.10	0.60	-0.91	0.00
Perceived communication of the standard owner ¹	0.05	0.18	-0.19	0.03
	0.76	0.87	1.34	5.14
	0.02	0.16	-0.23	0.01
Perceived expertise of the auditor ¹	0.05	0.08	-0.12	0.01
	0.82	0.77	1.47	1.55
	0.04	0.07	-0.14	0.22
Perceived costs of the certification ¹	-1.15	0.32	0.69	0.00
	0.36	0.47	0.39	268.47
	-1.17	0.32	0.69	0.00

¹ = factor values; ² = scale from +3 = totally agree to -3 = totally disagree; μ = mean; f = variance of variable x/ variance of x in the total sample; t = $(\mu(x) - \mu^*(x)) / \text{standard deviation of } x \text{ in the total sample}$; f* = f-value (ANOVA); p = significance level (ANOVA)

Source: authors' calculation

corresponding to 68 % of the total, are classified congruently by Ward's and the k-means methods. In addition, the kappa number is equal to 0.50. Moreover, a discriminant analysis shows that 99 % of the objects are classified congruently by the k-means method and the discriminant analysis (Wilks Lamda = 0.16). To describe the clusters, an ANOVA was applied (Table 5 and Table 2, 3 and 4 in the appendix).

All in all, three clusters were extracted. The groups can be characterized as “The Unconcerned” (Cluster 1), “The Satisfied” (Cluster 2) and “The Dissatisfied” (Cluster 3).

Cluster 1: “The Unconcerned” (29.1 %)

The first group, “The Unconcerned”, was generally satisfied with the IFS but did not perceive many advantages for the companies. Most members of this cluster are larger companies with about 450 employees, and ten are very large scale manufacturers with more than 1,000 employees. Of the companies, 46.8 % are part of a larger production group, and 45.9 % are situated in Germany. The members of this cluster were forced to implement the IFS, but, after using the standard for a while, they detected certain advantages. Referring to the number of certification standards (BRC, ISO 9001 and GMP), they have a lot of experience and, therefore, perceived low costs during the initial IFS phase. Furthermore, the IFS requirements were not too difficult for them to implement, and they did not need additional staff for IFS certification. However, they adopted the IFS without retailer pressure. Since these companies did not see too many negative effects on the management process from IFS implementation and had so much experience with other standards, they were labelled “The Unconcerned”.

Cluster 2: “The Satisfied” (40.7 %)

The second cluster, “The Satisfied”, consists of 40.7 % of the companies and is, therefore, the largest group. The cluster is composed of small companies—mostly situated in Germany (56.1 %) and Italy (10.3 %). Only 34.8 % are part of a larger production group. All in all, they had a very positive attitude towards the IFS, regarding internal (e.g., useful input for operational management) and external (e.g., improvement in relations with customers) effects on the enterprise. However, they perceived high costs during the certification process. Their motivation to implement the IFS—even in the absence of any retailer requirements—was higher than that of other groups. Therefore, they seemed intrinsically motivated. Since the majority of the companies evaluated the IFS very positively, they were labelled “The Satisfied”.

Cluster 3: “The Dissatisfied” (30.2 %)

Most respondents in the third cluster are medium-sized companies with an average of 311 employees. Most of them are situated in Germany (63.5 %) and France (20.0%). The members of this cluster have been certified, but, nevertheless, do not see positive effects on food safety or on their customers’ relations. They have less experience with other certification standards than companies in the other clusters. The IFS requirements were hard for them to implement, and they perceived high costs during the implementation phase of the IFS, especially the time they had to spend on the certification process, which was quite long, and to the need to engage additional staff. All in all, the cost/benefit ratio is negative for the companies of the third group; they are not satisfied with the IFS, and they would not implement the IFS in the absence of retailer requirements. Therefore, they were labelled “The Dissatisfied”.

Discussion

The interpretation of the results of the regression model (see Table 4) shows that the evaluation of the IFS is better if the companies perceive a good cost/benefit ratio. On the one hand, a positive evaluation arises from the benefits offered by the standard, for instance an increase in food safety, a better relation with customers or a useful input for operational management. On the other hand, lower costs regarding operational expenses and administrative efforts can be realized.

Corresponding to our results, various studies concerned with ISO 9001 and agrifood specific standards have revealed that the primary motivation for certification was the enhancement of operational efficiency and reduction in production costs due to lower error rates (Mumma et al. 2002; Briz et al. 2005; Zaibet/Bredahl 1997; Holleran/Bredahl 1997 and Turner et al. 2000). A further decrease in costs results in reduced management and process control staff as well as enhanced management and lower transaction costs (Zaibet/Bredahl 1997). The results of the study, therefore, confirm the importance of the cost/benefit ratio already mentioned in the literature. Hence, in implementing a standard such as the IFS, it is important to fulfil firm expectations, particularly regarding the benefits of the system, because of the high position of retailer power.

Cooper (1995) generally claimed that a standard interpreted by a company as purely a conformance standard will never attract interest as a means of reducing costs. This lack of internal motivation will negatively influence the perceived benefits, and the perceived costs will always outweigh the advantages (Taylor 1995; Dick 2000). In these cases, the ISO 9001 is demoted to a “hollow achievement” (Jones et al. 1997: 650). However, the results of the study also show that the external pressure does not influence the certification costs and only moderately influences the overall evaluation of the standard. Another aspect with a significant

effect on the standard evaluation is the catalogue of requirements of the IFS (Gawron/Theuvsen 2006). One explanation for the strong relationship could be the strict and detailed criteria that characterise the IFS; if they do not match the companies' structure, this can cause resentment. Furthermore, clear communication by the standard owner is also an important part of improving the overall evaluation of the approach because it helps firms to better understand the requirements of the scheme.

The high standard deviations of the sample and especially the cluster analysis indicate that there are huge differences with regard to the evaluation of the IFS. Perceived cost/benefit ratio, perceived costs of the certification, the evaluation of the IFS catalogue of requirements, perceived external pressure, the origin of the companies and the implementation of other QAS are key factors explaining these deviations.

Regarding the cluster solution, Cluster 2 ("The Satisfied") contains those companies which demonstrate the highest level of satisfaction with regard to such features as perceived improvements in food safety. In contrast, the evaluation of Cluster 3 ("The Dissatisfied") is strongly influenced by the time spent in the certification process and the costs of hiring the additional staff needed to implement the standard. This cluster has the highest costs and perceives no benefits from the IFS. Cluster 1 ("The Unconcerned") experiences low benefits and low costs; however, benefits outweigh costs, and satisfaction is ranked at a medium level. Taking the number of certification schemes implemented as one explanation, one can see that Cluster 1 in particular has the most experience with other standards, such as ISO 9001 or BRC. Therefore, the implementation costs are quite low because all necessary actions, like completing additional documentation, have already been taken.

With regard to the perceived quality of the IFS, compared to other quality systems, the members of Cluster 2 consider higher transparency, efficiency, relevance and a lower bureaucratic workload as advantages. Cluster 3, however, evaluates these aspects negatively, and Cluster 1 has a more or less unconcerned attitude towards the perceived quality, which can also be explained by their experience with other quality standards.

A third difference between the three clusters is the perceived competence of the auditor and, in combination with this, his or her perceived effectiveness. Clusters 1 and 2 are characterized by a high satisfaction level regarding the auditor's work during recent audits and the accuracy of those audits. Most members of both clusters found that the expertise of the auditor was adequate and that the auditor made many useful suggestions. Most companies in Cluster 3 agreed.

With regard to perceived communication on the part of the standard owner, for example, availability of information or communication with the IFS office, Cluster 2 indicated a generally positive position. Cluster 1 evaluated these aspects similarly. Only Cluster 3 reported negative experiences in communications with the standard owner.

With reference to the empirical evidence for the implementation of QAS, the clusters can be classified according to their internal and external motivation.

Cluster 1 (“The Unconcerned”): Forced by retailers, but, after the implementation period, the IFS offered certain advantages; motivation: intrinsic/extrinsic.

Certification schemes have to be implemented in day-to-day operations and then improve the organisation’s business. In particular, benefits such as more business and lower operating costs need some time to develop. At least for companies already certified for a longer time, these advantages may already have been partially realized and, therefore, they are much more conscious of them and reported them more often. Brecka (1994) proves that the benefits of QAS increase with time. However, there are also studies indicating the opposite is true. In fact, Jones et al. (1997) and Terziovski et al. (2003) found no evidence that companies progressively gain from certification, noting instead that organisations seem to experience declining benefits with time.

Cluster 2 (“The Satisfied”): Improvement of cost-/ benefit ratio; motivation: intrinsic.

According to studies that analyze mainly the ISO 9001 and standards in the agrifood sector, motivation for implementing the ISO was predominantly to improve operational efficiency and reduce costs through lower error rates in the production process (Mumma et al. 2002; Briz et al. 2005; Zaibet/Bredahl 1997; Holleran/Bredahl 1997; Turner et al. 2000). Costs are also diminished through reductions in management and process control staff as well as enhanced management and lower transaction costs (Zaibet/Bredahl 1997).

Cluster 3 (“The Dissatisfied”): Forced by large retailers; motivation: extrinsic.

Briz et al. (2005: 8) and Zaibet/Bredahl (1997) state that the importance of the external factor “staying in business” gains increasing importance in highly competitive markets characterized by great retailer power. This corresponds to findings by Lee and Palmer (1999), who revealed that external factors play a major role as key drivers for small firms seeking certification.

Certificates have achieved more and more the status of a “licence to operate” (Jones et al. 1997: 652). There is evidence that many suppliers put great effort into gaining the certificate but do not operate according to the ISO 9001 requirements in their

daily businesses (Gore 1994). However, Jones et al. (1997: 650) point out that ISO 9001 is a “long-term investment”. It takes time for the companies to make the QAS work and, thus, allow it to reveal its full potential. Hence, the huge expenditures for implementing and maintaining the system can only be acknowledged if they entail benefits. Consequently, the seeking of a certificate may initially be motivated by retailer demands, but, after a period of use, its costs pay off and its perceived advantages exceed its disadvantages. That is what Ortmann (1995) calls “the slow fabrication of objectives while acting”.

The results show that motivation is a very important variable when it comes to the reasons for seeking certification and ensuing performance (Huarng et al. 1999: 1015; Singels et al. 2001; Terziovski et al. 2003). Many authors allude to the fact that companies should not target the bare implementation of ISO 9001 (Tsiotras/Gotzamani 1996; Jones et al. 1997; Terziovski et al. 2003) since QAS do not *per se* achieve major benefits and inevitably improve an organisation’s performance (Jones et al. 1997; Beattie/Sohal 1999). The intention “must be the development of a solid quality assurance system which will lead to the future development of a total quality system” (Tsiotras/Gotzamani 1996: 75). The stance on merely “achieving a certificate” is a mentality arising from external pressures (Jones et al. 1997; Martinez-Costa/Martinez-Lorente 2007) and can result in fraud (Dick 2000).

Conclusions

Taking the IFS as an example, this empirical study presents insights into the assessment of certification standards by processors in the agrifood chain. Its rapid diffusion shows that the IFS has become a *conditio sine qua non* for European food manufacturers. Nearly all important retailers require their suppliers to present an IFS certificate; therefore, it can, at best, be classified as quasi-voluntary (Meuwissen et al. 2003).

The results of the representative survey clearly demonstrate that the overall evaluation of the IFS is positive. All in all, food manufacturers perceive the IFS as a useful instrument for assuring product safety. The regression analysis indicated that clients are interested not only in receiving the certificate but mainly in food safety benefits. Furthermore, some respondents reported positive effects on their companies, such as a continuous improvement process or improved quality motivation of staff members. Nevertheless, the cluster analysis also showed a more sceptical assessment by at least some of the respondents.

From the IFS survey results (especially from the cluster analysis), three managerial implications can be derived. First, the companies that do not yet perceive any advantages from implementing the standard should consider the IFS more as a quality management instrument. Some companies have already noted improvement

in their internal business processes following IFS implementation. These companies can serve as benchmarks for more reluctant and sceptical food manufacturers. Second, the catalogue of requirements offers the most important opportunity for improvement. Through its use, the standard setter has a chance to clearly enhance the satisfaction of certified companies. This could be achieved by integrating more subsector-specific requirements and benchmarking the IFS against other certification standards. This could lead to an improvement of the reciprocal acceptance of standards and convince retailers to refrain from auditing their own suppliers and to rely more heavily on third-party audits governed by the IFS. In this way, criticism from food manufacturers can be reduced, as can audit amount. The third area of improvement is better communication quantity and quality by the standard setter. This can be achieved by means of a regular newsletter, better notification of changing requirements, more industry specific information and advice on implementing requirements.

The study was conducted with the support of the IFS Working Group (standard setter of the IFS), which demonstrated its willingness to improve the scheme. Among other things, the results served as a basis for improvements and the development of the new IFS version (Version 5), which was published in August 2007.

Our contribution highlights a variety of theoretical starting points for further research evaluating quality assurance systems in food supply chains. Moreover, the study gives initial indications for the positive and negative impacts of certification schemes on the internal processes of food companies. In the long run, the success of quality assurance systems, satisfaction and positive motivation are important because a scheme that is recognized as a bureaucratic burden will not lead to major quality improvements.

Due to the comprehensive sample, which is marked by a large sample size and an integration of various European companies along the whole food supply chain, the study presented provides a good initial understanding of the factors influencing companies' evaluation of the IFS. However, the empirical study is limited to the analysis of only one standard. Future research should seek to contrast its results with evaluations in other countries (e.g., Asia) or with other certification standards (e.g., ISO 22000; BRC).

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Appendix

Table 1: Empirical Studies Analysing the Reasons and Performance Outcomes of ISO9001

Author	Year*	Objectives	Method	Sample Size	Main Results
Brecka, J.	1994	-	-	400 participating organisations	<ul style="list-style-type: none"> - Benefits of QAS increase over time. - Greater benefits with regard to lower operating costs, reduced wastage, expanded market share and improved efficiency and productivity. - Customer pressured companies were less likely to report improved organizational performance.
Jones, R.; Arndt, G.; Kustin, R.	1997	<ul style="list-style-type: none"> - Relationship between the benefits of ISO 9001 and the company's initial motivation - Impact of time on perceptions of benefits received 	Frequency tests	272 Australian companies	<ul style="list-style-type: none"> - 16 % rated performance-related reasons, 42 % externally-motivated reasons and 42 % rated internal and external reasons equally (mixed) as primary motives. - Internally motivated and mixed companies show stronger agreement that they have experienced benefits. - No statistical evidence to show that longer-certified companies experience more benefits than recently-certified companies, regardless of the reason for seeking certification.
Buttle, F.	1997	<ul style="list-style-type: none"> - Motivations to seek certification - Benefits which accrue from certification - Difficulties experienced during and after certification 	- Factor and regression analysis	1220 international companies in the UK	<ul style="list-style-type: none"> - Profitability and process improvement are most highly valued. - Marketing considerations (gaining new customers, keeping old customers, increasing market share and growth in sales and improving customer satisfaction) were secondary in seeking registration.
Skrabec, Q. R.; Ragunathan, T. S.; Subba Rao, S.; Bhatt, B. T.	1997	- Analyze cost, benefits, roadblocks and reasons for registration to ISO 9001	-	300 US companies	<ul style="list-style-type: none"> - Main costs: training and surveillance costs; indirect costs such as management and employee time can be substantial; registration costs are low. - Top current benefits: documentation, improved standards, and quality awareness - Estimated costs for system improvement via ISO 9001 can be considered low.
Casadesus, M.; Gimenez, G.	2000	- Determine the benefits of adoption with regard to various firm characteristics	Cluster analysis	288 Spanish SMEs	<ul style="list-style-type: none"> - 65 % benefited externally and internally from the standard; 6 % showed much fewer benefits. - 79 % are principally constituted by the companies most satisfied; high internal benefits. - 21 % are satisfied although they obtained fewer internal benefits. - 71 % are more satisfied with the external benefits. - 29 % perceived fewer external benefits.
Singels, J.; Ruël, G.; van de Water, H.	2001	<ul style="list-style-type: none"> - Do certified companies have better performance outcomes? - What motivates organizations to achieve ISO certification? 	Factor analysis	192 industrial and service firms in North Holland	<ul style="list-style-type: none"> - ISO 9001 alone does not have a positive effect on corporate performance. - Motivation positively influences the organisation's performance.

Author	Year*	Objectives	Method	Sample Size	Main Results
Calisir, F. Cahit, A. Bayraktar, Beskese, B.	2001 (1998)	<ul style="list-style-type: none"> - Examine the relationships between companies' demographic characteristics - Difficulties encountered in ISO 9001 implementation - Improvements generated after attaining certification - Large companies' satisfaction with ISO 9001 	Regression analysis	73 large Turkish companies (>100 employees)	<ul style="list-style-type: none"> - Corporate satisfaction depends on operational improvements and the overall success after implementation. - Benefits are increasing product/service quality, reducing error/defect rate in production/service and achieving standardization.
Gunn- laugsdóttir J.	2002 (2001)	<ul style="list-style-type: none"> - Time and cost to obtain ISO 9001 - Motivation to seek certification - Was time and money well spent? 	Frequency tests	24 firms in Iceland	<ul style="list-style-type: none"> - Adoption motivated by customer demand - Time required to gain a certificate is extremely long, and costs are substantial. - Improvement in record keeping - Investments are worth the cost.
Chow- Chua, C.; Goh, M.; Wan, T. B.	2003	<ul style="list-style-type: none"> - Has ISO 9001 standard compliance benefited listed firms which are already governed by a stricter standard of responsibility of wealth creation towards shareholders? 	<ul style="list-style-type: none"> - Empirical survey (factor analysis) - Examination of annual reports (1987-1997) 	146 Singapore based companies	<ul style="list-style-type: none"> - Certification leads to better overall financial performance. - Nonlisted certified firms experience better documentation procedures, higher perceived quality of products or services and more effective communication among employees than listed certified firms. - Problems include failure to establish adequate monitoring programs, to follow set procedures and to carry out appropriate management reviews of the new system as well as unclear authorization.
Terziovski, M.; Power, D.; Sohal, A. S.	2003	<ul style="list-style-type: none"> - Auditor's perceptions of ISO 9001 practice and its effectiveness for business performance - Relevance of the quality auditor within the relation between ISO 9001 certification and business performance 	<ul style="list-style-type: none"> - Quantitative data (sample of certified companies and quality auditors) - Multivariate analysis 	<ul style="list-style-type: none"> - 400 companies in Australia - 126 quality auditors 	<ul style="list-style-type: none"> - Significant and positive relationship between the manager's motives for adopting ISO 9001 certification and business performance - Principal motivation to pursue ISO 9001 certification was found to come from customer pressure. - Auditing style has an insignificant (positive or negative) effect on business performance.
Walgen- bach, P.	2007	<ul style="list-style-type: none"> - Reasons for ISO 9001 implementation 	<ul style="list-style-type: none"> - Qualitative interviews in 1996 	37 organisational units	<ul style="list-style-type: none"> - Customer demands are not the main trigger for adoption; however external reasons were main drivers - Implementation was an occasion for structuring and led to the development of a system of bureaucratic control
Calisir, F.	2007 (2004)	<ul style="list-style-type: none"> - Determine the level of difficulties/obstacles associated with the implementation - Importance of achieving expected improvements - Level of success in achieving expected improvements - Influence of these factors on service companies' satisfaction 	<ul style="list-style-type: none"> - Regression analysis 	86 Turkish service industry	<ul style="list-style-type: none"> - Regression analysis indicates enterprise's quality in terms of reputation, interpersonal relations and motivation on the part of employees as significant variables. - Companies are more satisfied if they put greater emphasis on considering alternative approaches to educating top- and medium-level managers and receiving support from top management. - "Motivating personnel" was the most difficult problem.

*Year of paper (year of survey – if reported)
Source: authors' representations

Table 2: Results of Cluster Analysis 2: Statements of the Factor Analysis

Constructs and Items	Cluster 1 (29.1 %)		Cluster 2 (40.7 %)		Cluster 3 (30.2 %)	
	μ	σ	μ	σ	μ	σ
Perceived cost/benefit ratio¹						
Would you agree that the IFS has improved your food safety management?***	0.50	1.15	1.90	0.80	0.11	1.51
The administrative effort is justified by the benefits of IFS certification.***	0.43	1.10	1.01	1.00	-1.10	1.19
The IFS has essentially contributed to increasing the safety of our food production.***	0.15	1.38	1.72	1.03	-0.37	1.44
The IFS makes our business processes more transparent.***	-0.36	1.49	1.37	1.08	-0.58	1.38
The advantages of the IFS outweigh any disadvantages.***	1.15	1.11	1.90	0.80	-0.04	1.48
Would you agree that the IFS has improved your relations with your customers?***	0.48	1.51	1.34	1.17	-0.65	1.41
The operational expenses of implementing the IFS are justified by its benefits.***	0.49	1.16	1.08	1.13	-0.80	1.13
Implementation of the IFS provides us with useful input for our operational management.***	1.23	1.14	2.29	0.61	1.17	1.19
Perceived quality of the IFS compared to other QS¹						
Compared with other certification standards, the IFS is more transparent. ^{p=0.27}	0.11	1.44	0.41	1.55	0.22	1.39
Compared with other certification standards, the IFS is more efficient.**	0.07	1.30	0.53	1.50	-0.09	1.35
Compared with other certification standards, the IFS is more relevant.**	0.24	1.46	0.53	1.47	-0.09	1.42
Compared with other certification standards, the IFS is less bureaucratic.**	-0.17	1.40	0.20	1.59	-0.45	1.79
Perceived communication of the standard owner²						
With the information provided by the IFS offices, I am...***	0.28	1.06	0.70	1.00	-0.05	1.27
With the communication with the IFS offices I am ...***	0.48	1.02	0.82	1.04	0.02	1.32
With the information available on the Internet I am ...***	0.63	0.90	0.80	0.94	0.21	1.16
Regarding the information on IFS, I am ...***	0.84	0.86	0.99	0.95	0.38	0.95
Perceived expertise of the auditor¹						
What was your level of satisfaction with the work performed by the auditor during your most recent audit?***	1.69	0.84	1.84	0.87	1.31	1.26
I was completely satisfied with the IFS auditor's expertise. ^{p=0.06}	1.64	1.16	1.72	1.14	1.37	1.31
The IFS auditor really had no clue about the evaluation. ^{p=0.20}	-2.13	0.95	-2.05	1.19	-1.86	1.13
The IFS auditor made a number of useful suggestions informally.***	1.31	1.35	1.77	1.12	1.09	1.43
Perceived costs of the certification¹						
We had to provide additional staff for the IFS certification process.***	-1.61	1.19	0.61	1.72	1.27	1.64
The amount of time we had to spend on the certification process was high.***	0.35	1.16	1.98	0.99	2.37	0.78
Perceived effectiveness of the auditor¹						
'Black sheep' will be singled out by the audit.***	1.03	1.28	1.12	1.46	0.28	1.58
The IFS auditor really tried to point out weaknesses.*	1.31	1.27	1.71	1.09	1.60	1.19
The IFS auditor was very exact.*	1.77	1.00	2.06	0.80	1.98	1.04

*** = p<0.001, ** = p<0.01, * = p<0.05 (ANOVA); ¹ = scale from +3 = totally agree to -3 = totally disagree; ² = scale from +3 = totally satisfied to -3 = totally dissatisfied

Source: authors' calculation

Table 3: Results of Cluster Analysis 3

Items	Cluster 1 (29.1 %)		Cluster 2 (40.7 %)		Cluster 3 (30.2 %)	
	μ	σ	μ	σ	μ	σ
Overall evaluation						
Before going into more detail, we would like to know your general opinion of the IFS. ^{1***}	1.20	0.74	1.43	0.68	0.34	0.72
Perceived external pressure						
We would have implemented the IFS even in the absence of any retailer requirements. ^{2***}	-0.52	1.86	0.39	1.43	-0.97	1.76
Further single statements						
I am very comfortable recommending IFS certification to other companies. ^{2***}	1.39	1.08	1.88	0.99	0.36	1.28
The requirements are too difficult to implement. ^{1***}	-0.59	1.09	-0.35	1.11	0.29	1.09

*** = p<0.001, ** = p<0.01, * = p<0.05 (ANOVA); ¹ = scale from +3 = totally satisfied to -3 = totally dissatisfied; ² = scale from +3 = totally agree to -3 = totally disagree; ³ = scale from +3 = clearly more successful to -3 = far less successful
Source: authors' calculation

Table 4: Results of Cluster Analysis 4: Descriptive Variables

Items	Cluster 1 (29.1 %)	Cluster 2 (40.7 %)	Cluster 3 (30.2 %)	Total
Country of origin				
Germany*	45.9%	56.1%	63.5%	55.4%
France***	2.7%	4.5%	20.0%	8.7%
Italy**	9.0%	10.3%	0.0%	6.8%
Austria ^{p=0.41}	6.3%	8.4%	4.3%	6.6%
Number of other QAS. *** μ (σ)	2.38 (1.40)	1.49 (1.32)	1.38 (1.16)	1.72 (1.36)
BRC***	53.2%	32.9%	25.2%	36.5%
ISO 9001***	62.2%	38.7%	40.0%	45.9%
GMP*	12.6%	5.8%	4.3%	7.3%
Number of employees. ^{p=0.15} μ (σ)	449 (908)	283 (582)	311 (614)	340 (704)
Companies part of a larger production group. ^{p=0.11}	46.8%	34.8%	36.3%	38.8%

*** = p<0.001, ** = p<0.01, * = p<0.05 (ANOVA)

Source: authors' calculation

