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Food Quality Standards: Quality Issues and Challenges of Food Chain in Burkina Faso

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ABSTRACT

Background: In Burkina Faso, the agricultural sector accounts for 35% of the gross domestic product (GDP) and employs 82% of the active population. The agri-food industries must apply the requirements of the management systems to improve their economic position and ensure sustainable development. The present study aimed to highlight the similarities and particularities of these repositories grouped according to the conformity procedures. **Methods:** Interviews were conducted with the state technical services and research and development support agencies of Burkina Faso in order to identify and make a comparative study of the available benchmarks. **Results:** We studied eight standards (ISO 9001, ISO 14001, ISO 45001, NBF 01-027: 2009, NBF 01-028: 2009, ISO 22000, BRC and IFS). These standards help improving competitiveness of the companies as well as developing the trade and food security. In addition to these standards, three private repositories were used for large distribution: Global Good Agriculture Practices, British Retail Consortium, and International Food Standard. These standards are responsible for the operations of agriculture and agribusiness in the face of numerous commercial, regulatory, health, economic, and societal requirements. They are mainly oriented towards the treatment of the main risks: cross-contamination, fatal accident, health damage, environmental pollution, unavailability of the production tool, loss of customer, etc. **Conclusion:** The conformity assessment of food products on the basis of specific benchmarks makes it possible to highlight the positive aspects of these products.

Keywords: *Quality standard; Food safety; GlobalGAP; BRC / IFS*

Introduction

Quality management is based on a holistic and systemic approach to organizations, which concerns all beneficiaries of a company (customers, actuators stakeholders, etc.). It has also extended to other areas, including those of the environment and security. Nowadays,

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standardization is recognized as an essential discipline for all stakeholders in the economy who must strive to master its challenges. Development of standardization requires two main factors: the quality requirement of consumers and the emergence of new techniques and technologies (Pablo, 1996; Gloanec and Porphyre, 2012). Standardization also imposes control on all the organizational system processes and continuous improvement of services (Bouaziz *et al.*, 2012, Sylvander and François M et Morin, 2005). Thus, standards, as privileged tools for the practical implementation of a quality management system, has twofold role: serving as a model of management and progress and ensuring the trust and satisfaction of all beneficiaries.

In recent years, the international references of management systems have grown strongly that shows the importance of organization and management in controlling the risks at work, industrial risks, and environmental impacts (Faucher, 2007 , Pascal and Beyerle, 2006). Quality of the products is an element of survival in a world of competition, so that quality can reinforce the image of a product in increasingly intense national or international competition context and can lower the production costs by limiting losses (Bouaziz *et al.*, 2012). In dealing with the crisis of consumer confidence, the agricultural production sector must take measures to ensure the quality of products. The quality of products includes factors such as quality approach, product certification, and establishment of a quality sign, which can promote a product by describing its specific characteristics (Blanchemanche *et al.*, 2003, Bouaziz *et al.*, 2012). Food products bearing distinctive signs of particular quality can claim a bright future (Badiane and Kherallah, 1997, Sylvander and François M et Morin, 2005). In fact, they meet the new expectations expressed by consumers and are part of the sustainable development in agriculture. The success of such products depends on efforts to strengthen consumer confidence by defining the characteristics of these products, which are well-known empirically or by reinforcing their typicality in the face of a very competitive market (Broutin *et al.*, 2003, Sylvander *et al.*, 2007).

Quality is a strong theme, recognized by all politicians around the world. It boosts trade at the national level, while protecting the consumers' safety and health by participating in the concerted development of promising sectors for the economy (CTA, 2003, Dabat *et al.*, 2008). The development of quality standards is understood in the broadest sense and covers health, organoleptic and technological quality, and signs of quality, which can be a decisive factor in improving the competitiveness of the agri-food chains (Broutin *et al.*, 2005, Lévêque and Massé, 2002). Standards are often treated from the view point of accessing agri-food products of the South to the markets of the North. The level of standard is often considered as a non-tariff barrier that can be highly burdensome for export operators (Broutin *et al.*, 2009). However, this is not always the case and depends in particular on the support that operators receive. In addition, quality standard issues concern agri-food products consumed and traded on national and regional markets in the South (Broutin *et al.*, 2009).

In west Africa, consumers are increasingly sensitive to the quality of agri-food products due to rising living standards, urbanization, and emergence of consumerist behavior (Bouaziz *et al.*, 2012, Broutin *et al.*, 2006). The development of a quality standard at the regional level can encourage the operators to seize the opportunity segmentation of the market to value their products better and improve their incomes while satisfying consumer requirements (Hammoudi *et al.*, 2010, International trade centre unctad/WTO commonwealth secretariat, 2004).

In fact, the quality of services and products, safety of food, health and safety of workers, and environmental health should be addressed by agri-food companies, who are aware of these issues and keen to adapt to constraints in

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development and sustainability. These integrated management systems allow the organization to manage the regulatory requirements (Faucher, 2007). These parameters (quality of services and products, safety of food, health and safety of workers, and environmental health) must be taken into account in the decision-making process and improving the risk management of food companies. The objective of this study was to highlight the standards used in the field of quality management, food, environmental, occupational health, and safety. These standards are designed for companies that certify one or more quality management systems or validate their own systems.

Materials and Methods

Data were mainly obtained from the State technical services. In addition, interviews were conducted with operators, consumers, as well as research and development support agencies (quality managers/ABNORM) in Burkina Faso.

We also considered the standards in the field of food safety. The identified standards were professional as well as individual or collective standards, which are most often subject to certification agri-food companies (codes of good practice, guide to good hygiene practices designed by professionals and recognized by public authorities, etc.) as well as frameworks governing the customer - supplier relationship.

We investigated eight standards of ISO 9001, ISO 14001, ISO 45001, NBF 01-0227: 2009, NBF 01-228: 2009, ISO 22000, BRC, and IFS, which are applicable in agricultural production. These data were collected from individual semi-structured surveys. The collected data were analyzed manually.

Results

Compliance processes are based on good practice guides usually composed by the industry. They attest to compliance with the requirements by a commitment previously defined in a reference document (specifications, standard, charter, etc.). There are two main types of compliance procedures that can be different. The standards, charters, and standards were developed to allow distributors who require proofing products' conformity and / or mode of production and processing from their suppliers. Among distributors and standards, we studied the requirements of standards for quality management systems (ISO 9001, 2015), occupational health and safety management systems (ISO 45001, 2018), environmental management systems (ISO 14001, 2015), food safety management systems (ISO 22000, 2018).

They provide the consumers with guarantees regarding the products' origin, method of production, organoleptic quality, or specificity.

Quality issues in Burkina Faso

Economic challenges: Improving quality and productivity, Strengthening competitiveness by reducing cost prices and non-quality costs, Conquering new markets, Improving customer satisfaction and loyalty, and Improving brand image.

***Social and human issues*:** Involvement and mobilization of staff, communication of more effective internal relationships, motivation by giving more individual responsibilities, and allowing accomplishment of the individual in his work.

Technological challenges: Control of production processes, reduction of errors by formalizing ways of doing things, uniform product quality, capitalization of know-how • technology transfer, and facilitation of the integration of new staff (Quality manual, manual procedures, etc.).

For customers: Increase in satisfaction, increase in confidence in the ability of the company to meet its needs, positive perception of the company for Burkina, renowned in terms of quality-increase in exports-foreign exchange inflows, and balance of trade.

Quality challenges in Burkina Faso

Companies require to consider the following issue to ensure about the conformity of their products and services with the international trade rules and technical regulations, in particular

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WTO agreements (TBT, SPS): Identify and set up Quality management Standards adapted to their needs, understand and master the appropriate quality management system (QMS) implemented for certification (If necessary), and allocate the necessary resources to make the QMS implemented effective.

For the state

A national quality policy (PNQ) Note was developed and applied by the Government on March 16, 2012 that included: Instilling a national quality culture, and strengthening the quality infrastructure so that it is able to: Support companies in quality matters, provide standardization, conformity assessment, and accreditation services in accordance with international standards.

IFS, BRC, and ISO 22000

ISO 22000: 2018 is developed by the international non-governmental organization, while the BRC is of Anglo-Saxon origin and the IFS is of Franco-German origin. The IFS and BRC are private repositories, developed by and for large retailers. ISO 22000 is applied to the entire food chain, while IFS and BRC are audit referentials that certify private label food suppliers. For example, a logistics company has a dedicated IFS repository. Another difference is that ISO 22000 only sets performance requirements, while BRC and IFS fix resource requirements. The IFS and BRC may be more stringent in applying the ISO 22000. Finally, BRC and IFS include some provisions to prevent malicious (Food Defense) or manage the authenticity of the raw material issues (Food Fraud). This is not the case in ISO 22000. However, the 2018 version of the standard does not prohibit integrating these provisions of the approach. These BRC and IFS type standards are imposed with an increase in audits by certifying the private label food supplieras. ISO 22000 was published (2005) and revised (2018) to deal with these private standards and should position itself as the reference standard for the food safety management.

The main requirements of the standards are recorded in **Table 1**. The comparative study of the main requirements of the standards is summarized in **Table2** and the Most commonly used quality frameworks in the area of the management were summarized in **Table 3**.

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Table 1. Main repository requirements

	NBF 01-027: 2009	NBF 01-028: 2009	Global GAP	BRC/IFS
Nature	National Standardization Body Burkinabe Recommended Code of Practice for Packaging and Transporting Fresh Fruits and Vegetables	National Standardization Body Burkinabe General Standard for Labeling Prepackaged Foods	Private Association of large retailers British Implementation of good agricultural and environmental practices on farms	Private Distribution professionals Anglo-Saxon / Franco-German Evaluation framework based on quality and food safety Implementation of an HACCP plan and management system of good hygiene practices
Objectives	Recommendations for packaging and transporting fresh fruits and vegetables to maintain product quality during transporting and marketing	Applies to labeling of all pre-packaged foods offered to the consumers or intended for catering, as well as certain aspects relating to their presentation	Guarantees the products for consumers to meet the referencing criteria of the world's leading buyers of fruits and vegetables	Support distributors in controlling their suppliers mainly through a common support for audits to focus on food quality and safety. It also guarantees the products and companies according to the requirements set by the European legislation and health safety. It provides access to new market
Technical requirements	Based on the mode of transportation and the type of equipment How to store the products during transportation, marketing mode, and type of packaging	Recommended Code of Practice for Packaging and Transporting Fresh Fruits and Vegetables Recommended reference for packing and transporting fresh fruits and vegetables	Based on food safety Based on controlling environmental impacts and working conditions	Applicable to all producers applying for certification for farm types Based on crop-specific production sector applicable to the needs of a particular type of production: fruit and vegetables
Feature	Recommended reference for packing and transporting fresh fruits and vegetables	Recommended Hygiene Code of Practice for Dried Fruit Standard setting general labeling standards for prepackaged foods	Enables certification with recognizing the effect of the QMS system in place	allows accreditation with recognition of the QMS and technical skills

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Table 2. Comparative study of the main requirements of quality standards

Type of approach	Conformity of production methods and transformations to good practices		Conformity of products to standards or protection	Efficiency	Ethical, social and societal approaches
Objectives	Trade, compliance with regulations, food security		Valuation, consumer recognition, legal protection	Evidence of an organization's ability to meet stakeholder requirements	Social and environmental tests
Inciter	Distributor	Professionals	Public or Private	Standardization Organization	Multiple
Name of the steps	NBF 01- 027: 2009	Packaging and carrier	Public	ABNORM	
	NBF 01- 028: 2009	labeling	Public	ABNORM	
	GlobalGAP	reasoned agriculture	Private	ISO	Max Havelaar
	IFS		Private (Red Label)	ISO	ESR BIO-EQUITABLE
	BRC	Trusted Agriculture	Private (Valuing mention)	ISO	ALTER ECOCES
	ISO 22000		Private	ISO	ISO 22000
		Sanitary Security of Food stuffs			

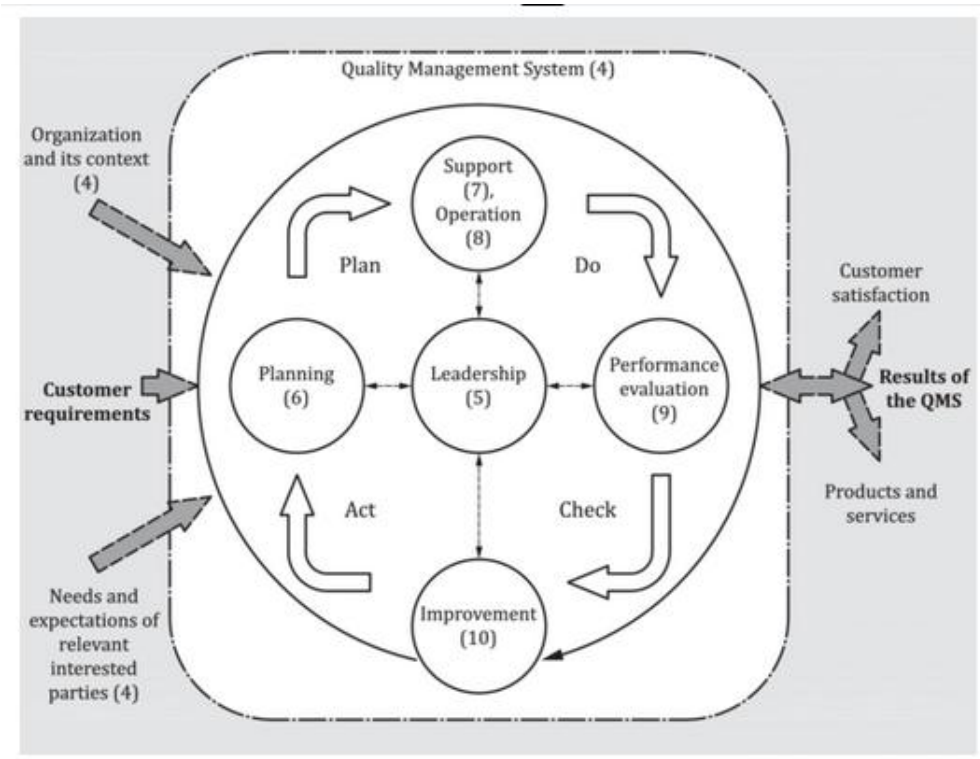

Figure 1. Presentation of PDCA cycle dynamics

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Table 3. Most commonly used quality frameworks in the area of the management system.

	Quality management system	Food safety management system	Environnemental management system	Occupational health and safety management
Definition	System to guide and control an organization in terms of quality according to (ISO 9001: 2015).	System based on four elements considered essential by the standard to ensure the safety of food at all levels of the food chain: interactive communication, systematic approach, (system management), prerequisite programs (prerequisite programs) and HACCP principles (ISO 22000: 2018)	The environment is defined as "all the elements (biotic or abiotic) that surround an individual or a species and some of which contribute directly to the maintenance of their needs". The set of natural (physical, chemical, biological) and cultural (sociological) conditions that can affect living organisms and human activities " (ISO 14001: 2015).	Terms of reference for managing OHS responsibilities. They are based on the standards that define a method for continuous improvement of performance and compliance with applicable laws in this area (ISO 45001: 2018)
Objective	Obtain customer recognition and support the performance of an organization, the implementation of a quality management system supports a dynamic of progress: customer focus, efficiency, increased competitiveness, durability. Also allows to demonstrate the performance of the methods used and the efficiency of the processes. Source of profitability improvement and vector of employee mobilization (ISO 9001 : 2015)	Allow perfect accounting and complementarity with the different management standards commonly used by companies. It is based on 4 principles: management responsibility, resource management, planning and implementation of safe products, validation and verification (ISO 22000 : 2018)	Enables companies to minimize the impact of their activities on the environment, prevent incidents and set an action plan to improve their environmental performance (ISO 14001: 2015).	Facilitates the integration of safety, quality and environmental management systems. This repository provides the company with concrete methods for their certification, namely: identifying industrial activities that have an impact on health and safety and consulting the relevant OSH laws. Define improvement objectives and develop a management program to achieve them, with frequent monitoring of progress. After conducting regular audits of the management system to test compliance with the requirements of ISO 45001 : 2018. To identify and evaluate the professional risks of the company, in order to preserve the health and safety of the personnel. To take into account the increasingly complex requirements (legal, regulatory, contractual, etc.), to promote social dialogue by creating the conditions for staff commitment in this project, to improve the policy of controlling risks and evolve company values on an ongoing basis (ISO 45001:2018).
General requirements	Chapter 4.1. The organization shall establish, document, implement and maintain a quality management system and	Chapter 4.1.Treaty of general requirements including management of SMSDA, communication and control of documents and records	Chapter 4.1. The organization must define and document the scope of its environmental management system	Chapter 4.1. Concerns the commitment of the company to respect the legislation in force. The policy must refer to employees' health and safety obligations. It must also be disseminated and

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	continuously improve efficiency in accordance with the requirements of the International Standard ISO 9001			periodically reviewed
Documentation requirements	Chapter 4.2. The documentation of the QMS must include: quality policy and quality objectives. A quality manual; documented procedures (control of documents, control of records, control of non-conformities, internal audit, corrective actions and preventive actions)	Chapter 4.2. The requirements of ISO 22000 are grouped into five chapters with the same number and sometimes the same title as that of ISO 9001: 2015; but with a content that differs widely and is adapted to the peculiarity of food safety management and the fundamental principles of this standard	Chapter 4.2: The organization must define the environmental policy and its environmental objectives. Planning (Chapter 4.3): The organization must plan a plan that controls the environmental aspects; legal requirements and other requirements and objectives, target and program.	Chapter 4.2: Addresses hazard identification, risk assessment and control. It involves putting procedures in place not only for all staff, but also for subcontractors and visitors. It is necessary to set up a proactive methodology, to classify the risks and to draw up adapted action plans. The information generated by the analyzes must serve, among other things, to develop objectives, analyze training needs and develop operational controls. The company must also put a procedure in place to identify applicable legal and regulatory requirements. This information must be communicated to employees and accessible to stakeholders
Management responsibility	Chapter 5. Includes the commitment of management; customer listening; political quality; planning, responsibility; authority and communication and the management review	Chapter 5. Regarding the commitment of the management which will result in a strong and concrete involvement on the ground. This commitment of management and its involvement is an important criterion for improving the performance of the company. This chapter presents management requirements in a dynamic cycle from food safety policy to communication and contingency response in emergency situations	Chapter 4.6. It has planned intervals, management at its highest level must review the organization's environmental management system to ensure that it is still appropriate sufficient and effective	Chapter 4.4. Implementation and operation: refers to the structure and responsibilities of the management and staff who manage, perform and verify activities impacting OHS. It requires commitment to improving OSH. The training, knowledge and verified skills of the staff are part of the requirement.
Resource Management	Chapter 6. Relates to the provision of human resources; financial; infrastructure and work environment	Chapter 6. Deals with the management of resources and the need to provide adequate human and material resources for the implementation, maintenance and updating of the food safety management system	Chapter 4.4. Implementation and operation: concerning resources, roles, responsibility and authority; competence, training and awareness; communication; documentation; operational control; emergency preparedness and response	Chapter 4.5. The documentation, data and control of these are also the concerns of ISO 45001. It is, of course, necessary to describe the key elements of the management system and to organize a document management system that goes from approval until archiving, through dissemination and proper updates of the documentation. Operational control involves identifying the operations and activities associated with the

				identified risks that require control. This part therefore includes maintenance activities, operational procedures and design stages, both in project and process engineering.
Product realization	Chapter 7. Pertains to product realization planning, customer processes; design and development of purchases, products and service preparation and control of surveillance and measurement provisions	Chapter 7. It is this chapter that makes the major difference between ISO 22000: 2018 and ISO 9001: 2015. The focus is on the need to plan and develop the processes necessary to achieve safe products. This chapter dynamically links prerequisite programs (PRPs) with the application phases of a HACCP approach as described by the Codex Alimentarius. Critical control measures are classified as operational PRP and as measures applied to CCPs. It also requires the company to establish a traceability system.	ND	Control and Corrective Action (Chapter 4.5): Advocates that the establishment define and maintain procedures to monitor and measure OHS performance on a regular basis. These quantitative and qualitative measures will be both proactive and reactive. They must relate to the achievement of objectives, compliance with various aspects such as the OHS management program or legislative and regulatory requirements..
Measure, analyze and improve	Chapter 8. Relates to monitoring and measurement; control of non-compliant product, data analysis, improvement	Validation, verification and improvement of the food safety management system (Chapter 8): this is the programming and implementation of the processes necessary for the validation, verification and improvement of the SMSDA to ensure that the results are in line with the objectives set for food safety. Emphasis is placed on the validation of control measures, the choice of monitoring methods and the calibration of measuring equipment to ensure the reliability of results. This chapter is also concerned with the verification of the SMSDA through the evaluation and analysis of audit results and the conduct of internal audits to ensure that the system remains relevant and also to update and improve it.	Control (Chapter 4.5): concerning monitoring and measurement; conformity assessment; non-compliance, corrective action and preventive action; control of records and internal audit	Chapter 4.6. At the highest level of the establishment, allows to review the entire management system OHS

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Discussion

A QMS includes the activities by which the organization identifies its objectives and determines the processes and resources needed to achieve the expected results. The QMS allows management to optimize application of resources taking into account the consequences of short-term and long-term decisions. It provides management with actions to address anticipated and unintended consequences in realizing the products and services (ISO 9001, 2015). It applies to any organization without considering its status, size, or sector of activity; whether it operates within a defined area (industrial site, activity zone, municipality, etc.) or in a not-defined area (providing services, building sites ...). The QMS aims to engage in a voluntary approach to improve management of its activities, products, or services and their impacts. Prevention and continuous improvement are among the basic principles of quality. In other words, quality is an endless project whose goal is to take into account malfunctions as far upstream as possible. Thus, management systems all respect a universally recognized principle represented by a cycle of actions, called "Deming Wheel" or "PDCA Cycle" (Bouaziz *et al.*, 2012, ISO 9001, 2015). This logic makes it possible to implement a continuous improvement of the integrated management system that leads to improved customer satisfaction, environmental performance, and/or health and safety performance. Each system is specific at the planning stage. Multiple elements developed in the other steps are common to all three systems. **Figure 1** shows a presentation of PDCA cycle dynamics.

Conclusion

These quality standards are for companies in the food and non-food chains that aim to build a global system for managing and monitoring the performance of their systems. If certifying quality is a challenge for some producers, a choice is required before embarking on the certification process: Should we certify a product or a company? Should we certify conformity and / or label? These two forms of certification, issued under separate procedures, are in fact complementary.

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Author Contributions

Tarnagda B, Karama BJP, Yaguibou AG, participated in the design of studies, and in the management of the project and the writing of the manuscript. Kaboré SSR, Zoungrana I. and Goungounga GC were involved in the acquisition of data, Tapsoba F, Ouattara-Sourabié PB, for data analysis and manuscript correction. Zongo C and Savadogo A had the main responsibility for the final content. All authors read the manuscript and finally checked it.

Conflict of interest

There is not conflict of interests.

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