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TITOLO TESI

EXPORT SUPPLY CHAIN ORGANIZATION AND FOOD SAFETY AND QUALITY STANDARDS : A CASE STUDY OF THE MOROCCAN FRUIT AND VEGETABLE SECTOR

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List of Abbreviations

AARC: Annual Average Rate Change (TVMA)
ACP: African, Caribbean and Pacific
AMFL : Annuaire Marocain de la Filière Fruits et Légumes
AMIGHA : Association Marocaine de l'Indication Géographique de l'Huile d'Argan
APEFEL : Association des Producteurs et Producteurs Exportateurs des Fruits et Légumes
AO: Appellation d'Origine
B2B: Business to Business
B2C: Business-to-Consumer
BO: Bulletin Officiel
BPA : Bonnes Pratiques Agricoles
BPF : Bonnes Pratiques de Fabrication
BPH : Bonnes Pratiques d'Hygiène
BRC : British Retail Consortium
BSE : Bovine Spongiform Encephalopathy
CAC: Codex Alimentarius Commission
CE : Commission Européenne
CEE : Communauté économique Européenne
CIPCARF : Commission Interministérielle Permanente pour le contrôle Alimentaire et la Répression des Fraudes
CIPV : Convention Internationale de la Protection des Végétaux
CMA : Comité Marocain d'Accréditation
CNCA : Comité National du Codex Alimentarius
CNSPS : Comité National-SPS
CSIQP : Conseil Supérieur Interministériel de la qualité et de la Productivité
CSNCA : Conseil Supérieur de Normalisation, de Certification et d'Accréditation
CTN : Comités Techniques de Normalisation
DCAE: Direction de la Coordination des Affaires Economiques
DELM: Direction de l'Epidémiologie et de la Lutte Contre les Maladies
DGCL: Direction Générales des Collectivités Locales
Dhs : Dirham
DIP : Direction des Industries de la Pêche Maritime
DMO : Modern Organized Distribution (Distribution Moderne Organisée)
DNPQ : Direction de la Normalisation et de la Promotion de la Qualité
DPEC : Direction de la Politique des Echanges Commerciaux
DPI : Direction de la Production Industrielle
DPVCTRF : Direction de la Protection des Végétaux Contrôle Technique et de la Répression des Fraudes
DRCI : Direction des Relations Commerciales Internationales
DSS : Direction de la Stratégie et des Statistiques
EACCE: Etablissement Autonome de Contrôle et de Coordination des Exportation
ESB: Encéphalopathie Spongiforme Bovine
FAO: Food and Agriculture Organization
FSS: Food Safety Standard
GATT: General Agreement on Tariffs and Trade
GCC: Global Commodity Chain

GDP: Gross Domestic Product
GFSI: Global Food Safety Initiative
GLOBALGAP: Global-retailer Produce Working Group-Good Agricultural Practice
GNO: Unorganized Wholesalers (Grossiste Non Organisés)
GTZ : Gesellschaft für Technische Zusammenarbeit (Société Allemande de Coopération Technique)
GVC : Global Value Chain
Ha : Hectare
HACCP: Hazard Analysis and Critical Control Points
HVAF: High Value Agricultural and Food
IAVH II: Institut Agronomique Vétérinaire Hassan II
IFS : International Food Standard
IG: Indication Géographique
IMANOR : Institut Marocain de Normalisation
INH: Institut National d'Hygiène
INRH: Institut National de Recherche Halieutique
ISO: International Organization for Standardization
KAS: Kingdom of Arab Saoudit
LA: Label Agricole
LMR: Limite Maximale de Résidus (MLR)
LNCMV : Laboratoire National de Contrôle des Médicaments Vétérinaires
LOARC: Laboratoire Officielle d'Analyse et Recherche Chimique
LRARV : Laboratoires Régionales d'Analyse et de Recherche Vétérinaires
LSI : Large Scale Irrigation
MAEC/DCM : Ministère des Affaires Etrangères et de la Coopération/ direction de la coopération multilatérale
MAEG: Ministère des Affaires Economiques et Générales
MAPM: Ministère de l'Agriculture et des Pêches Maritimes
NAFTA: North American Free Trade Agreement (ALENA)
NGO: Non Governmental Organization
NM: Norme Marocaine
NVP: Norme Volontaire Privée
NTB : Non-Tariff Barrier
OGM: Organismes Génétiquement Modifiés
OIE : Office International des Epizooties
OMC: Organisation Mondiale du Commerce (WTO)
OMS: Organisation Mondiale de la Santé (World Health Organization « WHO »)
ONSSA : Office Nationale de Sécurité Sanitaire des Produits Alimentaires
ONU : Organisation des Nations Unies
ORIGLN: Organization for International Geographical Indication Network
OTC : Obstacles Techniques au Commerce (TBT)
PAQIA : Programme d'Amélioration de la Qualité des Intrants Agricoles
PGQ : Programme de Gestion de la Qualité
PIAQ : Programme Intégré d'Amélioration de la Qualité
PIP : Programme Initiative Pesticide
PS : Private Standard
PVD : Pays en Voie de Développement (DCs)
R&D : Research and Develpment
SAU: Superficie Agricole Utile

SCM: Supply Chain Management
SDOQ : Signe Distinctif d'Origine et de la Qualité
SIAA : Système d'Information, d'Analyses et d'Alerte
SITC: Standard International Trade Classification
SME: Small and Medium Enterprise (SMF)
SMSI: Small and Medium Scale Irrigation
SNIMA : Service de Normalisation Industrielle Marocain
SPS : Sanitaire et Phytosanitaire
T : Tons
TCE : Transaction Cost Economics
TNC: Tesco Nature's Choice
UE : Union Européenne
UEA: United Emirates Arab
UK: United Kingdom
US$: United State Dollar
VC: Value Chain

General introduction

Agri-food supply chains extend beyond national boundaries, partially facilitated by a policy environment that encourages more liberal international trade. Rising concentration within the downstream sector has driven a shift towards "buyer-driven" global value chains (GVCs) extending internationally with global sourcing and the emergence of multinational key economic players that compete with increase emphasis on product quality attributes.

Alongside these trends in international agri-food market, recent food scares have raised consumers' concerns about the quality and safety of foods. As a result, public food safety regulation has been tightened, reflected in the greater incidence of Sanitary and Phytosanitary (SPS) measures across WTO Member countries. In addition, a plethora of private standards has emerged that operate alongside the regulatory system especially implemented by large food retailers, manufacturers and service operators, reflecting both their large market power and quality-based competitive strategies.

Agri-food systems are thus increasingly governed by a range of inter-related public and private standards, both of which are becoming *a priori* mandatory, especially in supply chains for high-value and quality-differentiated agri-food products and tend to strongly affect upstream agricultural practices, firms' internal organization and strategic behaviour and to shape the food chain organization.

Notably, increasing attention has been given to the impact of SPS measures on agri-food trade and notably on developing countries' export performance. Food and agricultural trade is the vital link in the mutual dependency of the global trade system and developing countries. Hence, developing countries derive a substantial portion of their income from food and agricultural trade. In Morocco, fruit and vegetable (especially fresh) are the primary agricultural export. Because of the labor intensity, this sector (especially citrus and tomato) is particularly important in terms of income and employment generation, especially for the female laborers hired in the farms and packing houses. Hence, the emergence of agricultural and agrifood product safety issues and the subsequent tightening of market requirements have challenged mutual gains due to the lack of technical and financial capacities of most developing countries.

Indeed, it is widely recognized that SPS regulations may significantly restrict exports from developing countries. Exacerbated by developing countries' structural inefficiencies,

compliance costs (human and capital investments, infrastructures, equipments, labour skills, etc.) significantly affect firms' profits and export volumes and may cause (especially small-sized operators') exclusion from the international market. In this sense, food safety standards are often pointed out as non-tariff barriers that may significantly hinder trade. However, empirical evidence on DCs' insertion in high-value chains is controversial with recent research suggesting a more nuanced picture by showing gains experienced by operators supplying high value supply chains. The heterogeneity of standards across countries and market segments seems to reflect differences in public standards and in buyers' strategies (lead firms and key intermediaries) according to differences in private standards. A relationship seems to exist between the prevailing mode for food safety governance and the type of Global Value Chain (GVC), whereby buyer-driven GVCs are mainly based on retail-led private standards coexist with traditional wholesale market transactions mainly based on public minimum quality requirements. How value chains are organized and function is essential for understanding how producers can access (global) markets and what the benefits might be. The strategies of 'global buyers' (retailers, manufactures, key intermediaries, etc.) and their role in shaping value chain typologies have to be carefully taken into account.

In this context, several studies illustrate the effects of supply chain organization on export supply chain performance and take the case of Morocco as a successful example (Hellin et al., 2009; Garcia Martinez and Poole, 2004). Morocco fruit and vegetable export supply chain is often taken as a example of successful integration in European high-added value supply chains characterized by strict public regulations and private standards. Moroccan export infrastructure and procedures show a degree of collaboration and vertical integration, which has facilitated the international success in the EU market. As for horizontal coordination, both producers and exporters are organized in cooperatives and exporting groups or exporters associations. Furthermore, suppliers and exporters, who operate in a highly coordinated supply chain, are likely to be supported by importers in the implementation of standards.

Other conditions seem to facilitate the access of Morocco's fruit and vegetable exports to the international market. Citrus and tomato have benefited from an array of favorable conditions that explain their long-term growth, including European consumer interest for fresh produce all year-round, producers' capacity to transfer and adopt new technologies, preferential treatment in Morocco's access to EU market, consistent macroeconomic

management, proximity and insertion in international cold logistics, and labor availability and favorable climatic conditions.

Moreover, given the advanced status of Morocco in European Union commission, his still making the depth changes in the food safety control system for agri-food products and, especially, for fruit and vegetables. So, at the local level, norms like the PCI/PIAQ (which includes the references of HACCP, Codex, Hygiene Pack,..), Law n° 28-07 regarding Sanitary and Phyto-sanitary, Law n° 13-83 regarding fraud food suppression, Law n° 12-06 regarding standardization, certification and accreditation, and the public norms like ISO, SPS, HACCP was developed.

Several factors are thus likely to have an influence of market access capacity and export supply chain performance: the regulatory environment of the target countries, which determines the market access constraints (norms, standards, control and inspection systems), the legislation, enforcement, and monitoring systems at the domestic level, in addition to the measures implemented to support exporters' compliance process, and the supply chain structure and organization, which partially results from the strategies of both downstream and upstream players.

Given these premises, and to investigate the Morocco export supply chain organization and to carry out this work, we used a 'Global Value Chain' approach that can allow us to better understand the functioning of Morocco fruit and vegetable export supply chain. The work is organized as follow:

Chapter 1 provides a general description and analysis of the "Global value chain governance and agrifood safety standards with special emphasis on the Global Value Chains approach (buyer-driven versus producer-driven value chains), GVCs and agrifood safety norms and standards, heterogeneity of norms/standards and heterogeneity of GVCs and food safety and the impact on the export from developing countries (DCs).

Chapter 2 contains an analysis of several aspects of quality systems and, in particular, the comparative analysis of quality systems in force in the EU and in Morocco, with particular attention to the public policies and private food safety and quality standards in the agrifood sector. Hence, it provides a description of the main institutions involved in the standardization initiatives, support/ accompaniment measures undertaken at the local level (Morocco) to facilitate the compliance process for local actors (producers-exporters, exporters) in meeting target market requirements.

Chapter 3 presents a general analysis of the fruit and vegetable export sector in Morocco, with special emphasis on tomatoes and citrus. The chapter describes the contribution of the sector to overall export, and production, trade supply chain structure, and specific market access.

Chapter 4 explains the methodology used through the survey directed to main operators involved in the field of fruit and vegetable in Morocco.

Chapter 5 contains the analysis of the data collected through a direct survey conducted in Morocco from the producers/exporters and institutions involved in the export sector. The analysis focused on the production of fruits and vegetables, management of logistic and cold chains, exports, structure and export supply chain organization and food quality and safety norms and standards and global market access.

Chapter 6 contains the analysis of the main results through the definition of a set of variables: typologies of actors and type of food safety standards, compliance costs and benefits and types of export supply chain actors, compliance costs and benefits and types of export supply chain actors, and downstream relations, compliance costs and benefits and types of export supply chain actors and upstream relations.

1 Global value chain governance and agri-food safety standards: the main economic issues.

1.1 Introduction

Throughout the past several decades, the world economy has changed in significant ways, especially in the areas of international trade and industrial organization. The structure of the industry (number of firms, their market shares, the relative ease of entering and leaving markets, etc.) was related to conduct of the firms (long-term strategies, pricing policies, investments in R&D, advertising policies, etc.) that, in turn, would define Performance (technical efficiency, social welfare and efficiency in resource allocation) (FAO, 2007).

Recent food scares have raised increasing concerns about quality and safety of agri-food products for both public authorities and food supply chain private actors, especially in developed countries. The concerns and consciousness have opened the way for deep changes in national and international regulations (European legislation for example that developed measures for production/processing practices improvement and LMR in agri-food products). More recently, standards required by private agents (as like retailers, large agri-food companies, etc.) in developed countries have been implemented, especially in the context of buyer-supplier relationships as for example GlobalGap (Global Retailer Produce Working Group Good Agricultural Practices), IFS (International Food Standard), etc. These standards rely on particularly strict rules concerning infrastructures, equipments and production processes (Valceschini et al. 2005; Hammoudi et al., 2009) and often 'go beyond' public regulations (Giraud-Héraud et al. 2012, Fulponi *et al.* 2006). Furthermore, a series of norms, quality assurance schemes, and quality management systems, with a third party certification (HACCP, ISO, etc.) have developed as *de facto* constraints in international trade. The net effect of the above changes is that contemporary agri-food systems are increasingly governed not only by public regulations and private standards, but also by public and private modes of

enforcement (Jaffee et al. 2011). Regulations reinforcement and private standards development and spread may significantly hinder developing countries' export performance.

Hence, the rising power of private standards and their 'de facto mandatory' nature have increased compliance difficulties for certain categories of producers, especially in Developing Countries (DC), and may generate a reduction of marketed volumes or the exclusion (especially of smallholder farmers) from the most safety-discerning and lucrative markets (Okello et al. 2011). In general, compliance with norms/standards implies both variable and fixed costs, and thus considerably increases exports costs for producers/exporters that want to comply. Moreover, compliance costs include not only those related to production process upgrading and certification, especially when private standards are concerned, but also those associated with compliance maintenance and certification renewal in the long-term (PIP, 2009). Furthermore, the norms/standards heterogeneity among industrialized countries implies additional costs for producers or companies that want to diversify export markets.

Moreover, food safety and quality requirements tends to vary by country according to differences in public standards and by buyers (lead firms and key intermediaries) within a country according to differences in private standards, which reflect their market positioning strategy and risk adversity (OCDE, 2007, p.17). More precisely, a relationship seems to exist between agrifood standards and Global Value Chain (GVC) typology (Lee et al. 2010), whereby buyer-driven GVCs mainly based on retail-led private standards coexist with traditional wholesale market transactions mainly based on public minimum quality requirements. Hence, international competition is likely to be increasingly among GVCs rather than among production systems. Therefore, analyzing how value chains function is essential for understanding how producers can access (global) markets, what the benefits might be (Gereffi, 2011, p.40), the effects of food safety standards on Economies, and namely on the competitiveness of producers faced to sanitary constraints (Grazia and Hammoudi 2012). The strategies of 'global buyers' (retailers, manufactures, key intermediaries, etc.) and their role in shaping value chain typologies have to be carefully taken into account (Kalaitzis et al., 2007; Rouvière et al., 2010).

This chapter is organized as follow, the first part regard an overview on value chain approaches. The importance will give to the 'typologies of GVCs', especially these so-called 'buyer-driven chains' and 'producer-driven chains'. The scope is to distinguish at which level the power-full in value chain is localized. In a second time, our subject is to make in evidence the relation nature between the GVCs and 'agri-food standards', with a particular attention on

the ‘private agri-food standards’, especially the so-called buyer-driven chains and ‘private standards’.

The second part takes attention on the analyzing of the ‘heterogeneity of norms/standards’ at the international level. Also, their impact on global value chains organization: ‘market/segment of market’ destination focusing on empirical evidences.

In the third part, we will discuss about the impact of ‘norms/standards’ on ‘developing countries market access’. Given the heterogeneity of norms/standards, we will point out the effects of norms/standards heterogeneity (positive or negative effect) and the exclusion effects, especially on small producers and/or exporters.

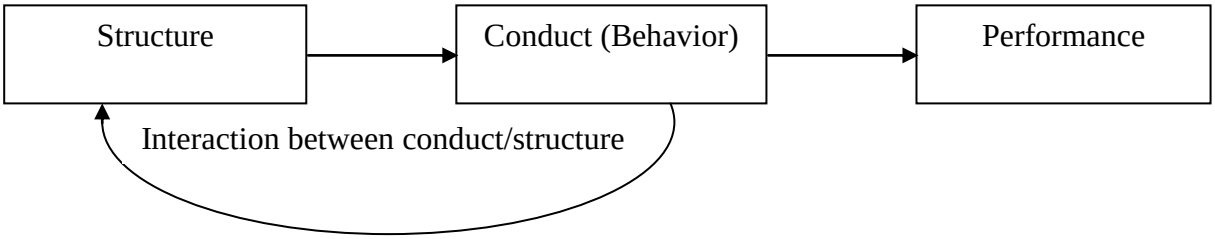
Finally, we will provide some concluding remarks on which food safety regulatory tools may facilitate the access of DCs to global markets.

1.2 An overview on Value Chain (VC) research

1.2.1 Historical overview

Throughout the past decades, the world economy has changed in significant ways, especially in the areas of international trade and industrial organization. The structure of the industry (number of firms, their market shares, the relative ease of entering and leaving markets, etc.) was related to conduct of the firms (long-term strategies, pricing policies, investments in R&D, advertising policies, etc.) that, in turn, would define Performance (technical efficiency, social welfare and efficiency in resource allocation) (FAO, 2007). In this context, Bain sought to analyze the possible relationship between the structure of industry and performance through a variety of empirical works based on a number of structural variables. Bain identified three types of entry barriers into an industry, which are (i) absolute cost advantage for an existing business, (ii) a significant level of product differentiation and, (iii) the economies of scale (Pankaj Ghemawat, 2007; OECD, 2005;). The Bain’s idea was to identify factors, in terms of structure, that allow an industry to achieve higher performance comparing to others. Thus, the paradigm of *“Structure-Conduct-Performance”* (S-C-P) offered a reference model for the investigation of economic sectors. This Paradigm involves the observation of each business sector of the firm (see figure 1).

Figure 1: Structure-Conduct-Performance Paradigm



Subsequently, Porter came to study the structure of the sector and business strategy. In the Porter analysis, the original idea of "value chain" is clearly present. Porter proposed the chain paradigm as a construct to relate the activities performed by one organization to its competitive position. In this chain paradigm, firms can be organized into primary activities that include inbound logistics, operations, marketing and sales, and services. Support activities, also performed by firms, include procurements, technology development, human resources management and infrastructures. This chain paradigm (or value chain) is the systematic arrangement of these activities that creates value and influences the competitive position of the firm.

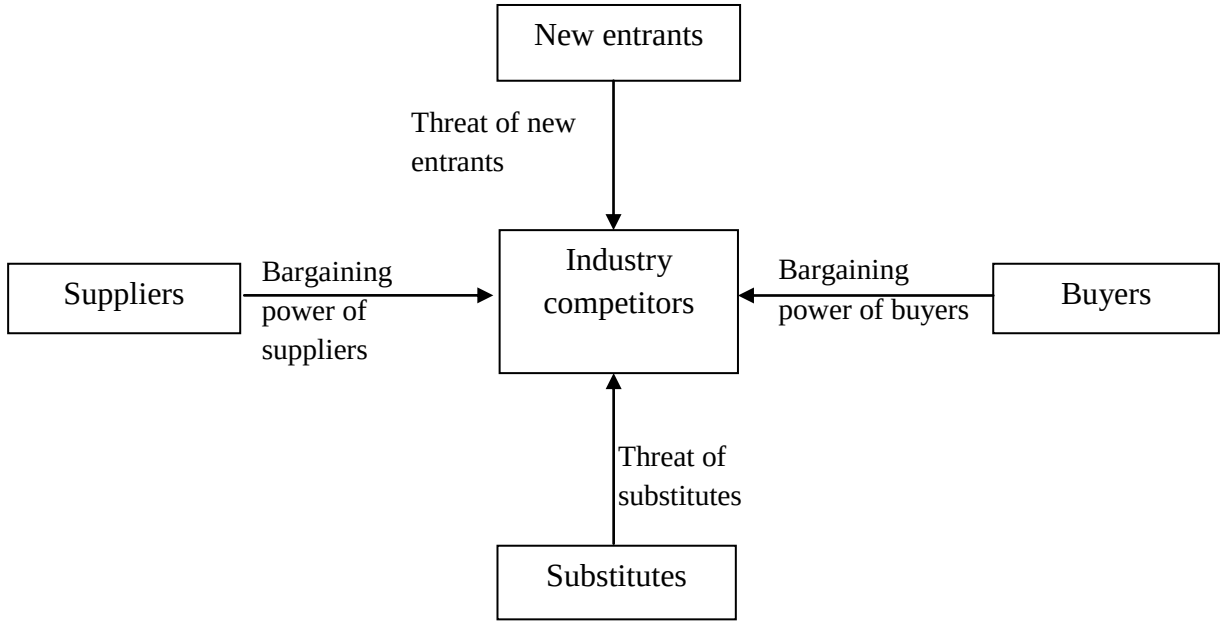
In the spirit of Porter, the analysis of the value chain of the company allows a classification of the organization according to nine macro-processes. Five of these macro-processes are the primary or core business for the company that directly contribute to the formation of added value (internal or external logistics, production, sales and marketing, after sales services), while four of them contribute in an indirect way (infrastructures, human resources, technology and procurement).

The objective of the analysis of the VC is to understand how to gain a competitive advantage. In other words, the aim is to distinguish the activities that generate higher value. The strategy is then to invest (in the general case) for the development of this competitive advantage. The margin of competitiveness that a company achieves may thus be determined by ensuring critical activities in terms of value with the concentration of resources necessary to carry out these activities effectively along the channel among competitors (best price, best quality, and time) or by providing other advantages absent in competing firms.

This approach serves, on the one hand, to categorize and analyze the various processes and, secondly, to select priority processes. It can also be used to analyze a particular process and identify improvements that can be made to its internodes (interlinks).

First, Porter emptied the importance of a strong rise of the existence of many competitors, who are in any way consistent with others. Second, in a vertical dimension, Porter gives his attention to two types of channels: chain with two stages (producers/buyers) and chain with three stages (producers, buyers and rivals or existing competitors) (Porter, 1980 & 1986; Pankaj Ghemawat, 2007). The Porter's model, defined five fundamental factors that determine the competitiveness intensity (see figure 2).

Figure 2: the five competitiveness factors.



Source: Porter, 1980; Pankaj Ghemawat, 2007

However, over the last two decades, the phenomenon of globalization has given rise to a new era of international competition (global organization of industries). It clear that these five factors are new entrant, threat substitutions, power of buyers (customers), power of suppliers and rivalry between the existing competitors (Porter, 1980 & 1986; Pankaj Ghemawat, 2007).

Indeed, following given the globalization of industries and the internationalization of markets, this model seems to be insufficient to for an exhaustive analysis of the sector. Indeed, markets and industries are globalizing and several modes of chain governance emerge (Gereffi et al. 1994). These elements are neglected in the S-C-P model. In this context, the "Porterian" value chain concept and, more recently, the "global value chain" concept developed by Gereffi (Gereffi et al. 1994) come to fill the gaps left by the S-C-P paradigm.

The presentation below is mainly based on three conceptual approaches: global commodity chain approach, global production (or supplier) network concept and global value chain approach.

While the following concepts overlap and build on each other, we decided to discuss each of them separately. We focus on the various elements of the approaches referred to in the literature reviewed.

a. ***Global commodity chains:*** The notion of "Global Commodity Chain» was originally introduced by Hopkins and Wallenstein (1986). Hence, the "*Commodity Chain and Global Capitalism"* book published in the early 1990s by Gereffi and Korzeniewicz has presented an approach as an analysis of *"Commodity Chains"* (Gereffi et al. 1994; Riedel, 2009) as a coherent paradigm. It is developed originally to analyze manufacturing. Later, this concept has been widely used to analyze trade in commodities and non-manufactured goods. Gereffi introduced three key dimensions of commodity chains. The first one is the input-output structure and geographical coverage, secondly their form of governance, and thirdly their institutional framework. The innovative core of the approach by Gereffi consists in (i) accentuating the international nature and territoriality of value chains demanding coordination of activities over long distances and across borders, (ii) emphasizing the issues of power relations and coordination in inter-firm networks, and (iii) introducing the notion of "producer-driven" and "buyer-driven" chains.
b. ***Global production networks:*** Several studies use the notion of "Global Production or Supply Networks", pointing out that production takes place in networks that are situation specific, locally integrated and socially embedded (instead of dyadic interactions between buyers and suppliers). Networks need a high degree of governance and coordination of activities and acknowledge the role or private standards in this context. In this framework, Raynolds builds on Gereffi's Commodity chain paradigm and develops a "Commodity Network Approach". This approach analyzes how individual and social actors build, maintain and transform commodity networks. Hence, Reynolds's approach offers a framework to analyze network organization, patterns of coordination and quality assessment through complementing traditional commercial and industrial conventions with a concept of alternative domestic and public conventions (trust, equality, social and environmental responsibility, collective effort, and social wide benefits). This approach maintains the analytical focus on governance

issues. It applies a less structuralist view on the commodity chain drawing from network analysis and conventions approaches. Therefore, Raynolds gives a definition to governance as "the relations through which key or lead actors create, maintain and potentially transform network activities". This approach highlights how social, political and economic operators influence practices across commodity networks.

c. ***Global value chains:*** the global value chain is focused on value adding activities and aims at analyzing profitability factors within a firm. Originally, Porter applied the value chain concept to activities internal to an organization. Hence, it was used to analyze competitive advantages in inter-organizational collaboration. The concept of 'Global value chain' was introduced and developed by Gereffi in the middle of 1990s (Gereffi et al. 1994; Gereffi et al 2005). Referring to this historical evolution, since 1990s, 'Global Commodity Chains' linked the value added chain concept directly to the industry organization. By contrast – in the middle of 1990s – the GVCs allowed to update unexplored mechanisms in companies that have reorganized production processes to global economy. Also, both "GCC" framework and "GVC" analyses highlight the international expansion and geographic fragmentation of contemporary production network and focus above all on the issues of industry (re)-organization, coordination governance and power in the chains (Gereffi, 2011). Consequently, the "GCC" and "GVC" allow understanding the organizational reconfiguration taking place in global industries and its consequences. "GVC" analysis draws inspiration not only from its GCC predecessor, but also from the distinct tradition of transaction cost economics with the aim to create a coherent and unique paradigm to study global value chains (Riedel, 2009). The most recent approach of GVC analysis has its origins in an interdisciplinary initiative of researchers, who examined different approaches to the study of value chains and *Global Production Networks* (Gereffi, 2011; Riedel, 2009). This approach is a methodological tool that analyzes global trends, studies the organization of international markets (more in general the global economy), and the power relations between the various industry players in these global markets. As a whole, the *theory of global value chain* is based on the process of value creation in the sectors by identifying four dimensions (Tozanli S et al. 2007; Gereffi et al 2005; Rastoin et al. 2005):

   – The first dimension focuses on the technical-economic component, which includes the sequence of activities undertaken from the design stage to the marketing of the product and its performance, inter-and intra-industry (production / marketing).

- The second dimension determines the territorial space, in which the supply chain stage is localized (regional, national, international). This geographical area varies according to the dispersion or concentration of activities. This variability is directly related to the type of value chains observed.

- The third dimension is the socio-institutional system, in which the supply chain is expected to operate, focuses on regulations, standards and public policies that govern and influence the activity of firms at international or macro-regional level.

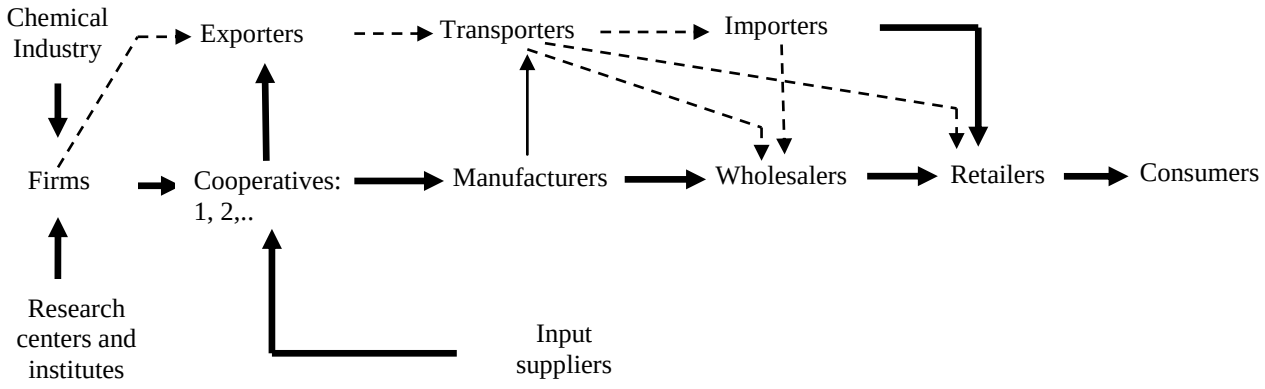
- Finally, the fourth dimension is the system of governance (nature of power and strategies of the actors that constitute the sector). This dimension is critical to understand the organization and the structure of product flows, the territorial and the socio-institutional extent of the chain..

This approach highlights the weight of hierarchical relationships in the analysis of value chains. In most cases, these chains are characterized by a "pilot" that dominates the rest of the chain. This is a strategic leader that defines and imposes (more or less powerfully) to other chain actor's production conditions and upgrading, in terms of price, quantity and quality. The location of this strategic link in the chain induces a particular form of governance or "steering". Frequently, two main forms are found (FAO, 2005):

- Agri-food chains are often driven by the downstream, or controlled by buyers ("buyer driven"). This strategic link corresponds to the example of retailers and international traders;
- Industrial chains are rather driven by the upstream ("producer driven") and dependent on technological innovations (see the global value chain typologies).

Before exploring these global value chain typologies, we define the global value chain approaches, theirs scopes, and the governance in GVCs.

Figure 3: A schematic representation of the agri-food supply chain



Source : Matopoulos et al. 2007

1.2.2 The global value chain concept

Supply chain definitions are multiple. The classic one defines the chain as a set of components and a network of functional relationships, which work together to reach an objective (FAO, 2007). Its includes also the *"rules of game"* – as laws, regulations, policies and other institutional elements – as well as the support services, which constitute the environment, where all activities take place. Economists have long been concerned with the ways in which individual sectors are organized and perform. Hence, "*industrial organization"* has offered the theoretical and analytical framework that inspired much of the early Harvard School works developed by Bain, Mason, Stigler, etc; (E. Lahcen, 2010; J-L. Rastoin et al, 2005). Since this period, the industrial economy was dominated by empirical approaches. Hence, in its modern acceptance, the FAO use the term of *"Value Chain»* to characterize a system composed by different actors, activities and institutions which functioning inter-related to accomplish a common goal (FAO, 2007). In other terms, chains can be seen as sets of interrelated activities that are typically organized as sequences of stages.

For Porter, the creation of added value to product(s) and / or service(s) occurs at each interface within the chain, so that the value is created at the nodes (links) or intersections of the complex "*Customer-Product-Process"*. This value represents an optimum balance between meeting customer needs, on the one hand, and the costs associated with product / service, on the other hand.

Natasha defines the value chain within the context of *"Supply Chain Management"* (SCM) as the linkages in the chain from primary producer to final consumer with incentive of reducing the *transaction costs* incurred within (Natasha, 1996).

Tozanli defines the concept of *"Global Value Chain"* (GVC) as an *inter-organizational network* built around a product and linking households and businesses within the States in the world economy (Tozanli S. et al. 2007).

For Gereffi, the "GVC" encompasses all the *possible activities of a chain* from the product design to the final product (Gereffi et al. 2005; Kuper et al. 2007).

Riedel (2009) has defined the value chain as a *socioeconomic system* that includes firms producing a set of interdependent activities to bring a product from conception to consumption with the creation of added value.

Given these premises, the value chain analysis seeks to *characterize how chain activities are performed and to understand how value is created and shared among chain participants*. It aims also at evaluating the *performance* of the chain and at identifying, if there are any *barriers* for the chain development. Thus, the "GVC" scope of analysis is to understand how to gain a *competitive advantage*. In other words, distinguishing the activity that generates more *value added*. The margin of *competitiveness* that a company achieves may thus be determined by ensuring critical activities in terms of value with the *concentration* of necessary resources to carry out these activities effectively along the channel among *competitors* (best price, best quality, and time) or by providing other advantages that are absent in competing firms.

This approach serves, on the one hand, to categorize and analyze the various processes and, secondly, to select priority processes. As it can also be used to analyze a particular process and identify improvements that can be made to its *internodes* (intersections).

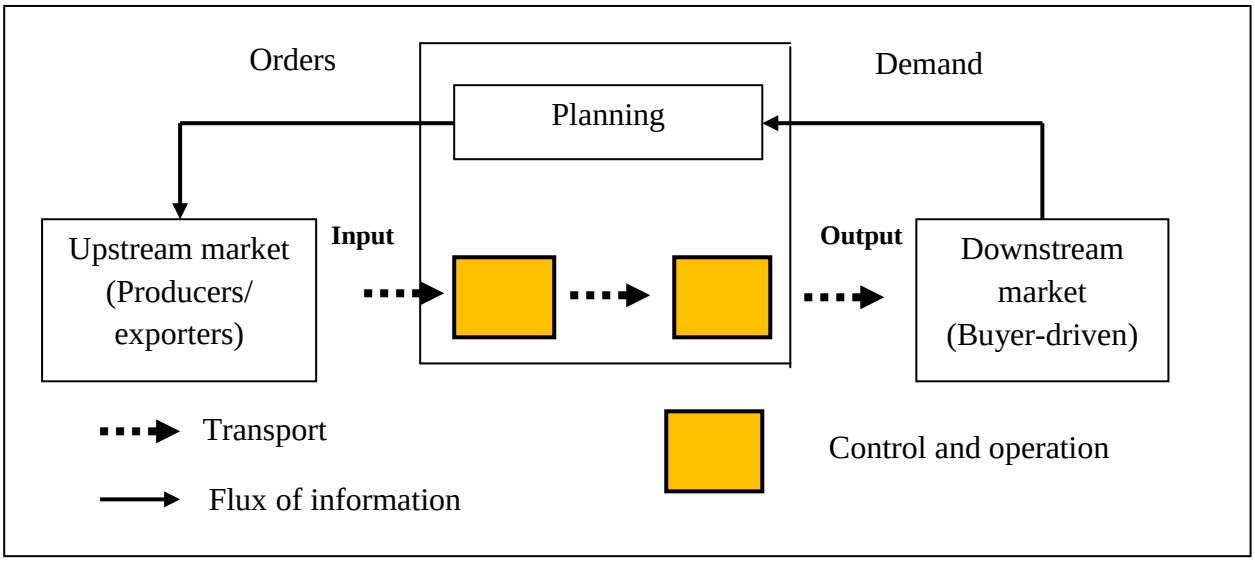
Finally, the access to *global markets* has increasingly become more dependent on the inclusion in *global networks* led by firms based in developed countries. Understanding how value chains function is essential for analyzing how firms in *developing countries* can gain access to *global markets*, what the benefits from such access might be, and how these benefits might be increased (Gereffi, 2011).

1.2.3 The global value chain typologies: buyer-driven versus producer-driven GVCs

As noted above, two main forms of "GVCs" seems to emerge at international level according to the strategic leader of the GVC: *buyer-driven* and *producer-driven value chains* (Gereffi, 2003; Gereffi 2011; Gereffi and Lee 2009 ;). In both cases, the strategic link corresponds to a leading firm that governs the rest of chain, defines and imposes its production conditions/requirements, in terms of price, quantity and quality on the other chain actors. The localization of this strategic link in the value chain induces a particular mode of governance or "piloting". Let us now detail the main characteristics of these two modes of governances.

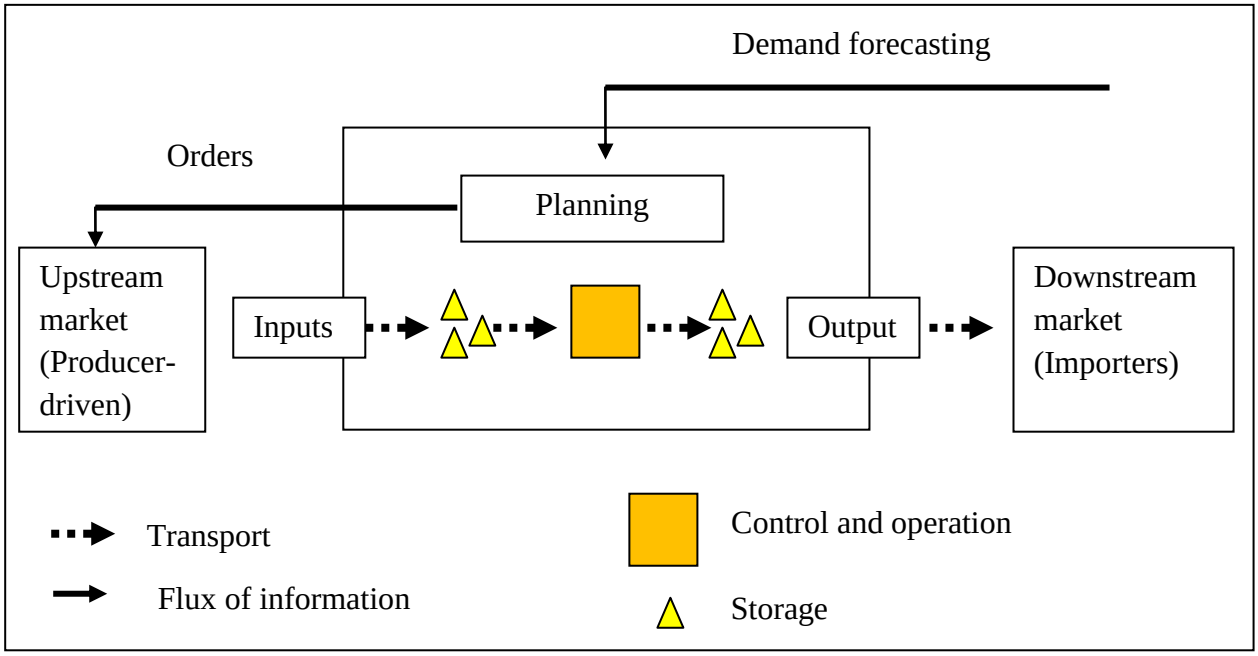
- Buyer-driven chains. This mode of governance frequently characterizes agrifood chains, where the downstream "pilot" is usually identified in supermarkets, international traders or large processing companies.

Figure 4-a: A model of control by pull/Buyer-driven chains (Downstream)



- Producer-driven chain. Here, the "pilot" of the chain is localized upstream.

Figure 4-b: A model of control by push/Producer-driven chains (Upstream)



As indicated by Gereffi, in the global value chain, the power is the ability of a firm or an organization to make or shape strategic decisions that affect the configuration and direction of the value chain and thus influence and control other firms in the chain (Gereffi, 2011). This form of power defines the governance in the "GVCs". The power can reside at any part of value chain and takes many forms.

1.2.3.1 Buyer-driven value chains « GVCs »

In *buyer-driven chains*, retailers or marketers and branded manufacturers play the pivotal roles in setting un-decentralized production network in a variety of exporting countries, typically located in developing countries. In this case, the *lead firms* (Gereffi, 1994; Humphrey and Schmitz, 2003; Humphrey and Schmitz, 2001) exert the most power through their ability to shape mass consumption via strong brand names. As example, buyer-driven chains tend to provide more opportunities to their suppliers for product and process upgrading because the core competence of the buyers is marketing, and the suppliers are responsible for implementing and sometimes refining the specifications issued by the buyers. A good example of these global value chain typologies is given by the fresh fruits and vegetables sector. In the fact, the key parameters in the buyer-driven chain are set by retailers and brand-name firms who focus on design and marketing, not necessarily possessing any production facilities (Humphrey and Schmitz, 2001).

1.2.3.2 Producer-driven value chains

In *producer-driven chains*, power is held by final-product manufactures, such chains include capital, technology – or skill – intensive industries (Gereffi, 1994; Humphrey & Schmitz, 2003; Humphrey & Schmitz, 2001). In other terms, the key parameters are set by firms which control key product and process technologies. In these types of global value chains, usually transnational, manufacturers play the central role in coordinating production network (include capital, technology – intensive industries). As an example for these GVC typologies, several authors cited automobiles; aircraft, computers, semiconductors and heavy machinery (see for example Gereffi, 2001).

Both buyer-driven value chains and producer-value chains are governed by the lead firms. In this section we will try to understand what does it means the *governance* in the global value chains? Why we need the governance in the GVCs? And which forms of governance we can adopt?

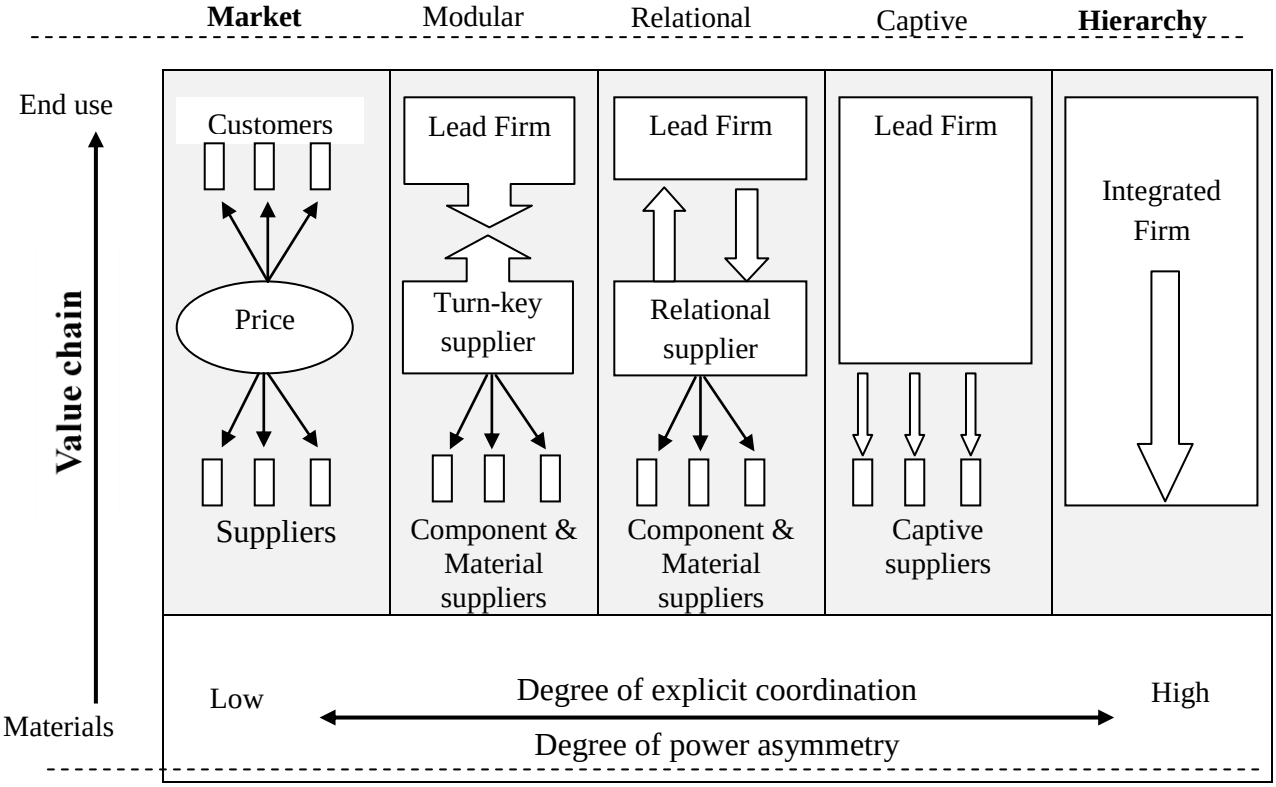
1.2.4 Governance and upgrading in GVCs

The global value chain research mainly focuses on two niches: governance and upgrading. Thereby, governance in global value chains has something to do with the exercise of control along the chain. The definition of 'governance' is firstly introduced by Gereffi (1994), defined as "authority and power relationship that determine how financial, material, and human resources are allocated and follow within a chain" (Z. Sun et al. 2009). Hence, according to Humphrey, governance in "GVC" occurs when one firm follows parameters set and enforced (through monitoring and sanctions) by another (product design and specifications, process specification and production scheduling logistics) (Humphrey, 2005). For Jaffee et al. (2011), *"governance in global value chains is defined as process of defining, communicating and imposing compliance with process and product parameters along the VCs"*. To better explain the governance of "GVC" Gereffi et al, introduced the *Transaction Cost Economics* theory (TCE), *production network by aggregation* of producers within associations and *technological capacity* (Gereffi, Humphrey & Sturgeon, 2005). The same authors identified three variables for better understanding the governance (management of power and control) of "GVC". These variables can be used to evaluate the governance of "GVC" are (i) *complexity of information* and transfer of knowledge needed to support a particular transaction, with respect for the product and process specifications (complexity of transactions), (ii) *codification of information* and knowledge to be transmitted efficiently

without specific investment transaction between the parties and the transactions (ability to codify transactions) and, (iii) ability of suppliers for procurement with the requirements of the transaction to achieve (capability in the supply-base) (Gereffi, 2011; Gereffi, Humphrey & Sturgeon, 2005).

Furthermore, the global economy can change, and the form of governance in the global value chains can changes also as an industry evolves and matures, and therefore patterns within an industry can vary from one stage or level of the chain to another. From this perspective, a global value chain theory has been posited that accounts for the five types of GVC governance, each of which provides a compromise between benefits and risks of sourcing (Gereffi, 2011; Tozanli S. et al. 2007; Gereffi, Humphrey & Sturgeon, 2005). Besides the two classical forms of coordination which are governance by the market and vertical integration (hierarchy), there are three other modes that depend on power relations that bind the principal agent in the chain and other stakeholders.

Figure 5. The five Types of GVCs Governance.



Source: Gereffi, 2005

- ***Market structure***: in this case, the governance involves the relative simple transactions. The information on product specifications is easily transmitted, and suppliers can craft products with minimal input from buyers. In this mode of governance also, these arm's-length exchanges necessitate little or no formal cooperation between actors, and cost of switching to new partners is low for both producers and buyers. Then the core governance in this mode is price rather than a powerful lead firm.
- ***Modular value chain:*** in this mode of governance the complex transactions are relatively easy to codify. The client sets the standards and requires specific product characteristics, while providers have any responsibility for the use of technology production and support costs expended to meet the needs of their customers. At this level, the degree of asymmetry in the balance of power remains relatively low, and both producers and buyers will opt to work with several partners. In the fact, information technology and standards for exchanging information are both key to the functioning of modular governance.
- ***Relational value chain:*** at this level, relationships between customers and suppliers are becoming increasingly complex. This mode of governance is characterized most often by a strong mutual dependence given the assets' specificity. Spatial and social proximity can play an important role in defining the relationship between suppliers and buyers.
- ***Captive value chain:*** in these chains, the power is directly exercised by the main actor denoted "key player" on all small suppliers. The result is that of a a high degree of explicit coordination and a strong power asymmetry between the leading firm and its suppliers. Control and coordination are completely exerted by the leading firm. In this case, leadership is required to ensure a fair treatment to suppliers and a fair value sharing among supply chain participants.
- ***Hierarchy value chain:*** this mode of chain governance is characterized by full vertical integration and managerial control within the leading firm that develops and manufactures products in-house ('transactions' take place inside a single firm). These chains are observed when products specifications cannot be codified, products are highly complex or competent suppliers cannot be found. This form of governance is usually driven by the need to exchange tacit knowledge between value chain activities as well as the need to efficiently manage complex inputs and outputs, and control resources, especially intellectual property.

Coordination chains become more complex with the integration of new suppliers. This complexity becomes very important when there are strong differences (asymmetries) between the demands of key stakeholders (leaders) that govern the GVC and local expertise. Upgrading supplier (especially in developing countries) requires undeniable efforts to overcome these

challenges. Nothing also that other "hybrid" forms of governance may be involved at various levels of skills training (Tozanli S. et al. 2007).

1.3 GVCs and food safety norms and standards

A large number of contributions highlight the existence of a relationship between the Global Value Chain (GVC) typology (Lee et al. 2010) and the prevailing modes for food safety governance, whereby buyer-driven GVCs mainly based on retail-led private standards coexist with traditional wholesale market transactions mainly based on public minimum quality requirements. Before closely analysing this relationship, we provide a brief definition of public norms and private standards in the field of food safety.

Since the 90s, the international trade in agricultural products and agri-food and particularly fresh fruits and vegetables is undergoing radical changes in the field of quality and food safety at the national and international level. These changes have been partially the result of food outbreaks that occurred in recent years (BSE crisis, dioxin, salmonella, etc.), and the more recent problem of cucumbers in Germany (caused by bacterium E. coli), which has caused several deaths. Consumers have become increasingly concerned of the safety of the food they consume. The question on how standards impact value chains is more important than ever. These food safety outbreaks have lead to raising regulations of food safety.

At the international level, two main international standard-setting organizations exist: the International Organization for Standardization so-called “ISO” and the Codex Alimentarius Commission so-called “CAC” which take part of the FAO/WHO food standard programs. The ISOs’ role is to develop norms across different areas and sectors from product specifications through managements systems. And the CAC’s role is to set standards/norms on food quality and safety as like codes of hygienic or technological practices. Also CAC establishes limits for pesticide residues and guidelines for contaminants.

At the regional level, especially the UE market, we can find the European Food Safety Legislation that includes the “hygiene package” terms which focused on the establishing of the maximum admitted thresholds of contaminants (heavy metals, dioxin, Aflatoxins, …) or the maximum of pesticide residues in foodstuffs. The “hygiene package” goal is to ensure the verification of compliance with feed and food law.

Alongside regulations, private actors in developed countries (producers, manufacturers, retailers, etc.) have reacted to food outbreaks and public instances by setting ‘private voluntary

standards' that enable to manage risks associated with food safety failures while constituting the basis of quality differentiation strategies on the final market. These standards rely on particularly strict rules (often more restrictive than regulations) pertaining to infrastructures, equipments and production practices.

The proliferation of private standards is shown to profoundly affect supply chain structure and organization (Hammoudi et al., 2009), market functioning, industry structure, and firms' competitive repositioning (Giraud-Héraud et al. 2012). Accordingly, the value chain structures have been changed, especially, at the international and regional level.

The strengthening of regulations and the development of private standards can prevent in a significant way the export performance of developing countries. In this sense, food safety standards are often pointed out as non-tariff barriers that may significantly hinder trade (Beghin and Bureau, 2001, Aksoy et al. 2005, Oyejide et al. 2000). Despite, recent research suggests a more nuanced picture by showing gains experienced by operators supplying high value supply chains (Vandemoortele et al. 2012).

In the recent years, private food standards have emerged as an important mode of market governance in many industrialized countries (Henson & Humphrey, 2010; Lee et al. 2010). This trend has enhanced deep questions about the role of public and private institutions in governing food safety, food quality and the wider social and environmental impact of the agri-food system. In this section, we will try to explain the relationship between the structure of value chain and agri-food safety and quality standards using a global value chain approach.

1.3.1 Food safety modes of governance: defining public and private standards

'Norm' or '*regulation'* is defined as 'a document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is *mandatory*. These categories of norms present as a referential and published by a standardization organization as like 'International Organization for Standardization' (ISO). They called also *'de jure standards'* which take part of legally binding contacts, laws or regulations.

'*Standard'* is defined as 'a document approved by a recognized body that provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which compliance is not mandatory'. It's defined also as instruments for value chain governance, particularly when it comes to facilitating arm's length

relationships. The GATT (General Agreement on Trade and Tariffs) define standard as 'technical specifications contained in a document that lays characteristics of a product such as levels of quality, performance, safety, or dimensions. In the same sense, standards may include or deal exclusively with terminology, symbol, testing and methods, packaging, or labeling requirements as they apply to a product'. Its noted standards *'de facto'* which means they are followed by informal convention or dominant usage.

We can distinguish between "mandatory" and "voluntary" standards, and between standards set by "public" and "private" entities (Henson and Humphrey, 2010; Henson and Humphrey, 2009; Henson and Humphrey, 2008). The term 'private standard' is frequently used in the literature as synonymous of 'voluntary standard'; this implicitly equates the role of public authorities with mandatory rules thus backed by legal actions (Henson and Humphrey, 2010); however, this distinction does not hold and several combinations of public/private and mandatory/voluntary are possible. The government may set public mandatory standards (more accurately termed 'regulations'), that are legally mandate (legal penalty arises from non-compliance); hence, ex-post regulatory tools (such as liability rules) are designed to sanction non-compliant behaviours. The government may also set standards with which compliance is voluntary (public voluntary standards or 'optional laws'), such as 'Label Rouge' in France or Protected Geographical Indications, or may require compliance with private standards (legally-mandate private standards), which are developed by the private sector and then made mandatory by public authorities. Finally, 'private voluntary standards' are developed and adopted by private actors (e.g. firms, industries, NGOs). It is worthy to notice that even if 'private voluntary standards' are not legally mandate, they are often referred to as de facto mandatory in a commercial sense for access to important markets (as required by dominant food operators). In addition, 'private voluntary standards' are often referred to as 'more restrictive' than public regulations. As highlighted by Henson and Humphrey (2010), private voluntary 'reinforce' public regulations in two distinct ways: either they take the form of more stringent standards, or they implement controls on issues that are not covered by public regulations.

Figure 6: Forms of standards

	Public	Private
Mandatory	Regulations	Legally-mandated private standards (private sector, set by public bodies)
Voluntary	Public voluntary standards ('optional laws' set by public bodies)	Private voluntary standards (set by private bodies)

Source: Henson & Humphrey, 2010

1.3.2 The relationship between GVC typologies and food safety governance: the raise of private standard-based buyer-driven GVCs

Over the last 10 to 15 years, a key trend in the governance of global agri-food value chains is the increasing prevalence of private standards in many industrialized countries (Lee et al. 2010; Henson & Humphrey, 2009; 2007; World Bank, 2005; OECD, 2004; Jaffee and Henson, 2004). This situation constrains much small producers mostly disadvantaged in the GVC, especially at the export level. This situation continues to worsen because the private firms and non-governmental organizations (NGOs) have progressively laid down standards for food safety, food quality and environment and social aspects of agri-food production, which are generally linked in turn to processes of second or third certification (Henson & Humphrey, 2009). Buyer-driven chains have emerged in many agri-food sectors as retailers in developed economies became highly concentrated. Retailer-led private standards tend to prevail along with public standards, with a focus on food safety, although quality standards are also on the rise (Lee et al, 2010).

For to better understand the value chain governance and food standards and the power in the value chains, Lee et al. present an analytical model that can based on four different situations depending on the degree of concentration in the markets for supply (food processor or supplier) and demand (retailer or buyer) (Lee et al. 2010). In this model, different characteristics of value chains are reported in each box. These characteristics concern how drives and governs the value chain.

Figure 7: global value chain structure and agri-food standards.

		Food demand (retailer/buyer)	
		Concentrated	Fragmented
Food supply (processor/ supplier)	Concentrated	**(A)Bilateral oligopolies** Private/ Most comprehensive standards	**(C)Producer-driven chains** Public + private/Safety & quality-focused process standards
	Fragmented	**(B)Buyer-driven chains** Public + private/ Safety and quality-focused product standards	**(D)Traditional markets** Limited public standards/ Least comprehensive standards

Source: Lee et al. 2010

In this model, each box links a form of chain governance to the type of agri-food standards most likely to occur, Lee shows, especially in the box B, where buyers are concentrated and suppliers are not, a buyer-driven chain where large retailers, brand-name merchandises and trading companies play the pivotal role in setting up decentralized production networks in a variety of exporting countries (Lee et al 2010). For Lee, the lead firms have different incentives and capacity to develop and adopt enhanced private standards, with varying emphasis on food safety and quality attributes. Really, both retails and manufactures have distinct motivations and interests in agri-food standards. Lee argues that in one hand, and in optical downstream players' strategic rules, retailers tend to be more involved to ensure food safety and brand reputations. Indeed, their first concern is the mastery of risk potential at multiple inter-links along the "GVC". The goal is to provide retailers to end consumers a product on healthy and satisfying their preferences set originally laid. In the other hand and in the optical upstream players strategic rules, food producers/manufactures, in terms of approach standards, must demonstrate their potential in differentiation their food (food and environmental safety). The ultimate goal behind these implications is to prove to retailers and Consumer end products that are on them and better than their competitors.

Hence, as noted by Lee et al. (2010), the more a particular chain is 'concentrated and governed through tight coordination by a few consolidated actors' the more food safety and quality are regulated by comprehensive private standards. It thus appears that buyer-driven chains (i.e. buyers are concentrated while suppliers are not), which have emerged as retailers became highly concentrated, are shown to be mainly associated with retailer-led private food safety (and quality) standards imposed to fragmented suppliers and implemented both individually (e.g. TNC) and in a collective manner (e.g. GlobalGap)

Referring to the figure 6, each type of global value chain structure is therefore associated with a distinctive constellation of food standards reflecting the attributes of its lead firms. A good example for the rise of buyer-driven chains in agri-food is represented by UK's horticultural trade with Africa (see also, Joonkoo et al. 2010; Lee et al. 2010; Gereffi, Humphrey & Sturgeon, 2005).

1.3.3 GVC typology, modes for food safety governance and upstream-downstream relations

A relationship is also highlighted between the typology of GVC, the prevailing mode for food safety governance and the degree of vertical coordination that characterizes upstream-downstream relations.

Hence, buyer-driven private standards-based GVCs are likely to be associated with more integrated relations between downstream operators (retailers), importers and upstream operators (e.g. exporters). As shown by the PIP survey, for example, the Anglophone value chain relations between buyers and exporters are likely to be more integrated and more stable compared to relations that characterize the Francophone value chain. In the same vein, Lee et al. (2010) highlight how the UK's horticultural trade with Africa has progressively shifted from market-based global value chain governance to more explicit coordination (Gereffi et al., 2005) crucially driven by supermarkets' competitive strategies (e.g. increasingly quality-based differentiation strategies). Hence, as noted by Gereffi et al (2005) and Lee et al. (2010), instead of purchasing through wholesale markets, UK retailers have developed closer relationships with fewer and larger UK importers and African exporters. Supermarkets have thus set renewable annual contracts with their suppliers that were subjected to monitoring and audit. The buyer/supplier interaction became more relational[1] with buyers/suppliers working together on product development, logistics, and quality. Over time, UK supermarkets have progressively reduced the number of supplier/importers for each product range and given the remaining suppliers/importers greater responsibility for supply chain management. Moreover, exclusive bilateral relationships between importers and exporters have been developed.

[1] *In the classification of GVCs proposed by Gereffi et al. (2005), relational value chains are those characterized by complex interactions between buyers and sellers that may lead to mutual dependence and high levels of asset specificity. Relational value chain linkages may be managed through trust and reputation.*

1.4 Heterogeneity of norms/standards, heterogeneity of Global Value Chains

1.4.1 Food safety standards and heterogeneity of GVCs

Given the heterogeneity of agri-food standards (public and private standards) at international level, a set of contributions interestingly puts the accent on the existence of a relation between the strictness of food safety requirements and the target country and/or market segment. An array of target markets seems thus to exist that are differentiated according to the stringency of food safety requirements (OCDE, 2007; Aloui et Kenny, 2005; Jaffee, 2003).

Namely, food safety and quality requirements tends to vary by country according to differences in public standards and buyers (lead firms and key intermediaries) within a country according to differences in private standards, which reflect their market positioning strategy and risk adversity. As a conclusion, we can say that the heterogeneity of norms/standards is a consequence of country/segment market destination.

Heterogeneity may concern both countries and market segments at international or regional level. At international level, Aloui & Kenny distinguish between markets according to stringency of sanitary and phytosanitary measures "SPS" in high-level markets (Canada and Scandinavia), medium-level market standards (UE), and low-level market standards (Eastern Europe and Middle East) (Aloui et Kenny, 2005). Several studies identify many value chains in the agri-food value chain as a consequence to the heterogeneity of norms/standards, especially in fresh fruits and vegetables value chain.

A recent PIP survey of fresh fruit and vegetable exporters in Sub-Saharan Africa (PIP, 2009) suggests distinct value chains for fresh produce exports: the "Anglophone" value chain (predominant in Kenya, Zambia, Uganda, and Ghana) that directs exports towards supermarkets in the UK, Germany, Netherlands, and Switzerland, and the "Francophone" one (predominant in Madagascar, Senegal, Ivory Coast, Benin, Mali and Burkina Faso) that directs exports principally to "other buyers" (wholesale, catering and others) in France, Italy, and Switzerland. The more stringent demand of the Northern European supermarkets (particularly in the UK, compared to other European buyers) is highlighted and private standards (e.g. GlobalGap) emerge as the most difficult buyer requirement to meet.

Similarly, Okello et al. (2011) examines the green bean high value chain (HVC) for African exports to Europe2 and identify three value chains through which smallholders farmers market their beans, particularly the supermarket chain, the continental European wholesale chain, and the domestic value chain. The authors argue that it is within the supermarket chain that European food safety standards are strictly controlled. Hence, supermarkets require changes in type and quality of inputs and the absence of pests and diseases prohibited by the importing countries.

In the same vein, an OCDE study (OCDE, 2007) points out the different regulatory and private standards faced by Ghanaian exporters of fruit and vegetables. As represented in Figure 1 below, at one extreme there are UK supermarkets requiring a range of private standards (GlobalGap, BRC, etc.) on an increasing proportion of their suppliers, followed by (the less exigent) continental supermarkets (especially in Germany, Netherland and Switzerland). At the other extreme, there are wholesale markets, where private standards are least developed. Hence, this study also points out that the strictest standards and control procedures are applied by supermarkets (especially in the UK, but also increasingly in continental Europe).

Figure 8. Heterogeneity of food safety standards: Ghanaian fruit and vegetable exports

Standard	UK supermarkets	Dutch/German/Swiss supermarkets	Other continental European supermarkets	Wholesale markets	Regional markets
Phytosanitary certificate	LLL	LLL	LLL	LLL	L
	-	-	-	-	-
Limits on pesticide residues	LL	LL	LL	C1	C1
	PPP	PP	P	-	-
HACCP	-	-	-	-	-
	PP	PP	P	-	-
Traceability	-	-	-	-	-
	PPP	PP	P	-	-
Microbial contamination	-	-	-	-	-
	PPP	PP	P	-	-
Good agricultural practice	L	L	L	L	-
	PPP	PP	P	-	-
Social welfare conditions	-	-	-	-	-
	PP	P	-	-	-
Quality grades	L	L	L	L	-
	PPP	PP	PP	P	-

Source: OCDE (2007), p.18.

Key: LLL Legally mandated and strictly enforced; LL Legally mandated and some enforcement; L Legally mandated and minimal enforcement; - No legal requirements; PPP Strict private standards; PP Some private standards; P weak/minimal private standards; - No private standards.

[2] *The aim of this paper is to identify the critical points at which exporters strictly enforce buyers' requirements and the risk of exclusion of family farmers at these points.*

Another type of value chain is looked in North African Countries (Morocco, Tunisia, Egypt) called the *"Arabo-phone"* value chain that direct exports to Golf countries (UEA, KAS, Jordan,…) through the agreement signed in Agadir on 2004 (Morocco) and entered in force in 2007.

As a consequence, in one hand, the heterogeneity of global value chains gives place of new modes of food safety governance with relation to market/or segment of market destination standards requirements. In other hand, the heterogeneity of norms/standards among industrialized countries implies additional costs for producers or companies that want to diversify export markets.

1.4.2 Effects of GVCs heterogeneity

The heterogeneity of standards across countries and market segments and the consequent asymmetries in compliance costs for producers, raises significant concerns about the "fairness of competition" among different "production systems" at international level (Hammoudi et al, 2010).

Heterogeneity of norms/standards and GVCs profoundly affects "strategic options" for countries/exporters. Several studies show that highly exigent markets (mainly, private standards-based) might offer opportunities in terms of added value, higher margins or marketed volumes (Henson et al. 2009).

For better explain the strategic options of players in the GVCs, several questions arise, how do public strategic decisions affect the incentive for private agents to comply with norms? How do they affect firms' export performance? Which is the best public/private partnership? Given the heterogeneity of norms, public requirements and private standards at international level, how does the private actors' strategic behavior affect the risk of rejection at developed countries' borders?

Which tools/policies (or which combination of complementary/tools and policies) have to be chosen in order to facilitate a better access of operators to the international market? Which ones are related to a short-term strategy? And which are related to a long-term strategy? Which elements make up a "proactive strategy" that might facilitate a long-term access to some global value chains?

Costs multiplication: Several studies show that standards are costly to meet. Compliance with safety standards (i.e. obligation of means or results) implies to firms fixed

and variable costs (cost of compliance).Hence, compliance process with standards requires human and capital investments (infrastructures costs, procedures implementation, control tests,...), which may considerably increase both fixed and variable production costs, thus affecting firms' profits and export volumes (Maskus et al., 2005; Mbaye, 2005; Niang, 2005). In the fact, increased of both fixed and variable costs may limit or reduce the ability of market access for exporters. Fixed costs affect the business performance and variable costs can significantly reduce the export volumes.

In other hand, tariff and non-tariff barriers represent a "trade cost". "Trade costs include all costs incurred in getting a good to a final customer other than the marginal cost of providing the good itself" (as like transportation cost, policy barriers, information costs, contract enforcement costs as well as costs associated with the use of different currencies, legal and regulatory costs and local distribution costs (wholesale and retail).

Trading options: heterogeneity of standards and GVCs profoundly affects 'strategic options' for countries/exporters (increase costs for actors serving multiple markets, reduce diversification of exports). Countries/exporters have several "strategic options". They can choose between high exigent markets with high compliance costs that might offer opportunities for added value and high margins, and less exigent markets that can be accessed with little or no investment, but where margins are likely to be lower. Responding to these 'strategic options', countries/exporters may perform on a market/segment of market with high food safety requirements, or exit particular export markets, or substitute products for which safety standards are less costly to meet. *Market destination choice*: faced to an array of target markets, a multitude of factors influence the strategic choice of the destination market (related to strategic options) because of the stringency of food safety requirements (financial capacity, technical how-know, production practices, production capacity). The market destination choices depend also on the characteristics of the target market/segment (level of standards-compliance costs, market opportunities associated with compliance, expected financial or reputational losses arising from non-compliance depending on the perceived risk of de-listing), among which conditions pertaining to the upstream production sphere. Downstream player behaviors' by focusing on the role of importers, the above-mentioned parameters are shown to interact in shaping strategic choices based on target market, volumes, supplier selection.

1.5 Food safety standards and the impact on exports from developing countries

1.5.1 Food safety standards as non-tariff barriers: a macroeconomic perspective

1.5.1.1 Non-tariffs barrier/technical measures: definition

'Non-tariff barriers' (NTBs) are defined as "all restrictions, other than traditional tariffs, with distort international trade". The term 'barrier' is considered by some authors should not be applied to measures whose principle objective is to correct market inefficiencies, but happen to have an incidental impact on trade. Others define NTBs by reference to the difference between an existing measures and the measure that would be applied if all supplies were from domestic sources (Maskus et al. 2005).

'Technical measure' are defined as "standards governing the sale of products in national markets which have as their 'prima facie' objective the construction of market inefficiencies stemming from externalities associated with the production, distribution and commercialisation of these products". According to the Sanitary and Phyto-sanitary Agreement of the WTO, food safety standards include all relevant laws, decrees, regulations, requirements and procedures including, inter alia, and product criteria, processes and product methods; testing, inspection, certification and approval procedures; quarantine treatments including relevant requirements associated with the transportation of animals and plants, or with the materials necessary for their survival during transport; provisions on relevant statistical methods, sampling procedures and methods of risk assessment; and packing and labelling requirements directly related to food safety.

In a global context, the rise of private standards has served to challenge the legitimacy of established international institutions that lay down rules for promulgation of public food safety standards, notably the World Trade Organization (WTO) and Codex Alimentarius Commission (CAC) (Henson et al. 2009; Henson, 2007; ...). Accordingly, the agreement on Technical Barriers to Trade (TBT) defines a technical regulation as a "document which lays down product characteristics or their related to processes and production methods, including the applicable administrative provisions, with which compliance is mandatory". According to these definitions, food safety standards are often pointed out as non-tariff barriers to trade, the costs of adjustment to information and those standards affect significantly on exports of Mediterranean countries to the European Union (Emlinger et al. 2008; Michalek, 2005; Aloui&

Kenny, 2005; Aksoy et al. 2005). Therefore, tariff and non-tariff barriers represent a "trade cost". "Trade costs include all costs incurred in getting a good to a final customer other than the marginal cost of providing the good itself" (as like transportation cost, policy barriers, information costs, contract enforcement costs as well as costs associated with the use of different currencies, legal and regulatory costs and local distribution costs (wholesale and retail).

1.5.1.2 The impact of technical barriers and SPS measures on trade

There are depth changes in the composition of agri-food culture trade in developing countries over the last three decades. Governments use a variety of measures to ensure that products are protected from contaminants, toxins, and other organisms that may affect human and animal health. The legitimated objectives cited by the Agreement are: national security requirements, the prevention of deceptive practices, the protection of human health or safety, animal or plant life or health, or the environment. The most one implemented is 'Sanitary and Phyto-sanitary' measures (SPS). Their aim is to protect human health and the health of animals and crops from pests and other diseases that may be transmitted by cross-border trade of food, plants, or animals. In parallel, consumers, retailers, and processors are concerned about food safety, and are developing their own quality standards. Hence, sseveral studies show that food safety standards (FSS) imposed by developed countries could impede processed food export from developing countries (Jongwanich, 2009; Aloui et Kenny, 2005). In this context, Jongwanich consider that one of the key challenges is the ability of developing countries to meet increasing stringency of FSS imposed by importers in developed countries. Hence, and because of the existence of a potential benefits that could emerge from imposing FSS such as a reduction in transaction costs and trade friction, developing countries should view SPS not just a trade barrier, but also present an opportunity to upgrade quality standards and market sophistication (Jongwanich, 2009). Upgrading means upgrade the agricultural sector and mobilize additional financial and technical assistance for redressing facing developing countries in meeting required FSS. Compliance with SPS measures may generate trade opportunities for developing countries, arising from export specialization in high-value products, improvements in export supply chain productivity and restricting of export supply chain through horizontal and vertical coordination processes (World Bank, 2005; Jaffee and Henson, 2004).

However, limited supply-side capacity in some developing countries, especially in terms of resources, as well as institutions, hinder these countries to overcome FSS, and in

otherwise the developing countries' structural inefficiencies may exacerbate difficulties on complying with SPS measures (ONUDI, 2005; Henson et al. 2000).

Henson and Loader (2001) group the impact of SPS measures on trade into three categories, SPS measures can:

- Prohibit trade by imposing an import ban or by prohibitively increasing production and marketing costs,
- Switch trade from one partner to another by laying down regulations that discriminate among potential suppliers, and,
- Reduce trade flows by increasing costs or raising barriers for all potential suppliers.

1.5.2 Compliance procedures and costs with food safety standards and exclusion effects

Compliance with standards implies compliance costs from various origins. They are distinguished in initial conformity costs (Hammoudi et al 2010; Chemnitz, 2007). Chemnitz differentiated between five categories of conformity costs (Chemnitz, 2007), these are physical upgrading costs, human capital upgrading costs, management costs, opportunity costs resulting from the outputs potentially lower and social costs. A clear categorization is given by Hammoudi while differentiating, beside initial costs, between audit and certification costs, maintenance costs, research and substitution costs, direct or indirect costs, hidden costs, risks and recurring or not-recurring costs (Hammoudi et al, 2010; Chemnitz, 2007).

The diversity of these costs impact deeply the weakest operators in the supply chains see even excluding them from the global chains with high added value.

These various typologies of norms/standards (public or private) and various typologies conformity costs which are associated following obtaining certification (or certifications) promote a certain number of actors compared to others. Majority of the most affected operators in negative terms are producers and producers-exporters arising from developing countries (DCs) where production practices are largely traditional and unsophisticated.

In these countries, a number of operators face real constraints which deprive to fit into global networks with high added value.

The situation in which the operators of these countries have faced, is explained by the weakness in their resources for to meet the requirements imposed by adopting quality standards that becoming more stringent (financial resources reduced, insufficient in human capital,

know-how and managerial, etc) (Grazia et Hammoudi, 2009), high and variable audit fees, confrontation to disproportionate difficulties to met private voluntary standards "NVP" (PIP, 2009), etc. Obviously, producers that not conform to these standards will be excluded from markets that require these standards (Hammoudi et al. 2010; Chemnitz, 2007).

Difficulties and costs of compliance with standards are the main factors explaining food safety standards effects on producers' exclusion from the international market. Hence, the exclusion effect is mainly justified in the literature by the fact that 'entry costs' in terms of farm upgrading (handling and hygiene practices, equipment and buildings for chemical storage, hygiene and temperature controlled facilities, pesticide storage units, pesticides disposal pits, technical skills, etc.) may be prohibitively large for small scale growers thus excluding them from high-value global chains (Jaffee, 2003; Dolan and Humphrey, 2000).

Most of the studies analyzing the procedures and costs of compliance with private standards focus on an open Economy perspective, notably on the impact of private standards on developing countries and show that compliance costs (non-recurring costs associated with buildings and facilities and recurring costs such as recurrent audit and certification, record keeping on chemical use, variable inputs such are safer pesticides, training, soil analysis, etc.) may be appreciable (Amekawa, 2009; Graffham et al. 2007).

In fact, the main cause of the exclusion of developing countries producers in global markets can be explained by significant compliance costs that exceed their capacities and available resources, and also by lack of global strategies called "proactive" which will ensure access to global networks in a long-term strategy (Hammoudi et al. 2010). However, there are still niches that can be exploited by those operators without changing drastically (rigorously) their production practices. Many operators are moving towards less demanding markets where standards are developed by the government not by the private sector (case of fruit and vegetable exporters from Ghana) (see Hammoudi et al . 2010). These operators, even if their remuneration is weak, find any way to sell their products in these markets. In these countries, a coexistence of a variety of export sectors in the fruit and vegetable supply chains is marked with a variety of distribution chains.

However, to carry out accessible profits, it is time so that operators of these countries fail to better organize itself, by changing rigorously their production practices by tracking good practices guidelines defined by private sector operators. Adoption of these NVP guarantees

their safe outlet and makes them more competitive at international level through their integration into global chain with high added values.

However, quality standards (especially private standards) can open up good opportunities to fit into particular segments in the international market (Chemnitz, 2007). So, companies that adopt a private voluntary standard have main aim to preserve and enhance their reputations by mitigating their risks (PIP 2009).

Private voluntary standards allow supply chain actors to demonstrate the implementation of systems taking necessary precautions (as far as possible) to ensure the quality and safety of their products; companies are useful of the private voluntary standards to differentiate their products (PIP 2009).

Hence, a possible explanation for the results obtained in the long term by certain operators and supply chains of developing countries in the external markets is that their practices is most often reflect the requirements set by their customers (importers) and strategic behaviour that they show at the international markets level. This behaviour adopted by developing countries stakeholders allows them to sell large quantities with a level as best as possible of quality production practices and compliance with safety standards and regulations (see Hammoudi et al. 2010). One of the issues of integration into international chains fined its relevance and effectiveness in aggregation of operators in producer groups or cooperatives with long-term strategies. This form allows them to exploit a wide margin of manoeuvre with minimal costs.

1.5.3 GVC approach and the impact of food safety standards on market access: a microeconomic perspective

The structure and governance of food value chains determine the conditions of access to export markets and local markets (Kuper et al. 2007). In developed countries, access to markets for higher value or differentiated agricultural and food products (HVAF) is not a challenge or facilitated by complying with public norms as like the “hygiene package”. By contrast, in developing countries, market access has been identified as one of the foremost factors influencing the performance, especially of small-scale producers (Jaffee et al. 2011). The same authors consider that smallholder access to market for higher value or differentiated agricultural and agri-food product is recognized as a “vital opportunity” to enhance and diversify the livelihoods of lower income farm households and reduce rural poverty (Jaffee et al. 2011).

As indicated by Jaffee, the "traditional" constraints (inadequate farm-level resources, farm to market logistical bottlenecks and more general transaction costs in matching and aggregating dispersed supply to meet buyer and consumer demand) have been amplified and, in some cases, surpassed by a "new" set of challenges associated with compliance with product and process standards, set and enforced by governments as well as private supply chain leaders (Jaffee et al. 2011).

The effect of standards on market access of producers cannot be explained solely by increased costs of compliance, the heterogeneity of global value chains implies additional costs for producers or companies that want to diversify export markets. Some authors argue that standardization and certification reduces transaction costs and act as catalysts for upgrading developing countries' export sectors, leading to enhanced market access and competitiveness (Maertens & Swinnen, 2009; Jaffee & Henson, 2005).

1.5.3.1 GVCs and smallholders exclusion

Existing theories may even appear, in some cases antagonistic (Rios & Jaffee, 2008; Otsuki & Sewadeh, 2001). Several study aims to illustrate the adverse effects of a significant reduction in exports in terms of exclusion of producers from weaker export supply chains (Maertens & Swinnen, 2006). Other contributions consider the positive effects that the rules can induce, both in terms of restructuring (more) efficient supply chains in developing countries that diversification/specialization of these countries export higher value added (World Bank, 2005; Jaffee & Henson, 2004).

The exclusion effect is mainly explained in the literature by the fact that farm upgrading entry costs' may be prohibitively large for small scale growers thus excluding them from more safety-discerning high-value supermarket global chain. Jaffee refer to the specter of smallholder market "exclusion" is thus raised again, this time on domestic turf, as smallholders (and their groups) may be unable to meet the volume and/or quality/food safety requirements of these and markets, or face high costs in having such compliance assured or certified (Jaffee et al. 2011). Similarly, several studies show that non-compliance producers-exporters/exporters will be excluded in value chains (references) technical inability to meet emerging regulatory and private standards or the high compliance and third-party certification costs involved (Jaffee et al. 2011). Some authors argue that the technical measures (control of food safety, quality standards, labeling requirements) can act as a barrier to trade as well as tariffs and qualitative restrictions" (Laird and Yeats, 1990; Vogel, 1995). For others, Proliferation of standards more

stringent induce increasing prohibitive of production and marketing costs and imply the significant reduction in the export volumes, or in some cases, excluding the lowest producers in the market transactions (market share)" (Henson and Humphrey, 2010; Henson, Loader, 2001; Horton, 1998; Roberts, Dekremer, 1997; Behrens et al. 2006; Anderson et Van Win coop, 2003; Vogel, 1995; Laird et Yeats, 1990).

The exclusion might be 'ex-ante' when the farms where products are produced without compliance to standards (public and/or private) requiring certifications by target/segment market. The exclusion her result from high compliance costs involving to the compliance process. Yet the continuous evolution of SPS measures, combined with the difficulty access to information by countries in developing world, implies more difficulty for exporters, to ensure 'ex-ante' that export product complies with the requirements of target countries.

The exclusion could be 'ex-post' when the products are rejected at the end of border controls if the final product is not conform with limits residues (LMRs) and pollutants when the quantities that pass through different channels are ineligible. In the most cases, developing countries often encounter the 'ex-post' risk that the product is rejected at the border of destination countries/markets at the time of inspection by the authorities' control. These difficulties may arise from rejections borders of the countries of destination, which can also act against operators initially certified and comply with obligations on the means (Good Practice Agriculture, HACCP, etc...). Compliance with the obligations on the means, therefore, is necessary, but not sufficient, condition for market access. In fact, the difficulties of market access by developing countries are not derived solely from the exclusion from the market of operators meeting or by the reduction in exports due to the increase of individual variable costs of compliance.

In literature, several studies show that there was a positive relationship between the degree of coordination upstream (vertically integrated producers/exporters, forms of horizontal coordination) and the performance of the export sector (the ability to access markets with high value added) (Grazia, Malorgio, Hammoudi, 2009; FAO, 2007). This finding is a result of the long efforts of compliance with standards. Evidence from Kenya, Ghana, and Ivory Cost, for example, suggest that horticulture exports are increasingly grown on large industrial estate farms, thereby excluding smallholder suppliers in the export supply chain. Also, supermarket-driven supply chains have been observe to exclude smallholders from their preferred supplier lists, the author gives South Africa country as an example (Maertens & Swinnen, 2009).

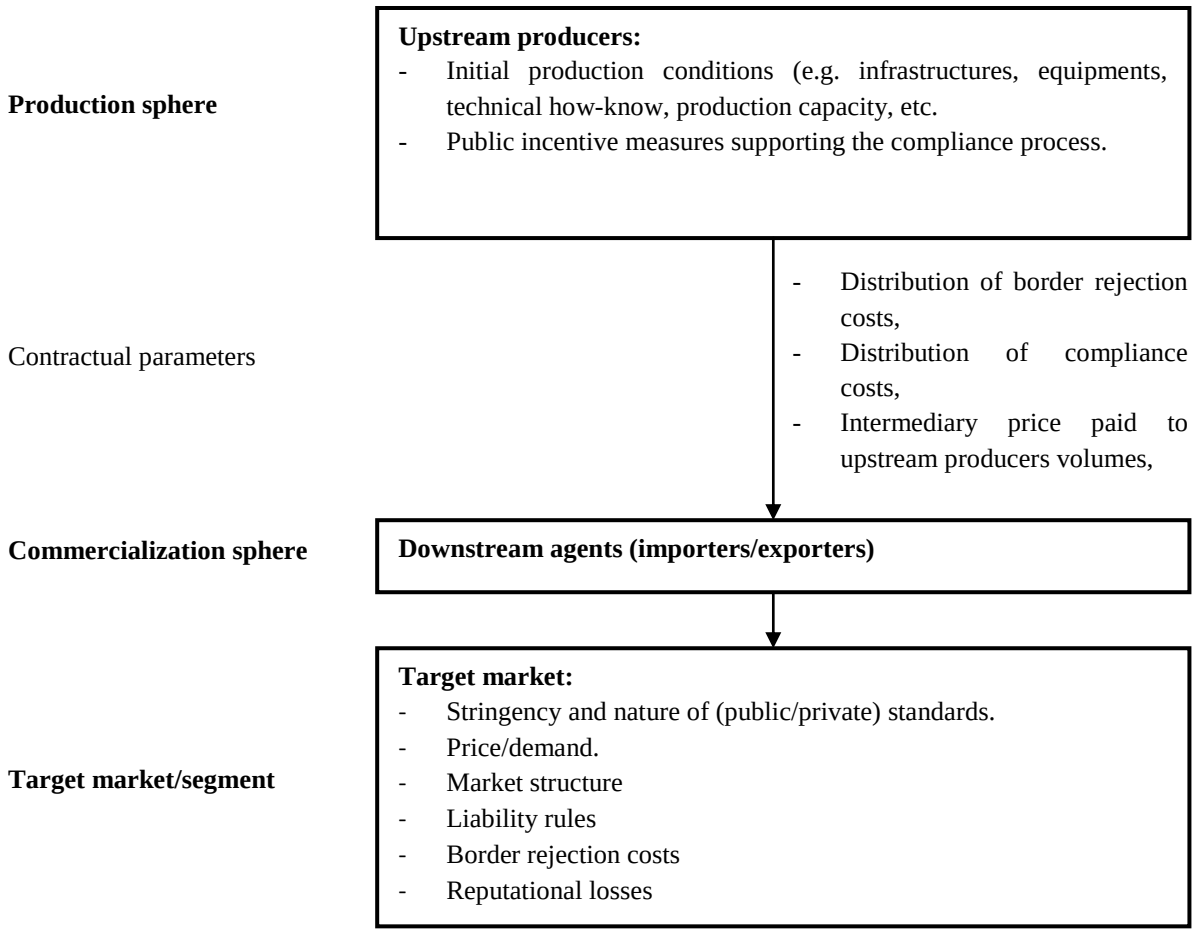
1.5.3.2 Inclusion effects of smallholders in GVCs

Some studies providing cases where smallholders have maintained or even enhanced their role in export value chains (Henson and Humphrey, 2010). In this case, participants of value chains see their productivity increase. In the case of Morocco, the chain has a high degree of coordination (organized groups of exporters, integrated producers/exporters), as well as machinery, know-how, logistics, resulting in a strong capacity for inclusion in international supply chains for high value added (Kenny et Aloui, 2005, Rastoin et al 2008, Chemnitz, 2007). For illustrating this case of figure well, concrete examples are given by fresh fruits and vegetables value chain. The FFV is one of the most dynamic export sectors, especially for developing countries, in which they have been able to capture a significantly increased share of world FFV trade. Maertens & Swinnen (2009) show that there is a positive effect on productivity (evidence from Madagascar, South Asia, and Eastern Europe). They argue that vertical coordination leading to increased access to inputs, technology, and increased productivity and investments. Despite increasing food standards in developed countries (EU for example), developing country exporters increase their implications in compliance with these standards. This situation can offer jobs for poor people workers (labor market), thereby contributing to income rises with a global poverty reduction. Producers that may be comply with these food standards see their volumes increase and their benefits increase positively.

1.5.3.3 The role of the supply chain organization

Consideration should be given "strategic dimension": the strategic behavior of downstream operators (retailers, buyers, importers) ("buyer-driven" supply chains), which in turn determines the type of organization of the supply chain, had no significant impact on performance long-term export sector (excluding producers, income and ability to market access in the long run, creation and distribution of value, etc..) (Giraud-Héraud, et al, 2010). Distribution of value among value chain creates vertical relations between actors, and creates also a certain type of confidence from buyer-driven chains to producer-driven chains in agri-food supply chain. Importers require that producers product must be conform with food safety standards (public and/or private) for to guarantee their access to international market.

Figure 9. Supply chain organization, downstream agents' strategic behavior and choice of the target market



Source: Hammoudi et al. 2010

1.5.4 Which policies to improve market access?

Global value chains are becoming more consolidated. Their framework focuses on the nature and content of the inter-firm linkages, and the power that regulates value chain coordination buyers/suppliers (Gereffi et al. 2005). Focusing on the stringency of norms/standards at the regional and international level, that implies the additional costs (certification and maintain this/these certifications), developing countries must be in grade to respond at these requirements. To ensure the ability of developing countries to compete in export value chains governed by agri-food standards it must endeavor, through WTO negotiations, to reduce trade barriers faced by these countries to access to global value chains.

A better regulation is that exporting countries, in general from developing countries, should not bear alone the compliance costs. Costs, benefits and risk along the supply chain might be sharing between buyers/suppliers for a better collaboration and governance in value

chain. In other hand, buyers can anticipate a financial support to their suppliers and in return the suppliers must ensure a quality product. For example, importers or larger exporters provide pre-financing and apply tighter contract-coordination while smaller exporters have management decisions to the farmers (Maertens and Swinnen, 2009). Hence, in the Mediterranean region, for to solve these problems (access to EU market), it is opportune to create a network of horizontal research interest. It is also opportune to exchange information between scientists and industrialists in the EU and Mediterranean Partner Countries in particular from an EU perspective and state of the art research and technologies employed in various areas related to agri-food system, especially in fresh fruits and vegetables.

Also, should be providing a support by development agencies for the emerging countries efforts to conform to WTO obligations by strengthening capacities to manage SPS risks. For example, the EU-supported "strengthening Food Safety System through SPS Measures in ACP[3] Member countries" program, this program is started in 2007, and has sought to raise stakeholder awareness, address identified system and institutional gaps, and support the strengthening of food safety inspection and compliance assessment (2011). In other side, it states a strengthen collaboration between SMEs to enhance the circulation and exchange of information and tacit knowledge at the expense of non-technological innovation, for example in the fields of market intelligence, design and trademarks, and human resource development.

1.6 Conclusion

This chapter examines the global value chains and governance. First an overview and typology of GVC and governance was given. It appears that GVC approach accentuates the natures of the relationships among various factors involved in VC, and their implications for business growth (Sun et al. 2009). Barratt suggest that there is a major barrier that can hinder the coordination in GVC in terms of when to collaborate and with whom (Barratt, 2004). Indeed, Barratt (2004) suggest that supply chain coordination requires the commitment of significant resources to implement it, and organizations that try to collaborate with a large number of their customers and suppliers will not succeed. Second, we examine the relation between natures of GVCs and agri-food standards, focusing on the private food safety and quality standards. Our primary observation is that private food safety and quality standards are undoubtedly having a profound impact, especially on the fruit and vegetable export sectors when the analysis concern developing countries. In these developing economies country, the

[3] *Africa, Caraïbes and pacific countries*

ability to comply with stricter food safety and quality norms is constrained and hampered by weaknesses in fundamental capacity (for example in Ghana (Fulponi, 2006)). This structure gave place to an array of GVCs heterogeneity. As a conclusion, we can say that the heterogeneity of norms/standards is a consequence of country/segment market destination.

However, governance and upgrading of GVCs by complying with agri-food norms/standards is a key to measure the ability of developing country exporters to access to global market, especially the EU market, and what the benefit of access and the risk of exclusion might be, and how the net gains from participation in GVCs might be increased (Gereffi et al, 2005). But it also must take inconsideration a review of non-tariff barriers to trade. In the fact, the SPS measures are actually considered as a form of protectionism in high-income countries. In addition, the obligation to meet the standards of quality and traceability established by private importing actor's in high-income countries is a major obstacle to access to international markets. In theory, the decision to implement a given certification standard and comply with SPS measures may be taken at any the three follows level: farms, packing houses or exporter groups. To address this problem, we need to promote public-private partnership to improve vertical coordination in the value chain, and products must meet the requirements of importers and health legislation in force.

2 The quality system in the Morocco agri-food sector

2.1 Introduction

Since the years 90s, the international trade of the agricultural and agrifood products, and especially, fresh fruit and vegetables, has experienced radical changes faced to an increased proliferation of food safety norms and standards at international level, the globalization of markets and the increased concentration (and power) of downstream supply chain stages (retailers, traders, large processing companies)

Recent food scares in a number of industrialized countries have increased consumer concerns about the quality and safety of products. Food safety assurance becomes a need more than ever.

In response to increasing consumer concerns and awareness, public regulations have been reinforced. Alongside public regulatory tools, a plethora of private standards has developed, either 'internal' to the firm (such as quality management systems) or in the context of buyer-supplier relationships, notably set by large food retailers, manufacturers and service operators. Private voluntary standards may be set and adopted by individual firm (such as sub-brands on retailers' private labels Marks and Spencer 'Field-to-Fork', TNC-Tesco Nature's Choice/Nurture, EQC-Engagement Qualité Carrefour, etc.), or by (most often international) 'coalitions' of operators (such as GlobalGap, formerly EurepGap as set by a coalition of European retailers that operate at pre-farm gate, or BRC-British Retail Consortium, SQF-Safe Quality Food 2000 at post-farm gate). Private voluntary standards rely on third-party certification assessing the compliance with specific requirements and are thus often referred to as 'voluntary certification schemes". Private standards impose significant requirements on upstream suppliers in terms of infrastructures, equipments and production practices.

This standards and legislations evolution made emerge a considerable number of public regulations and private standards which enact the minimal acceptable conditions so that an

agricultural and agri-food activity can guarantee a sanitary offer in favour of the health of the human and animal welfare.

The Chapter is structured in two parts. The first part provides an inventory of public norms and standards at international level, while the second part focuses on the food safety and quality system in Morocco.

2.2 Inventory of food safety norms and standards at international level

Food safety represents a major concern today, not only for those which assume, at various levels, the responsibilities on the public health, but also for the consumers who consider it a significant criteria in their choices of purchase. At international level, these norms and standards are characterized by a great heterogeneity (see Chapter 1). A first distinction is between norms, set by national and supranational public authorities (globally by the World Trade Organization "WTO", "ex-GATT", and the World Health Organization "WHO"), and standards set by private operators (large industrial companies, hypermarket, organized distribution, etc.).

These public regulations and private standards emerged at the developed countries level (especially, at the EU countries level), especially with the agreement on sanitary and phyto-sanitary measurements (known under SPS-Agreement) and Codex Alimentarius references. For developed countries, these new devices tend to improve the means and practical of production/manufacturing and define the minimal acceptable characteristics of products (Hammoudi et al. 2010), what will lead to reduction, see exclusion, of small size operators unable to accomplish the requirements, and allows the integration of others which show their capacity/capability to conform with these standards. However, these norms/standards remain constraining see inapplicable for developing countries. The application of these devices target various links of the supply chain as a guideline of good practices of production/manufacturing, guideline of good practices of hygiene (GHP), agricultural (GAP) or of manufacture (GMP) (Hammoudi et al. 2010).

The European legislation that is often considered as the most stringent at international level is taken as a reference to measure actors' degree of compliance with food safety constraints.

As noted in the Introduction, the proliferation of private standards may be partially explained by the severe food sanitary crises occurred in recent decades. Food safety

encompasses characteristics of a public good for which all countries and operators should mutually invest. An under provision of food safety by an operator, a supply chain or a country is prejudicial not only to the offending operator, supply chain or country, but to the whole set of actors, as it has been shown by the recent E.coli crises. Because of consumers' prudent (and hardly controllable) behaviour, the crisis may generate revenue losses for producers of other supply chains commercializing complement or substitute products. Hence, producers cannot expect to benefit from a sanitary crisis by automatically getting back the demand lost by their competitors. The necessity to *reduce market risk and reputational losses associated with product failures*, together with the incentive for a quality-based differentiation (where safety is bundled with other products' quality attributes in the communication to consumers), have provided the incentive for firms to set private standards more constraining than public regulations.

2.2.1 The typologies of standards

Several studies were dedicated to this level; the work brought recently by Hammoudi et al. distinguished its typologies on an international scale. Based on their report, the existing standards can be divided into two categories according to whether they require means or results (Hammoudi et al. 2010). According to the authors, there are standards which require means (infrastructures, staff training, and use of inputs...) and standards which relate to obligations of results, and establish regulating criteria and characteristics of final products (MLRs).

2.2.1.1 Obligations of « means » versus obligations of « results »

An important classification criterion is between performance and process standards. While first specifies the characteristics the final product is expected to have and thus specifies the outcome that has to be achieved (e.g. maximum admitted amount of pesticide residues), process standards specify the characteristics the process is expected to have (e.g. "safe", "organically grown", "environmental friendly"). As for this criterion, 'private voluntary standards' tend to be more specific than public regulations about *how* to achieve a particular goal and/or how to operationalise process-based requirements. For this reason, while public regulations are often referred to as "obligations of results", private standards often take the form of "obligation of means".

As their name indicates it, they are standards which require results and those which require means. The norms placed in the first category require references which fix the maximum thresholds of residues of harmful substances that a food product can contain (see for

example Hammoudi et al. 2010). The standards taking part in this category are the European sanitary and phytosanitary legislation (Hygiene Package), SPS measurements (OMC) and the MLRs set by Codex Alimentarius. Concerning MLRs, a program of harmonization is launched by the UE in which it defines own common and obligatory MLRs for the active matters approved by the UE countries itself (Hammoudi et al. 2010).

Concerning the obligations of means, they are summarized with the guidelines of good practices which teach the necessary elements concerning GAP, GHP, or GMP. These guidelines define the production rules of food under tolerable conditions by consumer health from the hygienic view concerning GAP and GMP, and from manufacturing process view under optimal acceptable conditions for hygiene sanitary (GHP). In addition to this category there are all guidelines of good practices available at multilateral level (Codex), regional level (UE) or local one. The HACCP method and norms ISO may be also include in this category of standards. The interest on these obligations is to create an effective system of management, a technical framing of production-manufacturing-marketing in order to guarantee a maximum level of safety to consumer.

2.2.1.2 Standards at the multilateral level: Sanitary and Phyto-sanitary (SPS) measures and technical barriers to trade (TBT)

At the multilateral level, the norms concerned are SPS – agreement and TBT – agreement (technical barriers to trade) which serve as reference at the international scale and determine or approve the legitimacy of proceedings of market safety. The organisms implied in the multilateral framework and which take part in a complementary way to definition of the markets safety means are the "World Organization for Agriculture and Food" (FAO), the "World Health Organization" (WHO) and the "Office Internationale des Epizooties" (OIE).

The SPS Agreement was signed in Marrakech[4] in 1994 at the end of the multilateral trade negotiations' in the framework of the General Agreement on Tariffs and Trade "GATT" (General Agreement on Tariffs and Trade) and come into force on 1st January, 1995 (with the creation of OMC). It defines the fundamental rules which relate to the harmlessness of the food products, as well as the safety standards for animals and plants. The terms of this agreement

[4] *Il s'agit de l'Accord de Marrakech instituant l'Organisation Mondiale du Commerce. Cet accord contient un certain nombre d'annexes y compris l'Accord SPS. L'OMC et l'Accord SPS lui-même n'établit pas les normes, cette tâche est confiée aux organismes internationaux appropriés ou aux pays membres. Les pays membres à l'OMC sont encouragés à établir leurs normes élaborées au niveau national sur la base des normes internationales, directives et autres recommandations adoptées par la Commission du Codex Alimentarius, la Convention Internationale de la Protection des Végétaux (CIPV) et l'Office Internationale des Epizooties (OIE).*

agree the Member States to establish their own measurements basing on norms, directives and international recommendations (if they exist) but also they can establish norms which show more rigorous based on scientific fundament well judged. In the framework of its application, the SPS Agreement concerns the following measures:

- To protect the people and animals life from risks rising from the additives, contaminants, toxins or pathogenic organisms present in the products;
- To protect the people health from diseases conveyed by plants or animals;
- To protect the animals life or to preserve the plants of the parasites, diseases or pathogenic organisms; or
- To prevent or limit, within a country, other damage rising from entry, establishment or dissemination of parasites.

The terms of the TBT Agreement relate to all the technical regulations and voluntary standards and procedures these intended to assume their respect, except sanitary and phytos-anitary safety measurements defined by SPS – agreement. The scope of this agreement leaves members free to set their technical measures and appropriate norms, but they must prove it to their clients if it is necessary.

These two agreements are converged towards common points, for example the fundamental obligation of the non-discrimination, transparency (by creation of information points)… However, they present also divergent points. For example, SPS – agreement, measurements can be applied only if they are necessary to ensure the protection of the life or health (human, vegetable and animal), whereas within TBT – agreement, the technical regulations can be imposed for various objectives. The field of SPS – agreement application relates to a quite specific category of safety protection measures subjected to rigorous conditions (it rests by a strong scientific demonstration), on the other hand, TBT – agreement relates to a broad range of technical specifications and also authorizes the countries to integrate the available data in risk evaluations'.

2.2.1.3 The European regulatory framework for food safety

Being the European legislation, it is consisted a whole lawful texts called "hygiene Package" come into effect since January 1st, 2006 and their application extends from farm to fork (upstream-downstream). These texts (six texts and two directives called also "operating sector") as well define the requirements relating to the hygiene of foodstuffs and food for

animals. These are regulations n° 178/2002 come into effect since 1st January 2005, so-called "Food Law", which fixes the general principles of the food legislation (it defines the procedures of food safety and the specific obligations such traceability, information of the supervising authorities,..), and 852/2004 which relates to the hygiene of foodstuffs and n° 853/2004 which relates to the foodstuffs of animal origin (constitutive of the package hygiene) and n° 183/2005 which defines the requirements as regards hygiene for the animal feeds and n° 882/2004 and n° 854/2004 concerning the official control system performed to ensure the verification of compliance with feed and food law. They aim redesigning and at harmonizing the various European laws. The two directives concerned are the directive 2002/99/CE which detects the specific rules of medical police force for the animal products and the directive 2004/41/CE which repeals the old directives (they are directives 89/662, 92/118 and 95/408).

Figure 1. Schematic representation of the EU food legislation

<table>
<tr><td rowspan="5">Hygiene Package</td><td colspan="3">Regulation 178/2002, which establishes the general principles of 'Food Law'</td></tr>
<tr><td>Regulation 183/2005 Animal feed hygiene</td><td>Regulation 852/2004 Hygiene of foodstuffs</td><td>Regulation 853/2004 Hygiene of foodstuffs (animal origin)</td></tr>
<tr><td colspan="2">Control Regulation 882/2004 (officials' control)</td><td rowspan="2">Control Regulation 854/2004</td></tr>
<tr><td>Directives :</td><td>2002/99/CE
2004/41/CE</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td rowspan="4">Implementing regulation</td><td>Draft Annex on criteria</td><td colspan="2">microbiological criteria: Regulation 2073/2005</td></tr>
<tr><td>Regulation project: positive list of matter</td><td colspan="2">Enforcement measures of the Hygiene Package regulation 2074/2005</td></tr>
<tr><td colspan="2"></td><td>Control Trichinae
Regulation 2075/2005</td></tr>
<tr><td colspan="2"></td><td>transitional measures Regulation 2076/2005</td></tr>
</table>

Source : Source : Bulletin d'information agroalimentaire (http://bitagro.imist.ma/spip.php?article161)

2.2.1.4 Private standards

The private standards are developed and adopted by private actors (large firms, large industrial companies, NGOs) and influence largely the supply chain organization. To be complying with these standards is not obligatory, because they are voluntary in nature (i.e. not legally mandated), and thus the non-conformity does not involve penal sanctions. However, the global current tendencies of the global markets, especially the EU market made these standards

'de facto' obligatory. These private standards are often referred to as more strict (require infrastructures, equipment and most sophisticated production modes).

The most significant private standard prevalent in developing countries is EurepGap known today under the name GlobalGap (Global-retailer Produce Working Group-Good Agricultural Practices). Concurrently to this standard, we can find also the GFSI (Global Food Safety Initiative), and IFS (International Food Standard).

Hammoudi et al identified two typologies of private standards, the first typology called "professional referential" who aims at the organization of the practices within a company or a sector, and the second typology relates to private reference set by customers in worms their suppliers or their subcontractors (Hammoudi et al. 2010). According to second typology of standards, the authors distinguished between those which relate to the primary production (i.e. farm level like GlobalGAP) and those concerning the industrial production (i.e. manufacturing as like BRC, IFS) or on the transparency or non transparency communication transparency from the efforts engaged in term consumers safety.

Another distinction is also made that they are the standards "Business to Business" (B2B) or standards "Business to Consumer" (B2C). According to the author, the "B2B" collective private standards fall under a strategy to reduce risks for the long-term (initiative of collective standardization), whereas the standards registered in category the "B2C" individual firm standards is represented by the initiatives of individual standardization and relates to the logic in which the consumers are informed on the efforts of security with regard to the differentiation of the product (see Hammoudi et al. 2010). Hence, private standards can play an important role in providing additional security and reduce the expected risks associated with food safety failures (risk management) while constituting the basis of a quality-based product differentiation (Grazia and Hammoudi 2012).

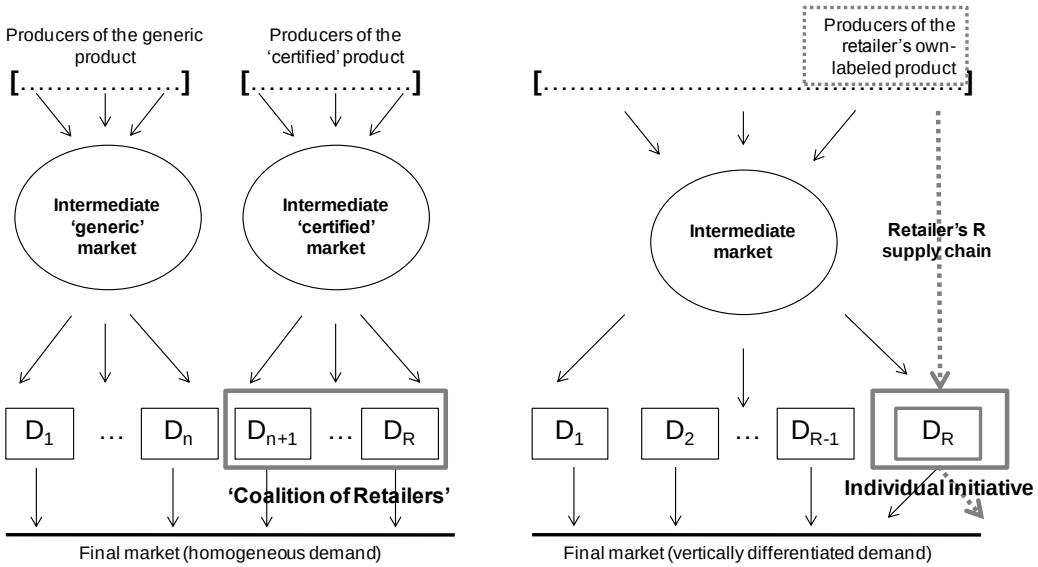
- ***B2B standards.*** They perform a risk management function and "procurement regulation" in intermediary markets (Giraud-Héraud et al. 2012) assuring firms against the risk of food safety failures and the consequent strategic costs (e.g. loss of market share, market revenue, erosion of brand capital, etc.) and operational costs (e.g. product recall, customer complaints, and penalties from enforcement authorities, these latter depending on the extent of liability rules). Liability rules are thus crucial for these standards to emerge (Giraud-Héraud et al. 2012; Hobbs, 2004). In this case, private standards afford "domain defense" (Caswell and Johnson, 1991) and protect market

share and reputation (Fulponi, 2006). In this context, B2B private collective standards implemented by large food retailers (such as GlobalGap) result from 'coalitions' of retailers requiring their upstream suppliers to meet specific requirements; these standards are international (global) in character and the market power of their adopters may make these standards *de facto* mandatory for access to important markets.

- ***B2C standards.*** Allow firms to take advantage of market opportunities through a quality-based product differentiation ("domain offence"). This function mostly refers to B2C individual firm standards. Increasing consumers concerns about the quality and safety of foods and the possibility to capture a premium price based on consumers' willingness to pay (WTP) for an increased quality level may drive private actors to move beyond public regulations (Garella and Petrakis, 2008; Giraud-Héraud et al., 2006). Here, private standards allow retailers to differentiate from each other on a quality basis and gain market share. These standards mostly rely on direct (more or less contractualized) relationships with upstream suppliers.

Given their specific objectives, these two approaches mainly differ in their 'visibility' to final consumers and in their collective or individual nature that in turn affects the type of vertical coordination mechanisms induced (intermediate markets or contractual relations) and the related effects on agrifood supply chain organization.

Figure 2. B2B and B2C private standards and effects on supply chain organization.



B2B COLLECTIVE PRIVATE STANDARDS: THE LOGIC OF GLOBALGAP **B2C INDIVIDUAL PRIVATE STANDARDS: THE LOGIC OF EQC**

Source: Grazia and Hammoudi (2012).

Until this point, these standards spread at the international scale and while being spread out beyond their borders of development. Even they are voluntary in nature, they are a strong tool which allows the integration of a certain number of operators in the global chains or disadvantages others by excluding them in these global chains with high value added, for their lack of their incapacity to support enormous costs of conformity.

2.3 The framework of standardization and quality control and food safety in Morocco

Morocco is a party to the agreements of the WTO, and thus is compelled to respect the various agreements to which it subscribed in this context. The SPS and TBT Agreements are those which are in direct relations to legal and institutional environment related to food safety and have an impact on trade of goods in international trade. On the other hand, Morocco has committed, as part of its economic development in a number of free trade agreements or association (as EU main partner to Morocco) with a number of countries or regional groups to expand its economic and commercial opportunities following the progressive liberalization of trade and open borders. Indeed, the regulatory and normative component is therefore one of the levers by which public authorities harmonize the national legal framework with international standards to eliminate the maximum distortion that could hamper trade with the outside world. Therefore, the domestic agricultural sector is directly affected and challenged on this subject. This sector should anticipate changes imposed by these partners on the issue of quality and engaging in strategies of medium and long term to achieve its economic development and durable sustainable development.

Of course, this goal is at the centre of economic debates and policy-makers and all interested entities, because everyone knows the issue of quality constitutes a fundamental key of competitiveness.

2.3.1 The framework of food safety and quality standard in Morocco

Mindful of the importance of food quality, Morocco has engaged a long time ago, in a restructuring and reorganization process of the national system for the management and promotion of quality. In this framework, monitoring and promotion of food quality concern several departments. Within these departments, commissions, committees and councils have been established for interdepartmental coordination in the field of food control. Among them, are (i) the Permanent Interministerial Commission for Food Control and Fraud Repression

(CIPCARF) founded in 1968, (ii) the National Codex Alimentarius Committee (NCAC), established in 1997 and (iii) the Interdepartmental High Council of Quality and Productivity (CSIQP) established in 1970, standardization birth date in Morocco after the promulgation of legislative texts governing this activity. Hence, following the importance of public health issues (e.g. SPS – agreement) in which the country is engaged, Morocco has embarked in recent years many reflections on the situation of the quality control of food products, especially the side relevance and effectiveness. This gave today birth at a "SPS – National Committee[5]". The desired objective is implementing a coherent food policy control, more caring, efficient and dynamic. This requires a better organization of the involved economy structures to ensure this mission, the human resources capitalization and strengthening intervention tools and the involvement of all stakeholders in the quality process.

Creation dates of these commissions have testified Morocco attention to quality food issues. However, this system, in spite of the means available to it, shows deficiencies at several levels taking into account the current economic climate.

At the national level, the issue of quality is required; however, the consumer is conscious of its purchasing power and the price at which it is willing to pay and therefore, his choice reasoning in terms of price. At the international level, where the consumer imposes more its preferences, Moroccan producers/exporters have no choice to meet these requirements in order to remain operative on international networks. The quality system foodstuff in Morocco was therefore developed especially to meet the international market requirements.

The survey[6] conducted with the Autonomous Establishment of Coordination and Control of Exports (EACCE) showed that the development of standards at national level is based on laws, ordinances (arêtes) and decrees that are subject of law project.

2.3.1.1 Standards inventory at the local level

In Morocco, the policy of *standardization of agri-food products* has taken place in the legal arsenal in the 1970s with the promulgation of a law relating to industrial standards for improvement and quality assurance of productivity. This law established by Dahir No. 1-70-157 of 16 July 1970. In 1993, Dahir No. 1-70-157[7] is amended by Dahir No. 1-93-221, Decree

[5] *The SPS National Committee (CNSPS) was established by Decree No. 2-10-122 of Rejeb 1431 (July 6, 2010, published in the Official Bulletin No. 5862 of 5 August 2010, p. 1547*
[6] *Survey and interview conducted with Chief of department of communication and trade relations (EACCE).*
[7] *Official Bulletin No. 3024 of 14 September 1970.*

No. 2-93-530[8] of 20 September 1993. This last decree (Decree No. 2-93-350), relates to mark or compliance certificate to Morocco standards. The decree distinguishes between product and enterprises certification. Thus, under Article 1 of Dahir cited above, the standards specify particularly "definitions, dimensional or qualitative characteristics', and employment rules and control objects or of industrial processed products".

Control and Fraud repressions on goods have also taken place in the legal arsenal by Dahir No. 1-83-108 of 5 October 1984 (9 Moharram 1405) promulgating the law "13-83[9]". This law, "law 13-83" bearing on the control and repression of frauds on food brought responsibility of food quality control at the agencies of Agricultural Ministry level. Recently, the new law "28-07 law[10]" *'de facto mandatory'* was developed that placed the responsibility for food quality control on the company having produced and/or distributed (as import for example). The terms of this law (28-07) stipulate that the manufacturer (or producer) and importer (if importing) must ensure themselves a self-monitoring system equipped with traceability documents before allowing distribution of food to consumers. In addition, this law (28-07) impose licensing requirements of food safety units, registration and identification of livestock, good hygiene practices guideline (GHP). The scope is to meet development goals targeted by the "PMV" in one part, and insert within the European Union requirements arising in particular from Morocco's advanced status in the second part. In other terms, this law target both local and international market

Figure 3. Comparison between the Law n° 13-83 and the Law n° 28-07 according to responsibilities

New Law no 28-07 (2010) : food safety ***Responsibilities:*** **Liability at** the **company** level - Monitoring of self-control, - Mandatory : traceability, - Maximum limited level of contamination: MLRs, Pesticide, heavy metal…	***Vs***	***Old Law no 13-83 (1984):*** Control and prevention of fraud on goods. ***Responsibilities :*** Control placed at the relevant departments on Agricultural Ministry

Source : own elaboration on the Moroccan authorities Official Bulletin

[8] *Official Bulletin No. 4223 of 06 September 1993.*
[9] *Law 13-83, for more details, see Official Bulletin (OB) No. 3777 of 1985, p. 152.158*
[10] *Law 28-07, Official Bulletin No. 5822 of 18/03/2010, pp. 214.219*

In 2010, the Law No. 12-06 relating to standardization, certification and accreditation promulgated by Dahir No. 1-10-15 (2010) was developed. This law provides the establishment of a national device governing certification activities and other activities of accreditation and conformity assessment. This device should be represented in three bodies.

- The first is the Moroccan Committee for Accreditation (CMA) as a "regulatory authority" that supervises the certification process undertaken by the certifiers. However, the recourse to this authority is voluntary[11].
- The second is the Moroccan Institute for Standardization (IMANOR), which replaced the Moroccan industrial standardization service (SNIMA) (Moroccan standards development).
- The third is the Higher National Council of standardization, certification and accreditation that replaced the Higher Interdepartmental Quality and Productivity (CSIQP).

Alongside the regulations, ordinances and decrees mentioned, there is another type of local certification that is voluntary in nature: the Moroccan HACCP certification (Hazard Analysis of Critical and Control Point). Indeed, the implementation of HACCP certification by the responsible authorities is meant to increase the level of food safety, on the one hand, and provide support confidence and flexibility for managers and the assessment regulators to facilitate their inspection tasks, on the other hand. The expected outcome is to promote international trade by strengthening the confidence of market actors (hygiene quality).

In this context, a Moroccan norm named "NM 08.0.002[12]" (which is based on the management system and HACCP requirements) has been developed based on the latest version of the principles of HACCP and Codex Alimentarius derived from the NM ISO9001 Moroccan standard. This NM HACCP norm is addressed to validate the implementation of a food safety system according to NM 08-0-002 norm requirements (HACCP Management System-Requirements). Beyond compliance with regulations in force, the company seeking to obtain the NM HACCP certificate also must comply with the NM 08.0.002 norm and the general circular which sets out the practical methods for granting and maintaining the requested certification (NM HACCP[13]). However, the recourse to this certification is voluntary.

[11] *Note that companies can be accredited with external certifiers as the use of "control authority" is voluntary.*
[12] *This norm treats terms of implementation and control of the seven principles of HACCP.*
[13] *This standard was developed based on the following standards:*

With regard to sanitary and phyto-sanitary measures (SPS), Morocco is engaged to the SPS Agreement of the World Trade Organization (WTO / FAO). To meet the requirements concerning this agreement, Dahir No. 1-10-08 of 26 Safar 1431/11 February 2010 on the promulgation of Law No. 28-07 relating to food safety is now the basic framework in the field for all operators in the agri-food and agro-industry sector. The first article of this law:

- Establishes the general principles of food safety;
- Establishes the conditions under which the food must be developed, produced and marketed for to be classified as safe products, whether products fresh or processed, which may be the processes and systems used of conservation, processing and manufacturing;
- Provides the general requirements for not allowing the placing on the market of safe products, including establishing general rules of hygiene, healthiness, use of cleaning and disinfecting products, the tolerable limits of contamination in food to which they must respect, including standards that made *de facto* mandatory;
- Indicates mandatory rules of consumer information, including labelling of foodstuffs and determination accompanying documents;

The provisions of this law cover all stages of manufacture, handling, treatment, processing, packing, packaging, transport, storage, distribution, exhibition, sale and primary products export, and foodstuffs for human consumption and animal feed. This law is aligned with what is practiced in the United States and Europe (free trade partners). The features of this law are based on devices of WTO SPS Agreement.

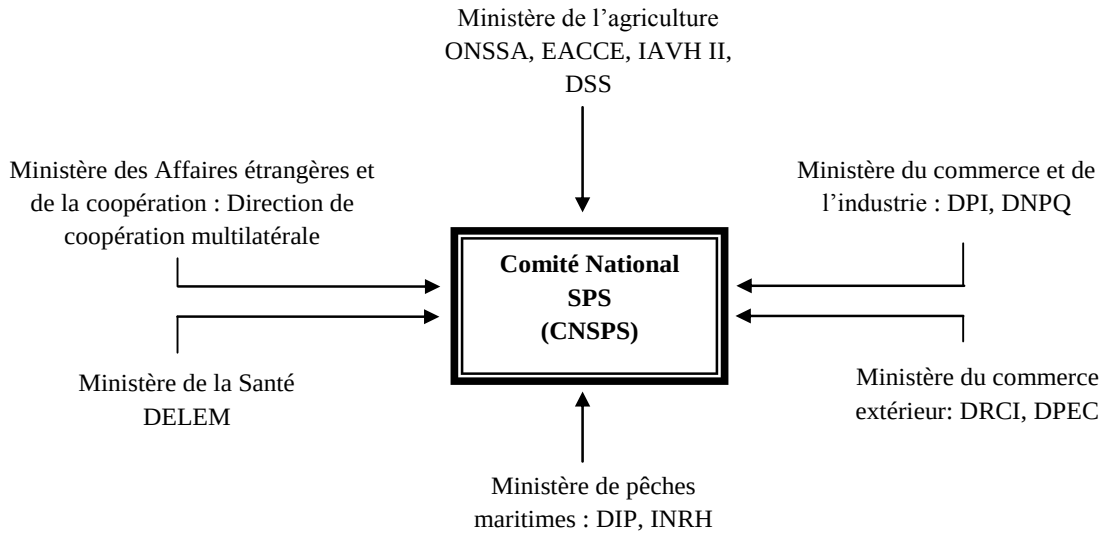
National professionals already operating on the agri-food chain have until March 2011 to comply with the new rules of this law. This period may be in favour of the organized sector where companies have already set up a monitoring system of quality (as HACCP, ISO...) giving them a "*first mover advantage*"; it is also in favour companies who are in this direction. For companies that have not yet implemented a quality assurance system, the upgrade of the law requires a period that exceeds the maturity date (March 2011). This problem of "timing" will play in favour enterprises with a quality assurance system, which will bring in other illegal enterprises that could not be conform.

- *CAC / RCP 1-1969 (Rev. No. 3, 1997), Amendment 1999: "International Code of Practice - General Principles of Food Hygiene" Codex Alimentarius.*
- *European Directive 93/43: on the hygiene of foodstuffs.*
- *ISO 9001-2008 " System Management - Requirements"*
- *DS 3027-1997: "Safety of food according to HACCP - (Hazard Analysis and Critical Control Points)."*

Commitments to be taken against non-compliant companies to the expiry of the deadline (March 2011), are detailed in the Law 28-07 (in particular Articles 25, 26, 27 and 28 of the law), they incur see if fines prison.

The country's commitment to the SPS Agreement give place to National Committee on Sanitary and Phyto-sanitary measures (CNSPS) basing on the Decree No. 2-10-122 of Rejeb 1431 (6 July 2010[14]). This committee includes in its constitution all departments involved in SPS and is chaired by the agriculture government authority (ONSSA).

Figure 4. Structures involved in the National SPS Committee.



Source : own elaboration on the Official Bulletin No. 5862 of 05/08/2010

This committee is responsible for developing national SPS policy. On the commercial side, he takes care to inform all trading partners on the implementation of new regulations and national and international standards on the animal and vegetable products safety as well as animal and plant health. Among these tasks too, contribute to programs of economic and social development, contribute strongly in raising awareness on SPS and extension national and international human rights work studies.

As a result, the new vision of Moroccan food control system has two components: a relation to the management and communication of risks. This component is provided by a public body under the supervision of the Agricultural Department (called ONSSA). The second part concerns the assessment of these risks. This task is entrusted to the Health Department (Ministry of Health).

[14] *Official Bulletin No. 5862 of 05/08/2010 page 1547.*

Table 1 : The main standards (Dahir, laws, decrees and orders) developed at national level

Dahir/Norm	Law/Decree/ Circular	Field of application
Dahir No. 1-70-157 (1970) Dahir No. 1-93-221 (1993) which amended the previous Dahir	Decree No. 2-70-314 Decree No. 2-93-530	industrial Standardisation
Dahir No. 1-83-108 (1984)	Law No. 13-83	Repression of fraud on food
NM 08-0-002 (NM HACCP) NM ISO 9001	General Circular	Food hygiene *(voluntary)*
Dahir No. 1-10-08 (2010)	Law No. 28-07	Food safety *(mandatory)*
Dahir No. 1-10-15 (2010)	Law No. 12-06 (which amended the Dahir No. 1-70-157 of 1970)	Standardization, certification and accreditation
Referential PIAQ/version 1 2007	PCI/PIAQ*(*)*	Self control program *(voluntary)*

(*) Internal Control Program/ Program of Quality Improvement, for more detail, see paragraph 2.2.3.1

Source :own elaboration basing on the Agricultural Ministry's Officials Bulletin

2.3.1.2 Standardization organizations

Currently, the main Moroccan organizations for standardization are the Technical Committee for Standardization, the Moroccan industrial Standardization Service and the Higher Council Interdepartmental of Quality and Productivity (which were replaced by the Moroccan Institute of Standardization "IMANOR" according to new law 12-06).

Technical Committees of Standardization CTN

These committees are established at the "Service de Normalisation Industrielle Marocaine" level (SNIMA). They can also be created from any ministerial departments, agency or inter-professional stakeholders interested. Their mission is to bring the technical work on the development of Moroccan standards. In this context, the committees determine their own work programs which take part of identifying market needs for different work items. To ensure coordination of work in all subjects of common interest, links are established between the technical committees.

Service of Industrial Standardization Moroccan SNIMA

Entity worked under supervision of the Ministry of Industry, Trade and New Technologies. Among these main missions, institution of CTN with any Ministerial department concerned, it also ensures the coordination of Moroccan standardization works and provides printing and broadcasting of standards and normative documents finalized. SNIMA also

represents Morocco to the International Organizations and Foreign Standards. *As mentioned above, this structure was replaced by Moroccan Institute of Standardization (IMANOR).*

***The Interdepartmental Higher Council of Quality and the Productivity** CSIQP*

This council is supervised by the Prime Minister whose ONSSA is an active member. The main Missions accomplished by ONSSA within this council are:

- Approval of draft standards after consensus of the various departments;
- Approving annual Standardization programs of various ministerial departments, etc;

The Law No. 12-06 sets the status of standardization, certification and accreditation. It also includes a number of innovations in the sense that private actors can become more involved in the concern of standards and provide more transparency on the institutional level. Therefore, *the Moroccan Institute of Standardization (IMANOR) is implemented by replacing the SNIMA and CSNCA replaced CSIQP*. The technical standardization committees are created within the new structure in place that is IMANOR. This strategy will involve next public bodies (state) private organizations in the framework of a public-private participatory approach.

2.3.1.3 Standardization procedures

Local public norms applied are basing on laws; decrees etc, and are subject to standard project programs. These project norms are prepared (or preparing) by technical standardization committees (CTN). This preparation phase is managed by the National Office of Health and Food Safety (ONSSA). In order to validate these projects, a three-month investigation was opened. This period of validation of project norms is managed by the Moroccan Industrial Standard Service (SNIMA). One time the project norm is approved by SNIMA, the Inter-ministerial high Council of Quality and Productivity (CSIQP) ensures its approval under supervision of the Ministry of Economic and General Affairs (MAEG). In the end these project norms been published in the Official Bulletin (BO) by joint ministerial decree prepared by the SNIMA.

2.3.2 The framework for food safety and quality control

2.3.2.1 Modus operandi of the control system at the local level

The quality control in Morocco is provided by two main bodies: ONSSA and EACCE (Ministry of Agriculture) working since November 2010 on training, service delivery, sharing

analytical expertise and information in the framework of the law n°28-07 relating to food safety of products, which establishes the sanitary conditions for both imports/exports of products. The enforcement of these regulations is ensured at national level by the Directions of quality control (Casablanca, Tangier and Agadir) and the border inspection posts (Al Hoceima, Dakhla and Laayoune, Fez, Jorf Lasfar, Kenitra, Marrakech, Nador, Ouarzazate, Oujda, Rabat-Salé, Safi). This law organizes professionals in the entire food supply chain from the farm to the fork (problems zoo-sanitary or phytosanitary measures) as well as new responsibilities and obligations (responsibilities of professional obligations of professionals, internal control, consumer protection...). According to this law, professionals must put on the market as food presents no danger of humans and animals' life or health and must inform the competent authority when a food does not meet law requirements of or cannot be considered safe product in accordance with its provisions and must provide all necessary information on the measures taken or to be taken to prevent, reduce or eliminate the risk to final consumer.

Professional Obligations

Food must meet hygiene and safety to preserve and ensure their quality and safety from the health point of view, does not poses danger to human life or health: traceability, internal controls, labeling. The self-control implies the repository to give coherence, credibility and efficiency which are necessary to quality control and food safety system.

Import and export conditions

At local level, the goods (imported or exported) are subject to sanitary and phyto-sanitary controls. In this context, ONSSA developed standardized procedures for importing. The export goods subject to controls must meet applicable regulations including those required by destination market/country and accompanied by sanitary or phyto-sanitary documents approved by the official services of ONSSA.

To accomplish this mission, ONSSA and EACCE have mobilized a number of control laboratories that are scattered throughout the production areas (see Part 3-2. laboratory of Analysis).

Regarding Fraud Controls, Law No. 28-07 dictates penalties (Articles 25, 26, 27 and 28 of the Law) which are exposed companies or operators not complying with the terms of this law (Article I of law).

2.3.2.2 The control bodies « Green Morocco Plan » (PMV).

National Office of Food Safety (ONSSA)

This public body includes all entities of the Agricultural Department involved in the control process of food products from the farm to the consumer. The ONSSA invested, therefore, in a vertical and horizontal control mission on import as on export production, processing and marketing of food products, both quantitative and qualitative, phyto-sanitary fraud as fair trading (the farm to fork and farm to table). These main tasks are:

- Implement government policies that fit within the safety of plants, animals and food.
- Analyze health risks.
- Control of food products.
- Delivering authorizations or approvals health.
- Controlling of food additives, packaging materials, products and materials that come into contact with foodstuffs and fertilizers and irrigation water ...;

Autonomous Establishment of Control and Coordination of Exports (EACCE)

The EACCE is a public body supervised by the Ministry of Agriculture and Fisheries. This body was established by Dahir 1-88-240 in 1986, and has legal personality and financial autonomy and governed by a Council composed by public Administration representatives and the exporting private sector of agri-food chain.

These main tasks are summarized in the control of agri-food products of animal or plant origin intended for export. Control provided by this body starts from approval conditioning units, manufacturing, packaging or storage of these products to control of final product at the exports level.

As regards to food safety, EACCE is charged to guarantee the compliance of the Moroccan foodstuffs intended for export with the lawful requirements of the international markets and to be ensured of the good respect of all the obligatory provisions related to the human health risk.

Direction of Epidemiology and Fight against Diseases (DELM)

It’s charged to realize a sanitary and hygiene control of foodstuffs as well sanitary and hygiene control of food (under supervision of Ministry of Health). Within its mission:

- Prevention of all forms of infections, toxi-infections, intoxications and epidemics related to food;
- Inspection of hygiene conditions in the establishments of manufacture, restoration, marketing and tourist within a prevention context;
- Technical and sanitary study of foodstuffs;
- Elaboration and following-up of projects of standardization, additives regulation, hydrotherapy;
- Control of food by microbiological, chemical and toxicological analyses;
- Seizure of recognized unhealthy food;
- Investigation in cases of foodstuffs poisonings;

Direction of Coordination and Economic Affairs (DCAE)

Body involved in controlling of prices and food safety from production to marketing of products by it economic and social division at the local level (provinces and prefecture of the country).

General Direction of Local Collectivities (DGCL)

It's relates to hygienic and safety aspects. The control is ensured by the Municipal Hygiene Offices (BMH). The BMH controls concern the animal or vegetal products origin at the processing, marketing, touristic restoration and personnel staff level.

Service de Normalisation Industrielle (SNIMA)

This structure is established by Dahir No. 1.70.157 of 26 Jumada January 1390 (30 July 1970) relating to industrial standardization and certification (IMANOR) for the improvement of quality and productivity. It is attached to the Ministry of Industry and is responsible for the coordination of national system activities of certification and compliance with norms.

Table 2. The main Morocco's control bodies

Sigle	Body's name
ONSSA	National office of Food Safety
EACCE	Autonomous Establishment of Control and Coordination of Export
DELM	Direction of Epidimology and Fight agaist Diseases
DCAE	Direction of Coordination and Economic Affairs
DGCL	General Direction of Local Collectivities
SNIMA (IMANOR)	Industrial Standardization Service

Source: own elaboration

2.3.2.3 Laboratories of analysis

Three types of laboratories are identified: microbiological laboratories, physic-chemical analysis or packaging. They are synthesized in the Table below.

Table 3. Laboratory of analysis

Structure/Laboratory	Functions
EACCE (8 laboratories)	– 6 for Physic-chemical analysis: Berkane, Meknes, Laarache, Casablanca, Marrakech and Agadir; – 1 for microbiological analysis : Casablanca – 1 for packing control: Casablanca
ONSSA (7 laboratories)	– 6 laboratories for analysis and veterinary research; – 1 for control and expertise service Ensure microbiological, chemical and toxicological analyses concerning food hygiene, serologic analyses and diagnosis of animal health
Official Laboratory of Research and Chemical Analysis 'LORAC'	Physic-chemical analysis on agri-food products
National Institute of Hygiene 'INH'	Microbiological and toxicological analysis on foodstuffs
Pasteur Institute laboratory	Microbiological and biological analysis of agri-food products

Source: own elaboration

Alongside these laboratories, others private laboratories in nature exist, or in possession of operators themselves to ensure internal control.

2.3.3 Support programs

The 1st steps to upgrade the management of food quality products in Morocco go back to 1990s. Supported by the World Bank (1992), the country is committed to supporting with strength a series of projects aimed at improving quality. These projects launched are aimed at strengthening the improvement of quality management at the enterprise level. Among the main objectives of this project:

- Empowering professionals to produce safe products with good quality;
- Strengthening of improving product competitiveness at national and international markets;
- Overcoming constraints to systematic control products for export;

2.3.3.1 Integrated Program of Quality Improvement (PIAQ)

The actions to be implemented consist in bringing in place an Integrated Quality Improvement system based on both a self-control (internal control program "PCI") based on the HACCP plan (concerning companies directly), a "Prerequisite Program" to improve conditions throughout the enterprise environment (where the food will be prepared or passes must be healthy safe) and regulatory requirements (labelling, packaging, additives ....) . The originality of the program is that it combines the administration, enterprises, professional associations and consumer associations.

Having started in January 2002, the program has focused its activities on three products covered of canned vegetable: table olives, jams and tomato concentrate. The choice of these products can be explained by the importance of their production or weight in exports of canned vegetables, but also by the importance of the problems of low quality products, especially in the case of jams and tomato paste.

For the purposes of the program, two large cans vegetable producing regions were chosen: Marrakech and Fez-Meknes. Companies can benefit from assistance must undergo a pre-diagnosis (12 companies are involved in this program).

The evaluation of the program covers the following areas:

- Accountability of the direction of the company benefiting;

- Prerequisite program;
- Regulatory requirements;
- The HACCP plan;
- Documentation system;
- Verification and update.

Subsequently, the program covers all nationwide of products plant origin. Companies with successful adoption of the program to 80% on each axis are qualified auditable. Among the main achievements of the project, elaboration of a repository "Integrated Program of Quality Improvement (PIAQ)[15]" for harmonizing the sanitary approaches and quality management in the agri-food sector, a gain and a lower cost and greater openness to foreign markets. This repository includes codes and guidelines specific to agri-food products (see below box):

Table 4. PCI/PIAQ (2007) repositories

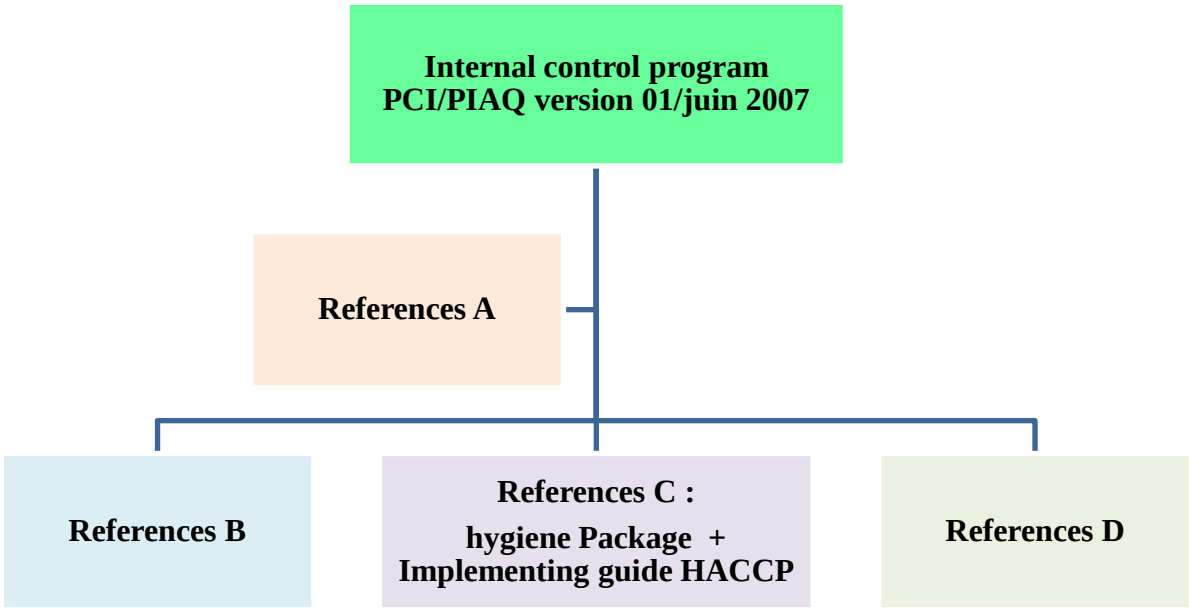
References A	Include the Codex Alimentarius references which provide examples of control measures including 'pre-requisite programs' and recommendations concerning their selection and use.
References B	Include the Codex references which provide standards relating to hazards and their measurement.
References C	Include application guide references that provide recommendations on applications to different regulations of importing countries such as the hygiene package of EU countries. In addition to the hygiene package, also references C include implementation guide of HACCP.
References D	Contain specific guides' references to certain products of plant origin; International Olive Council guides (IOC).

Source: own elaboration on the PIAQ version 01/June 2007 document.

According to the previous table, the PCI/PIAQ program can be summarized as follows:

[15] *Integrated Program of Quality Improvement (PIAQ) repository for the establishment of self-enterprise-level production, processing and packaging of food of plant origin. Version 01, June 2007*

Figure 5. Simplified scheme of PCI/PIAQ



Source: own elaboration on the PIAQ document, version 01/juin 2007.

The last PIAQ progress assessment in all concerned enterprises shows that 48 have met system requirements and therefore certified PCI/PIAQ Version 01/June 2007 (which 36 operate in the fresh or frozen fruits and vegetables) (see table).

Table 5. Internal control program (PCI): Achievements and Projections 2008-2012.

Products	Agreed units October 2007	Eligible units October 2007	2008-2009		2009-2010		Objectives 2010-2011 Audits	Objectives 2011-2012 Audits
			Audited units	Certified units	Audited units	Certified units		
Early vegetables	194	42	27	19	37	28	52	68
Citrus	49	9	6	5	11	8	22	35
TFLF*	243	51	33	24	48	36	74	103
TPVT**	283	32	25	12	13	12	35	65
TPOV***	526	83	58	36	61	48	109	168

(*) Total fruits et légumes frais
(**) Total produits végétaux transformés
(***) Total produits d'origine végétale

Source : EACCE Direction technique (Département des infrastructures techniques).

On the total of approved companies under this program, those that operate in the fresh (or frozen) fruit and vegetables represent 46.2%. The goal for the 2011-2012 campaign is to audit 168 units in which 103 perform on fruit and vegetable sector.

The strategic idea of the program is to support and assist companies to comply with PIAQ programs by implementing a quality management system.

2.3.3.2 Improving quality Program of agricultural inputs (PAQIA)

Conducted under the supervision of the DPVCTRF, this project included among its activities the development of an "information system analysis and alert" (SIAA) for agricultural inputs. This system aims to connect the different entities involved in the quality control and analysis of agricultural inputs through a computerized system that will enhance:

- The speed of information transfer;
- The number of criteria analysis of the test results;
- The periodicity of test results analysis update;

Structures involved in the project are: DPVCTRF, LOARC, and Directions Quality Control at the border of Casablanca, Tangier and Agadir.

2.4 Labels and quality signs

Brands and labels are signs of compliance and quality recognition (Alpha A. et al, 2009). So, operators looking to better stand out on market position through these signs can make the recognizable quality. This allows ensuring of consumers the products with it origin and characteristics, and allows producer to enhance its quality efforts for a better remuneration (Alpha A. et al. 2009). In Morocco, the Dahir of 14 October 1914 is introduced and forbade any attempt to mislead the contractor on the spices of any goods or it origin. It comes to “organic certification”, ‘Appellation of Origin’ (AO), ‘Geographical Indication’ (GI) and ‘Agricultural Products Labelling’ (LA). To assign one of these signs to the applicant, it must conform to the specifications.

2.4.1 Framework of Moroccan legislative of recognition and protection of distinctive signs of origin and quality « SDOQ »

Distinctive signs of origin and quality (SDOQ) of agricultural and fishery products

Recently, a draft law was approved and implemented, namely the law 25-06 on "distinctive signs of origin and quality (SDOQ) of agricultural and fishery products[16]",

[16]*This law (Law 25-06) has two decrees of application: Decree No. 2.08.404 relating to the composition and operation mode of the SDOQ National Commission, and Decree No. 2.08.403 relating to the SDOQ food and agricultural and fishery products. The second decree is composed of three Order of the Minister of Agriculture and Fisheries. These are (i) MAPM Decree of 05/01/2009 on the procedure for recognition of a SDOQ, (ii)*

promulgated by Dahir 1 - 08-56 of 23 May 2008. This law establishes the conditions under which the SDOQ of concerned products are recognized, awarded, used and protected. It also determines the obligations and responsibilities of those who wish to benefit from.

This bill is part of the national policy for sustainable rural development. He assigns essentially the value of agricultural products and consumer protection by improving quality by allowing it to characterize the products for which they are looking for and/or to distinguish between similar products that may confront on the market. Indeed, a system for recognizing and protecting specific quality products is introduced. This system has relevance and coherence and includes two main steps: the recognition of "distinctive signs of origin and quality" (Decree No. 2.08.403, Order of MAPM 83-09)[17] and certification of food and of agricultural and fishery products (Decree No. 2.08.403, Order of MAPM 82-09)[18].

Figure 6. Schematic representation of regulatory architecture of products AO, IG and LA in Morocco

Decree 2-08-404: defines the composition and mode of operation of the National Committee SDOQ

Decree 2-08-403: relating to SDOQ on the food and agricultural and fishery products.

- ***MAPM Order '83-09'*:** establishes the recognition procedure of SDOQ
- ***MAPM Order '82-09'*:** establishes the certification procedure of products benefiting from a SDOQ
- ***MAPM Order '81-09':*** establishes the internal rules of CNSDOQ

Source: own elaboration on the Ministry of agriculture documents.

2.4.1.1 Organic certification

In Morocco, the "Organic" certification refers to foods obtained in compliance with all standards for organic production at all stages (production, handling, processing and marketing) and certified as such by a body or authority duly empowered. Many certification bodies are present in Morocco including: Ecocert, ISACert, Quality France, Afaq-Acert International, Sygma-ProCert.

MAPM Order of 05/01/2009 concerning the procedure of certification of products benefiting a SDOQ and (iii) MAPM Decree of 05/01/2009 on the rules of Procedure of the National Commission SDOQ.

[17] *Enforcement Decree of the law on 25-06 "distinctive signs of origin and quality of agricultural and fishery products" 83-09 Order of the Minister of Agriculture and Fisheries of 05/01/2009.*

[18] *Idem, 82-09 Order of the Minister of Agriculture and Fisheries of 05/01/2009.*

Recently, a bill is being drawn by the competent authorities. This law defines the basic principles of organic production. It comes to Law No. 39.12 on the production of agricultural products and aquatic. The following table summarizes the flow dynamics of export of organic agricultural products (table 5)

Table 6. Dynamic flow of organic product exports by sectors (in tons)

	1998/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07
Early vegetables	1233	1904	4385	3036	2892	3332	4059	5457	5531
Citrus	659	773	626	492	909	890	792	1213	1110
Processed products	3	0	2	35	77	37	33	109	589

Source : EACCE in Fellah-trade.com

Overall, early vegetables are the first category of organic product exports with an annual average of about 77%. Organic product exports are characterized by a high exports' concentration on the French market, a low level of product diversification and a strong fluctuation of exported volumes. The main products exported are Tomato, Zucchini (early), citrus (navel and Morocco-Late).

Table 7. Program-contact targets

	Current Situation	Objectives of 2020	Growth
Area (Ha)	4 000	40 000	36 000
Production (T)	40 000	400 000	360 000
Exports (T)	10 000	60 000	50 000
value (millions DH)	100	800	700
Creation of work (million days of work)	1	9	8

Source : http://www.fellah-trade.com/fr/developpement-durable/contrat-programme-2011-2020-filiere-biologique

2.4.1.2 Geographical indications (IG)

Geographical indications are at the heart of cultural heritage, traditional methods of production and natural resources. In order to characterize a product or whole products, the geographical indication used to identify it as originates in a territory, region or locality where a given quality, reputation or other characteristic of product can be mainly attributed to its geographical origin on the one hand, and the production and/or processing and/or preparation

of which take place in the defined geographical area[19] (Argan Oil "AMIGHA" Clementine Berkane).

2.4.1.3 Appellation of origin (AO)

The geographical denomination of a country, region or locality which serves to designate a product originating therein, the quality, reputation or other characteristics determined are due exclusively or essentially to the geographical environment, including natural and human factors, and the production, processing and preparation of which take place in the geographical area. Among the products that have benefited from a protected appellation of origin Tyout “olive oil” of Chiadma.

2.4.1.4 Le Label Agricole (LA)

The purpose of having recourse to certify a product "Agricultural Label" is, in fact, distinguish it from other similar products as conditions of production, manufacture and, where appropriate, its original production. Recognition of agricultural labels requires that product(s) to recognize shall (has) have a set of specific qualities and characteristics and so therefore has (have) a high quality. Given that Morocco has a large diversity reservoir of its natural environments, traditional practices of farmers and their culinary art developed by its population through centuries.

Table 8. SDOQ requirements in Morocco

SDOQ	Requirements	selected signs	Example
IG	Specifications	Geographical area	- Clementine Berkane, Datte Majhoul of Tafilalet, Argane (Souss-Massa-Daraa)
AO	Specifications	Geographical area + mode of production (know-how of the local population)	- Tyout Chiadma olive oil, Safran of Tiliouine,
LA	Specifications	Mode of production (the intrinsic qualities of products)	- Agneau Laiton

Source : own elaboration

[19] *TRIPS Agreement (WTO Agreement on Trade-Related Aspects of Intellectual Property Trade), in particular Article 22.1*

2.4.2 Recognition procedure and certification of SDOQ

Accordance with the provisions of the law Decree No. 2.08.403 especially 25-06 83-09 MAPM Order of 05/01/2009, the recognition of a SDOQ in Morocco requires two main conditions that must be met by applicants. It comes to examine the application for recognition and follow specifications requirements. Producers have to meet these two conditions if they wanted to benefit from these SDOQ. The role of the IG is to highlight a place or region of production that determines the precise qualities or characteristics of the product originating therein.

The certification process whose provisions are established by MAPM Order 82-09 of 05/01/2009, meanwhile, involves two basic steps: (1) the recognition and registration of SDOQ with authorized bodies (2) uses the certification of food and agricultural products and fisheries benefiting from these signs. Certification, in fact, is issued by a competent body once the product(s) is (are) conform to the regulations that define SDOQ. The law states that any attempt to deceive the person exposed to penalties, sanctions or even the withdrawal of SDOQ concerned.

2.5 Management, control and quality promotion of export products: the case of fruit and vegetables

The control at the local level (domestic market) is ensured by ONSSA that control all stage from the farm to final product. At the export level, the control is ensured by EACCE that control also the all stage from production to export. The control ensured by EACC focused more on the export stage, given that the law 28-07 and the PCI/PIAQ required the obligation of results. Moreover, the control at this level is systemic and drastic by checking every consignment or truck, and inspections on the packaging houses. After control, and when products intended to export is comply with destination market requirements, a certification of conformity to norms in force is delivered for to improve the conformity at the border of destination markets. This mission is ensured by a great number of the EACCE controllers. However, in some cases, the control at the export level can be ensured by both the EACCE and ONSSA.

Concerning analytical control (laboratory analysis), the verification of conformity of products intended to export, including maximum residue limits of pesticides (MRLs) to international markets regulatory requirements, the EACCE set up a monitoring plan designed pest control pesticide levels in export plant products (especially fresh produce). The plan

developed is based on its regular monitoring records phyto-sanitary treatments in packaging units as well as the establishment of an annual collection of Sample to be analyzed by each delegation.

Over the last five years, the delegation[20] of Agadir (Souss-Massa area) takes on average 1000 samples per year for the MRLs analysis.

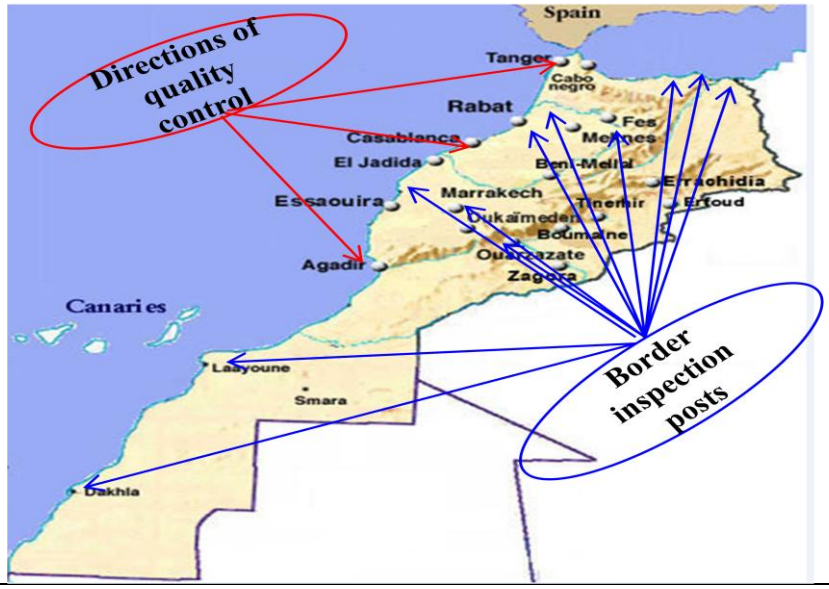
At the national level, and during the period ranging from 01/09/2010 to 30/04/2011, the number of samples taken increased to 1950 against 1774 samples during 01/09/2009 to 30/04/2012 representing an increase of 10% almost (EACCE, 2011).

2.5.1 The control system of products intended to export

Producers/producers-exporters are required to comply with a number of requirements to fulfill customer needs, both public norms and private voluntary standards (as EU standards, USA norms and EACCE standards, etc.), as illustrated in Chapter 1.

The control of the compliance with these standards to local border is ensured by EACCE, accredited by the EU and certified ISO 9001 version 2008. This organization ensures a police role by exerting a consistently and drastically control. A number of regional offices with necessary technical resources, skilled human resources, and reference standards and regulations are available to carry out the control mission (see maps).

Figure 7. Localization of quality direction control and border inspection posts



Source: Map extracted through Google image

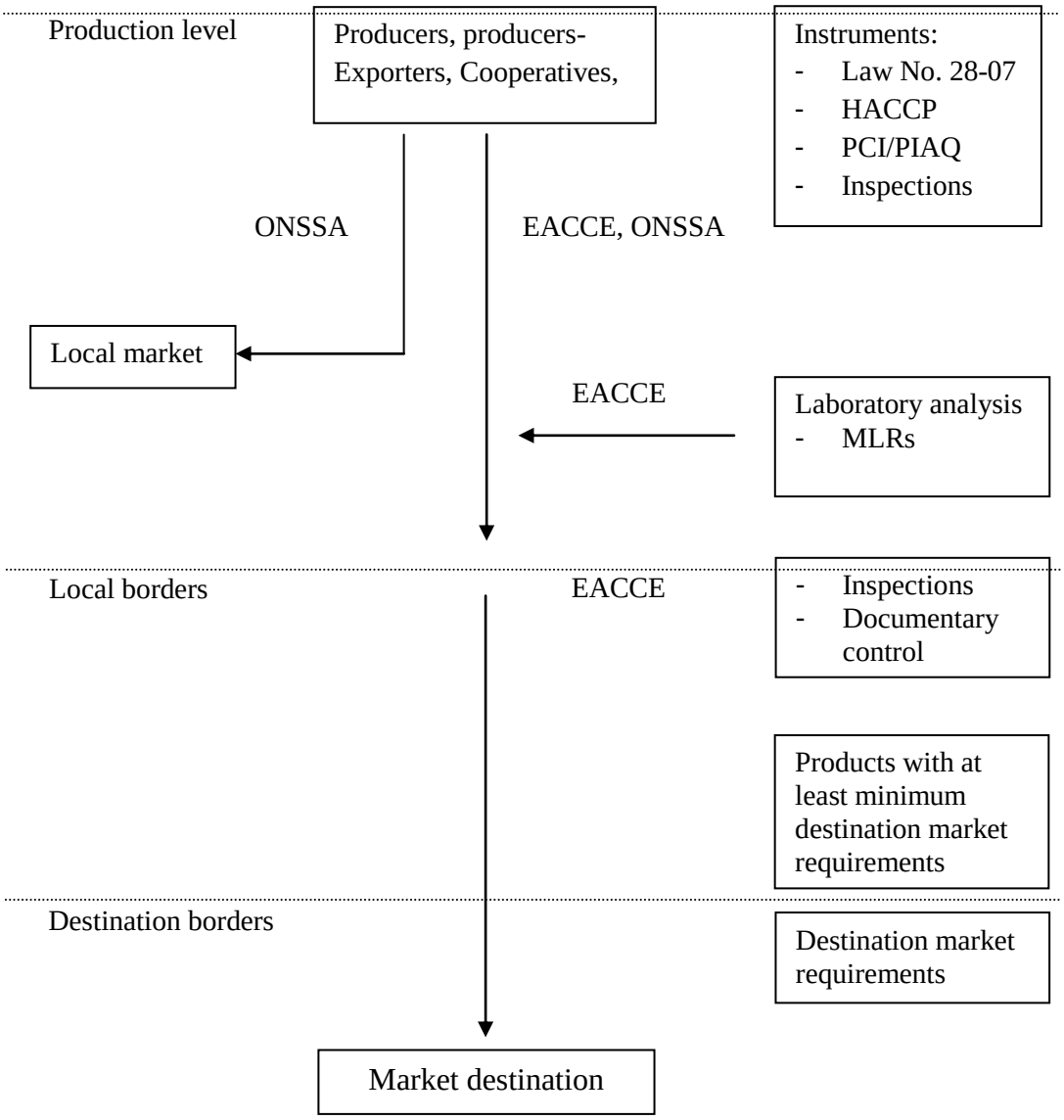
[20] *Regional Delegation of Autonomous Establishment of Control and Coordination of Export located Agadir area.*

Given that the products (fruits and vegetables) are characterized by high sensitivity (perishable), companies are subject to *inspections* on the production and treatment sites. The certifications awarded can be removed by this organism (EACCE) if non-observance of quality standards. Recently, EACCE set up the repository PIAQ version 01 / June 2007 imposing a self-control system. The internal control program is a consensual approach and participatory management of food quality products intended to export based on sustainable engagement of EAACE and exporting companies to continuously improve the level of satisfaction of their export products to safety and compliance requirements applicable on destination markets.

The fruit and vegetable stands out in fresh and processed products. For processed fruit and vegetables, the export canned units are approved, and control is entrusted to EACCE. Control made for the conservation process and product quality intended to export in accordance with the law No. 32-86 relating to Morocco's technical controls of manufacturing, packaging and export. With regard to the fresh produce that is our scope (citrus and early vegetables), we see that there is already a system of traceability that can be traced back from downstream to the origin of the exported product or even the station which has ensured its packaging. The goal is to provide the maximum useful information to meet the requirements of customers (importers). To meet this need, the package must include the following information (according to the law No. 28-07):

- Packaging identification code in accordance with current standards;
- Product origine;
- Indication of the production area (this item is voluntary but helps to better identify the product, indicating the production area);
- Information about the product i.e. nature, category, size, net weight see the variety of references and packing station exporter references,
- Certification regards farms (production sites) as well as the packing stations.

Figure 8. Simplified diagram of supply chain and control instruments implemented



Source: own elaboration

2.5.2 Role of exporting groups

The creation of these groups comes after the liberalization of the marketing of citrus and early vegetables in 1986, thus declaring the state disengagement. These intermediaries, who are often key players in international value chains have long worked to develop marketing strategies based on both quantitative objectives (export larger volumes possible) and qualitative (ensuring the highest possible quality level of production practices and compliance with standards and sanitary requirements). Based on these objectives, exporting groups are trying to frame their affiliated producers. This commitment enhances the reputation of these groups. Reputation is established basing on trust relationships development with their customers by enhancing the quality of traded products.

The two major Morocco's exporting groups are 'Morocco Fruit Board' (MFB) and 'Fresh Fruit Morocco' (FFM) which is affiliated with other exporters and producers-exporters. Basing on the web site of these groups and the survey conducted in 2010 with one of them, the mission of these groups is to manage the marketing of exports to far-away destinations such as the EU, North American countries (USA and Canada), Scandinavia, Russia, the Middle East, etc.

These groups and their members follow a traceability system by investing in their skills, know-how, organization of their packing stations and farms. On the side of certification, they are committed to meeting the requirements and specifications of their partners. This requires an efficient system of support and awareness at the upstream level. On the whole, the majority of actors operating across these groups are certified. To better fulfill the requirements of downstream customers, these exporter groups impose on their upstream customer's specifications which are none other than that required by importers or target markets (downstream). This finding becomes more important, especially, when it dealing to strong higher value chains (e.g. 'super market driven chains'). In general terms, it come organized modern retail with higher value added. In response to these new international market requirements, the upstream players must invest in this new strategy aimed at meeting the needs of downstream customers (usually the consumer). A positive reaction to this observation allows players to better position itself on their markets or even conquers others (or market segments) with higher value added.

The resultant of all these findings (survey), the exporter groups impose on their customers upstream (producers, producers-exporters, exporters and cooperatives) who wish to export through their groups a certain level of production practices that corresponds to the level of target market requirements (or targeted market segment). A traceability system and obtaining certificates of compliance are also required to meet the specifications and justify the compliance of their products at the border.

One of these two groups has sold 200,000 tons of exports in 2006 (result of the questionnaire[21]). This volume has increased to 220,000 tons in 2009 achieving a performance of + 10% from 2006 to 2009. Almost the entire product sold by this group is composed of citrus.

[21] *Survey conducted with this actor in 2010 concerning Morocco fruit and vegetable export supply chain organization*

Table 9. Main exporting groups in Morocco

Exporting group	Date of creation	Member groups	Main products		Role of group	Brand marketed
			Citrus	Early vegetables		
Fresh fruit Maroc « FFM »	1998	AGRI-SOUSS, GPA, LIMOUNA SOUSS, STATION PRIAGRUS	Clementine, Nova, Ortaline, Mandarins, Oranges, other citrus	Tomato, Peppers,	Manage the marketing of exports to far-away destinations	
Maroc fruit board « MFB »	2000	GEDA, COPAG, DELASSUS, SALAM, GKB, SOGECAP, OCE	Clementine, Mandarins, Oranges, Lemons	Tomato, zucchini, Beans, Peppers		Maroc Select

Source: own elaborations on the web site of groups

2.6 Conclusion

We have tried throughout this chapter confine the quality management system in Morocco compared to his counterpart at the international level, with particular attention to the EU system, Morocco's traditional customer. The study shows that Morocco inventory - with a range of draft laws, decrees, Dahir, action programs - is well underway in the way of regulation in order to harmonize its system not only the quality of its partners (importers), but also to ensure a quality product and safe for the local consumer.

Of course, the implementation of Law No. 28-07 on the food products safety (by ONSSA) and internal control program PCI/PIAQ (integrated program for quality improvement by EAACE), which place the control responsibilities at companies themselves through the establishment of a system of self-control with traceability obligation evidenced by the great efforts made by the public authorities with the commitment, of course, of private sector (professional sector) at this level.

At the international market, despite the international norms and standards evolution, characterized by a clear tendency to strengthen requirements severely penalizes producers, they show a great capacity to better adapt to new changes.

According to these new issues, we can summarize the evolution of Morocco quality system as follow:

Table 10. Evolution of Morocco quality system

Current situation	The modern approach
- Official control focused on the final products - Inadequate involvement of professional on the safe and quality food production - Manufacture of food products in the most case in non-accredited establishments - Lack of traceability of food products	- Control based on the principle of risk analysis - Traceability of animals , plants, and food - Obligation of self control - Granting of approval for safe food establishments; - Professional accountability vis-à-vis quality and safety of their products

Source: ONSSA, Morocco

3 Fruit and vegetable sector of Morocco

3.1 Introduction

Agriculture is a key sector of the Moroccan economy. In 50 years, it has made great progress in terms of modernization and diversification. So, Morocco's economic growth is highly correlated with that of agriculture, which highlights the importance of this sector to the country's economy. While the upstream and downstream linkages between agriculture and the rest of economy account for some of this correlation, the bulk of it is due to fact that the incomes in rural areas are primarily derived from agriculture. The rural population is also estimated at 18 million people, about 70% of population.

However, Agricultural policies of successive past 50 years, even if they have made undeniable progress, have not been able to address agricultural development in its totality, in its diversity and in its fundamental relationship with rural development and sustainability. They remained generally too interventionist and technicist, they were unable to address the human capital, mobilize and empower actors sufficiently or effectively support their initiatives[22]

In the global context of food security, climate change, rising prices of agricultural products, producer responsibility, the fight against poverty has forced Morocco to review its agricultural strategy in a way upgrade, restructuring and redefinition of missions. It is in this perspective that the new Green Morocco Plan[23] (PMV) was developed and to make agriculture the main engine of growth in the national economy in the next 10 to 15 years. Along with significant benefits in terms of GDP growth, labor creation, exports and the fight against poverty.

[22] *Haut Commeceriat au Plan (HCP), "Prospectives Maroc 2030", Mai 2007*

[23] *The main objectives of the PMV are:*

- *Print the agricultural sector a dynamic evolution harmonious, balanced and scalable into account its specificities;*
- *Exploit margins of progress and make the most potential;*
- *Facing new challenges while preserving the social and economic balances;*
- *Accompany the profound changes experienced by the global food system*

Based on the diagnosis of the agricultural sector, the outline of the Green Morocco Plan is organized around six ideas relating firstly to a clear conviction that agriculture should be the main engine of the national economy growth for the next 10 to 15 years, with huge impacts in terms of GDP growth, labor creation, exports and the fight against poverty.

The second idea considers that agriculture must be all inclusive through a differentiated strategy for each type of player, breaking with the traditional concept distinguishing between modern agriculture and farming social and taking into account the diversity of actors and their intrinsic and socio-economic constraints.

According to the third idea, Morocco must address the issue of agriculture background: the weakness of the actors around innovative organizational models, in the following examples that have proven themselves in international level and in Morocco, as the aggregation of actors.

The fourth basic idea focuses on the need to promote private investment, accompanied, if necessary by public support. In this perspective, the 5th idea calls for the adoption of a transactional approach around the actual implementation on the ground than 1,500 projects identified on the basis of a business model focused.

The sixth idea recommends that all sectors have a chance of success. This is to give players the best chance to succeed this mutation.

To achieve these main ideas, the agricultural strategy is focused on a global approach to all stakeholders according to their objectives, based on two pillars:

- The first pillar focuses on the development of modern agriculture with high value added/ high productivity to meet the rules of the market based on private investment, through funding from 700 to 900 projects with a total cost of 10 to 15 billion dirham annually.
- The second pillar concerns the solidarity support of smallholder agriculture through improving farmers' incomes more precarious, especially in remote areas. In this context, there will be funding 300 to 400 social projects registered under a regional plan retraining of farmers in precarious activities with high added value and less sensitive to precipitation. It is also to encourage intensive production projects in the areas of animal as well as plant production, through the supervision of farmers and their qualification for an extra income.

According to it crucial role in the country's' economy, fruit and vegetables supply chain tacked a large place in the PMV strategy. Because of it high value added in terms of exports and money that generate at the export level.

3.2 Agricultural sector in the country's economy

The share of agricultural upstream in the national economy is considerable, with 74 billion dirham, which represents 14% of gross domestic product (GDP). Despite repeated cycles of drought, agricultural GDP has more than doubled since the 60s. From 2000 to 2011, agriculture's contribution to Gross Domestic Product (GDP) varied between 11% and 18%. Agriculture employs around 50% of the nation's labor force and 80% of the rural labor force[24] (49% of the national labor force) playing thus a social and economic roles. The country's food security goals are furthered with self-sufficiency ratios reaching as high as 100% for fruits and vegetables and meat, 82% for milk, 60% for cereals, 50% for sugar and 20% for edible oils. On the average over the last 10 years, agricultural exports accounted between 15% and 21% of the national's total exports.

Internationally, agricultural imports are between 14 and 24% of total imports, while agricultural exports accounting between 15 and 21% of total exports.

The fruits and vegetables sector occupies more than 700,000 Ha, of which almost 250,000 Ha is in vegetable production, and more than 450,000 Ha is in fruit production, excluding olives. The average annual, production amounts to about 7 million tons with 3 million tons of fruits (43%) and more than 4 million tons of vegetables. The average annual, in terms of GDP, varied from 10% to 20% depending on the seasons. Also, fresh fruits and vegetables contributed to processed export products at 20%.

Annually, it generates 90 million workdays with packaging and processing activities providing an additional of 30 million workdays, which is more than 22% of the employment generated by all agricultural activities. In 2010/2011 fruit and vegetable amounted to 1.8 million tons with a turnover amounted to 3 billion DHs. The Souss-Massa area generates itself 90% of the turnover (2.7 billion DHs).

[24] *The rural population is estimated at 18 million peoples*

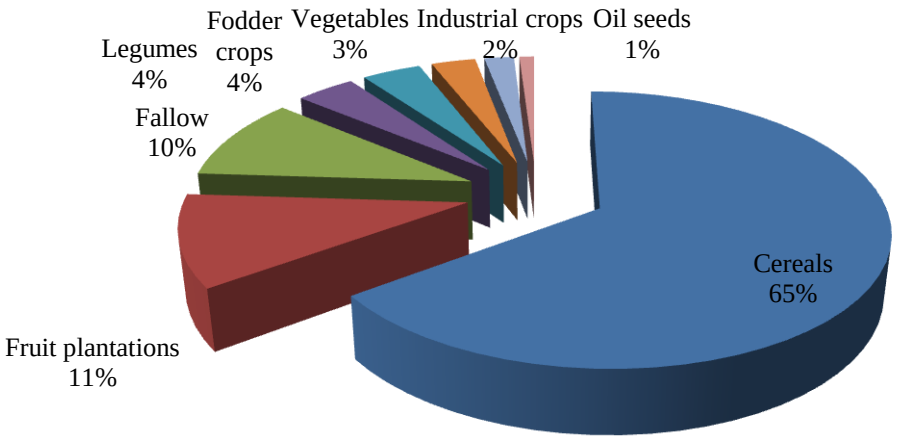
3.2.1 Natural conditions

3.2.1.1 Land use

Morocco covers an area of 71 million Ha, with 39.2 million Ha or, 55% have an agricultural orientation. This latter is made of 8.7 million Ha arable lands. Arable land account only around 13% of the country's total area. The limited supply of arable land is irritated by water scarcity. About 7.4 million Ha or 84.1% of the arable land is cultivated. Furthermore, land that has irrigation potential is estimated to be 1.4 million Ha.

Concerning land use, overall cropping patterns are dominated by cereal production. Of the total cropped area of 8.7 million Ha, 65% of total arable lands were used to produce cereals. Fallow land accounted 10% of the area cropped, fruit plantations accounted 11%. Legumes and fodder crops represent each 4%, and vegetables and industrial crops represent each less than 4% of total arable land. Vegetables represent exactly 3% of this arable land (see figure down).

Figure 1. Land use in % (2010)



Source: own elaboration using the MAPM data

Therefore, and economically, fruits and vegetables can improve returns on agricultural land, compared to cereals or livestock, and provide a better job and a good recovery of work capacity. As named in the "Moroccan Green Plan" (PMV), the agricultural sector should be an engine of economic growth and an effective tool to fight against rural poverty.

Concerning performance of the agricultural sector, and according to the 1996 general agricultural census, around 1.5 million farms in Morocco use an arable land mass of 8.7 million Ha (see table).

Table 1. Distribution of class of area by farms number and area

Class of area in Ha	Number of farms (1000)	Area (SAU) in 1000 Ha	Number of farms in %	Area (SAU) in %	Cumulus of farms number	Cumulus of area
0 – 1	315.3	170.4	22.0	2.0	22	2
1 – 3	446.7	904.7	31.2	10.4	53.2	12.3
3 – 5	237.7	1011.1	16.6	11.6	69.8	23.9
5 – 10	247.8	1894.7	17.3	21	87.1	45.6
10 – 20	125.2	1880.5	8.7	21.5	95.9	67.1
20 – 50	48.0	1526.0	3.4	17.5	99.2	84.6
50 – 100	7.8	585.2	0.5	6.7	99.8	91.3
100 and more	3.2	759.4	0.2	8.7	100.0	100.0
Total	1431.7	8732.2	100.0	100.0		

Source: MAPM (general agricultural census, 1996

Therefore, five different types of land ownership can be found in the country: private property (75.8%), collective ownership (17.7%), State domain (3.1%), Guich[25] (2.8%), Habous[26] (0.6%). Almost 24% of arable land, which amounts to more than 2 million Ha, is affected by usufruct, and due to these type of property use and right, investment and intensive production patterns are discouraged.

Land use right are unevenly distributed and severely fragmented. Around 70% of the farms have less than 5 Ha and use 24% of the arable land. Farms having more than 20 Ha represent 4% of the total farm number but use 32% of the total arable land. The challenges of facing small farms are further aggravated by severe fragmentation. The average number of parcels per farm is 6.4 with an average parcel size of 0.92 Ha.

3.2.1.2 Water use

Morocco's renewable water resources never exceed 29 billion cubic meters (m^3). After accounting for potential storage and ground water development, only 20 billion cubic meters are divertible annually, with 16 billion cubic meters from surface water and 4billion cubic meters from ground water.

[25] *Guich signify another form of collective ownership of land.*

[26] *Land affected by individuals (liberality) to serve a community purpose, often to support mosques' operating expenses, through the generated income. They're administrated by the Ministry of Habous and Islamic affairs that often rent them to farmers.*

As a consequence of a sustained water mobilization effort, a great number of large dams have been built, increasing the storage capacity of water (dam policy).

Water scarcity will be exacerbated by expansion of irrigated agricultural production and urban development combined with a slow growth in available supplies, a depletion of aquifers and the pollution of available resources. A number of watersheds are already experiencing water shortages, which will impose costly water transfers from well endowed watersheds to poorly endowed ones. Some of the more intensively used aquifers are now considered to be under stress with saltwater intrusion in the coastal regions. In addition to the high volatility, average, annual rainfall level is decreasing over time.

Rain-fed area, which account for 88% of arable land, is dominated by cereal production that cover 65% of cropped area, followed by fallow land that occupies 21%. Olive groves and legumes occupy each 4%, while fodder and industrial crops occupy 2% and 1% respectively.

Irrigated area can be divided into two types: large scale irrigation (LSI) and small and medium scale irrigation (SMSI). In large scale irrigation area, cereals remain the predominant crop accounting for 32% of the cropped area, followed by olive orchards at 15%, industrial crops of sugar cane and beet at 14%, vegetables at 13%, fodder crops at 11%, citrus at 6% and legumes at 2%.

The SMSI areas are very diverse, and include modern and traditional irrigation techniques. They are located in mountain valleys, along the main rivers, in coastal plains, or over aquifers. The production systems vary from specialized crops for export to subsistence farming based on cereals. Overall, these areas are also dominated by cereals production at 29% of the cropped area, which is than that of rain-fed and LSI area. Vegetables rank second with 24% of cropped area, followed by the olive groves (11%), fodder crops at 9%, citrus with 6%, industrial crops at 3%, and legumes at 2%.

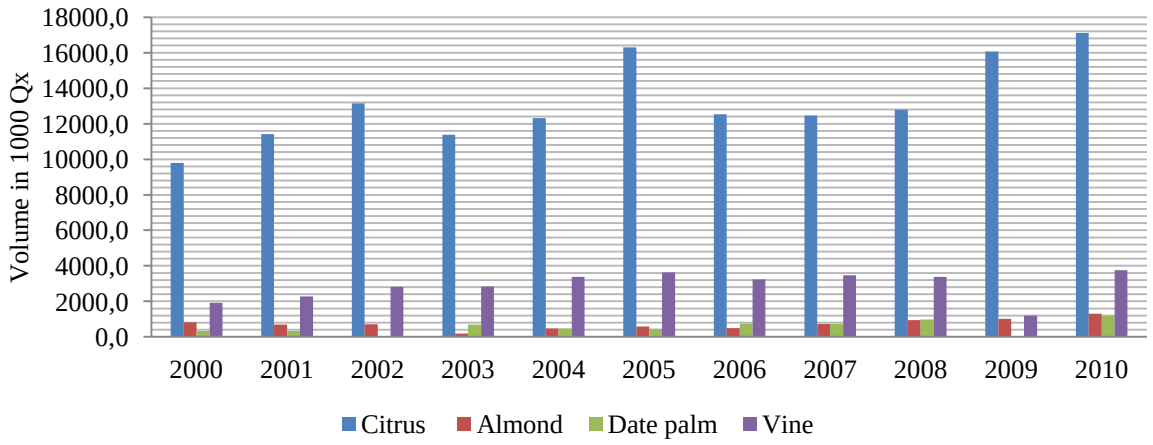
Although irrigated land accounts for only 14% of the arable land, it contributes significantly to the production of basic food products, supplying 80% of the sugar beets, 100% of the sugar cane, 75% of the milk and 80% of the vegetables (an average of 45% rate on GDP, depending on the climatic conditions). Hence, between 35% and 70% of the total value-added by the agricultural sector comes from products on irrigated land, depending on the level production for the season and climatic conditions.

3.2.1.3 Products

Cereals are the major crops grown in Morocco, both in terms of acreage and production. These crops occupied an average, annual acreage of 5.6 million Ha, about 65% of the total arable land. Barley is the cereal most frequently planted with a 41% share of total cereal acreage, followed by soft wheat at 33% and durum wheat at 20%.

The acreage in fruit plantations amounts to around 1.5 million Ha, of which 11% is arable land. Olive trees are the predominant specie, covering 784,000 Ha and accounting for 55% of fruit plantation acreage, followed by almond trees at 14%. Citrus covers 92,000 Ha (8%), while vineyard covers 50,000 Ha (5%) and, pomes and nut fruits (excluding almond trees) occupy 57,000 Ha (6%).

Figure 2. Evolution of fruit plantations production in 1000 qx (excluding Olive) 2000-2010



Source: own elaboration on the MAPM data

Vegetables acreage amounted to around 260000 Ha, and produces approximately 7 million tons per year. The season vegetables acreage amounted to 226,000 Ha and represent almost 87% of the vegetables area.

Early vegetables are cropped along the Atlantic coast from Larache to Agadir. For the last crops years, the total acreage amounted to 27,000 Ha in which 13,400 Ha are in greenhouses plastic for the crop 2010, showing a 10.2% increase as compared to the 2000/2001 average (24,500 Ha). Production average 1.7 million tons, in which 750,000 tons exported (44%).

Table 2. Use of land and production of vegetables

Type of culture	Area (Ha)	Rate in %	Production (T)	Rate in %	Export (T)
Saison vegetables	226000	86,9%	5060000	72,3%	-
Early vegetables	27000	10,4%	1700000	24,3%	750000
Industrial crops	7000	2,7%	240000	3,4%	-
Total	260000	100,0%	7000000	100,0%	750000

Source : MAPM (Maroc)

While early vegetables' acreage increased by 10.2% from 2002 to 2010, production increased from 1.1 million tons to 1.7 million tons in the 2010 crop year, showing a 54.54% increases as compared to 2001-02 crops year. This improved performance stems from a substantial improvement in productivity linked to the introduction of new varieties, the adoption of better production techniques, such as micro-irrigation and better disease management and the implementation of the greenhouses.

Tomatoes and potatoes are the major early vegetables crops. In 2010/2011, tomato acreage was around 6779 Ha and represent 22.5% of early vegetables' acreage. In terms of production, tomatoes account 51% of the total early vegetable production.

Potatoes acreage are 6244 Ha and represent 20.7% of early vegetables' acreage and 9.5% of the total production of early vegetables' production.

Figure 3-a. Main early vegetable products by area

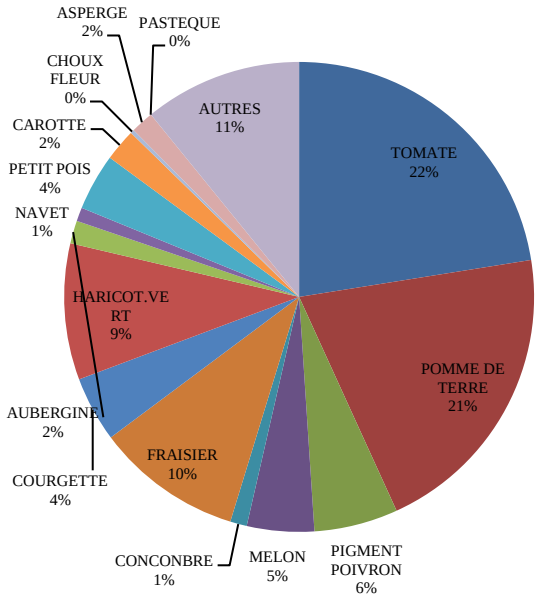
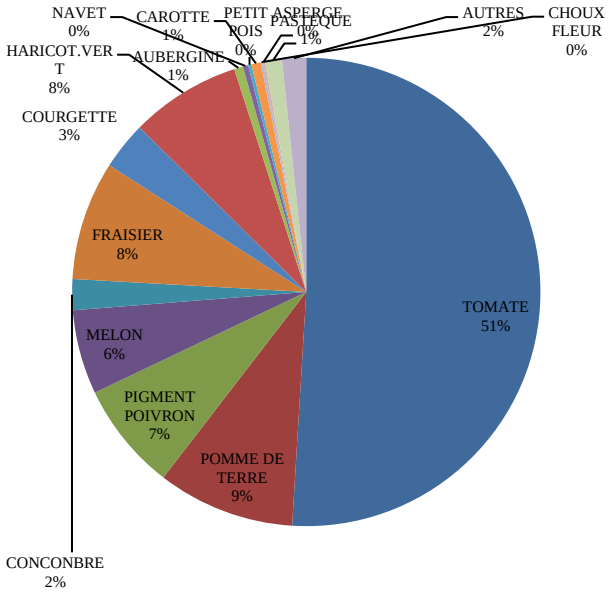


Figure 3-b. Main early vegetable products (% of volumes)

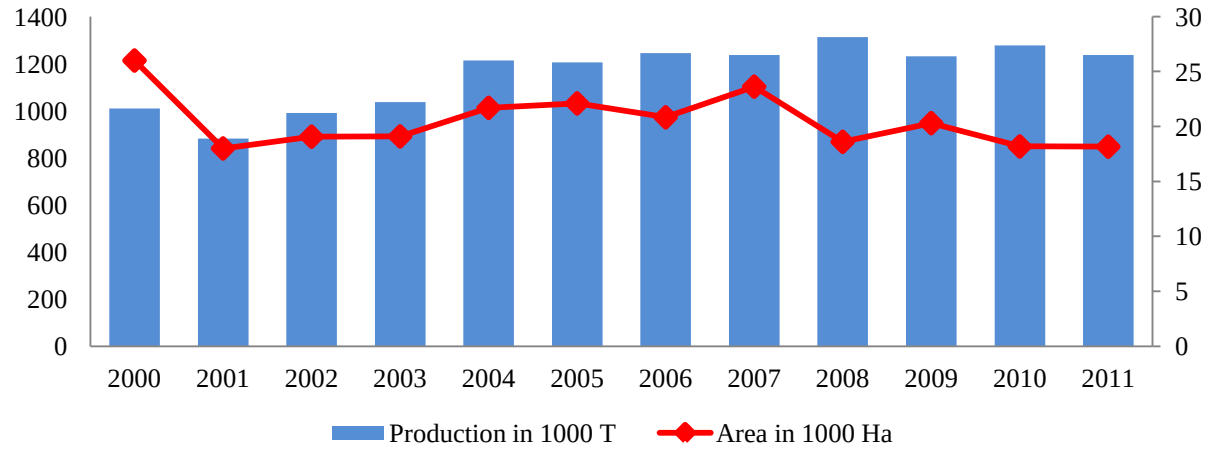


Source: own elaboration on the 'Direction de la stratégie et des statistiques (MAPM, Maroc)

Tomatoes production reaches approximately 1 million tons per year, of which 80% is consumed as a fresh produce and 20% is processed. The fresh produce is split in two between season tomatoes for the national market, and winter or early tomatoes sold in European markets.

The follow figure shows the evolution of tomato production (area and volume) from the 2000 to 2011 year.

Figure 4. Evolution of tomato production by area and volumes



Source own elaboration on the FAOSTAT data

Citrus acreage amounted to 92,000 Ha in the crops year. It exports story in Morocco is beginning in the 1930s with French agricultural colonization looking for complementarities between colonies' production and French production. In the mid-1970s, large-scale and private irrigation development in Morocco led to expansion of citrus farming. The major citrus plantations are located in the major irrigated areas and have an average annual yield of 1.3 million tons with a value of about 3 billion dirham, and 530,000 tons are exported. The citrus growers accounted approximately 13,000 who operate a total area of 92,000 Hectares. The citrus supply chain contributes to the creation of 21 million working days per year. Further, 47% of farms are equipped by irrigation system.

The main production areas are Souss Massa (38%), Gharb / Loukkos (20%), Moulouya (17%), Tadal (14%) and Haouz (6%). The main varieties of citrus are Clementine (39%), Morocco Late (29%), Navel (22%), semi-season Oranges (5%) and other varieties (5%).

Figure 5-a. Production of citrus by region

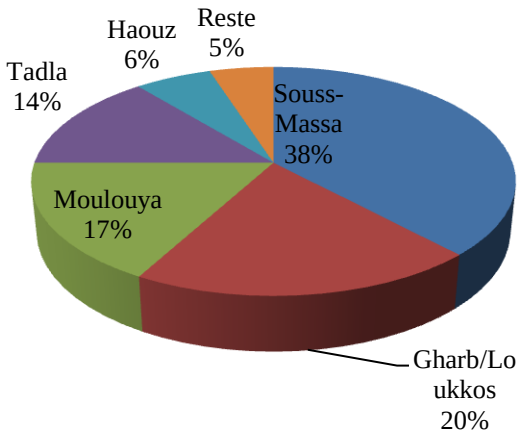
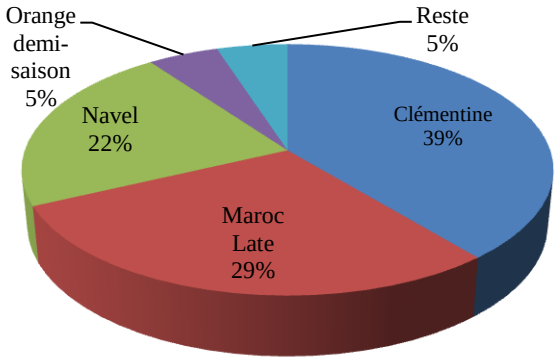


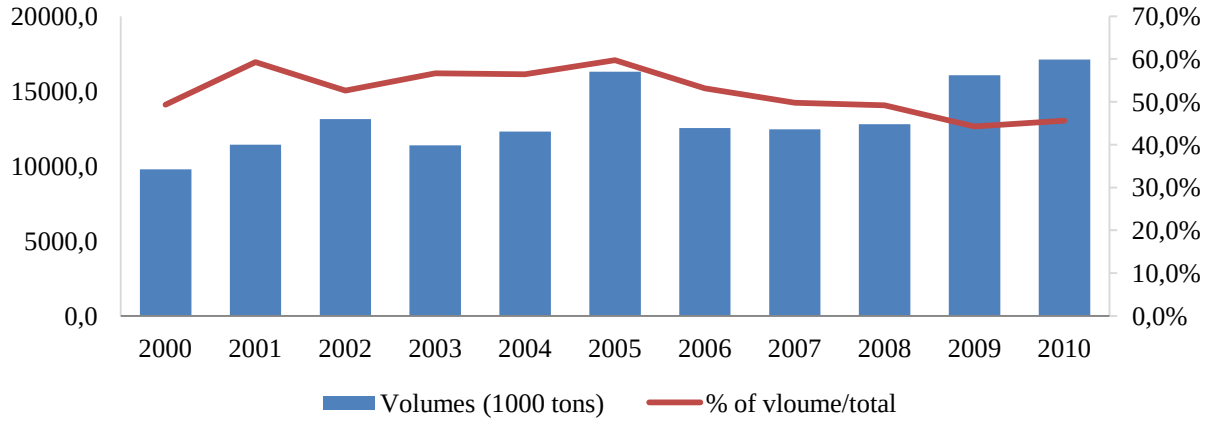
Figure 5-b. Main citrus products



Source: own elaboration on the MAPM data

To foster growth, industry efforts are focused on adapting to market changes in variety preferences. The producers tried to reconvert old orange varieties plantations to new "small fruits" (as Clementine) and late varieties (Maroc-Late) plantations. The citrus volume evolution is described by the following graph.

Figure 6. Evolution of citrus production between 2000 and 2010 in 1000 tons



Source: own elaboration on the MAPM data

3.3 Fruits and vegetable sector

The Moroccan food export sector has been going through a reform process since the mid-1980s. State monopoly of food exports has been abandoned, and private export groups have emerged. The current organizational framework is one in which the level of integration in the supply chain plays a critical role. The industry is heavily dominated by integrated export groups that control the overall chain from farm to market. The producers in these export groups have access to new imported technology and benefit from the well-trained local labor, know-

how and logistics. There are also a number of small nonintegrated farms that are surviving more or less marginally. New entrants in the industry are rare, especially in citrus, due to certain barriers in the land market. The main actors are producers/producers-exporters (farmers), packing houses (including cooperatives) and exporter groups.

At the national level, in which dominates seasonal fresh vegetable crops showed satisfying levels of consumption. However, these seasonal fresh vegetable crops are less diversified, grown in open field, and they suffer from adverse valuation conditions, market structure and price/quality ratio.

3.3.1 Vegetables' Supply Chain

At the farm level, the producers are approximately 8,000 mainly small farms that produce fresh vegetables for export markets on 27,000 Ha. Compared to the rest of Moroccan growers, vegetable producers are highly specialized and do not grow more than 4 or 5 vegetable species. Tomato is usually the main crop and uses 50 to 70 % of the land. The rest may be allocated to beans, zucchini, pepper, eggplant, sweet corn, cucumber, or melon. Fresh bean is the vegetable that increasingly is attracting the attention of producers and exporters.

The use of shelters and plastic houses for tomato and other vegetables has helped the farmers to significantly improve the management of pest and diseases problems. For instance, the use of environmentally friendly means (biological control, mesh) has helped reduce significantly the amount of pesticide used against certain vegetable pests and disease for vegetables.

At the packing house level, and according to EACCE report (2012), there are 158 packing house that process vegetable. It should be take in consideration that some units (packing houses) can be processed several products at the same time. Hence, the packing house is the main interface between farmers and the exporters organized groups. It constitutes the most critical element in the trade follow linking farmers to foreign markets. Packing house operations are complex and subject to various social, economic and commercial interactions.

According to Aloui and Kenny (2005), there are three types of packing houses: private, cooperative and state-owned. Due to the flexibility in the decision-making process, private packing houses and cooperatives are developing a more aggressive marketing strategy. They are always the first to introduce new technologies, know-how and implement sanitary and phyto-sanitary measures (SPS).

Indeed, private packing houses represent 2/3 of the total number and supply up to 60% - 80% of vegetables exported from the Agadir area. These private packing houses are supplied mainly by large companies that well prepared for implementing new rules and measures.

Cooperatives and state-owned packing houses provide approximately 40% of the exports and are open to small and medium-sized farms. The provide services for packaging, labeling, and transport and even the purchase of pesticides and fertilizers. They may also provide financial assistance for small farmers if required. Packing houses are supplied by either their own members or non affiliated farmers.

At the export level, there are groups specialized in vegetable and tomatoes trade. Tomato trade has become a complicated issue and tends to be dominated by large integrated companies.

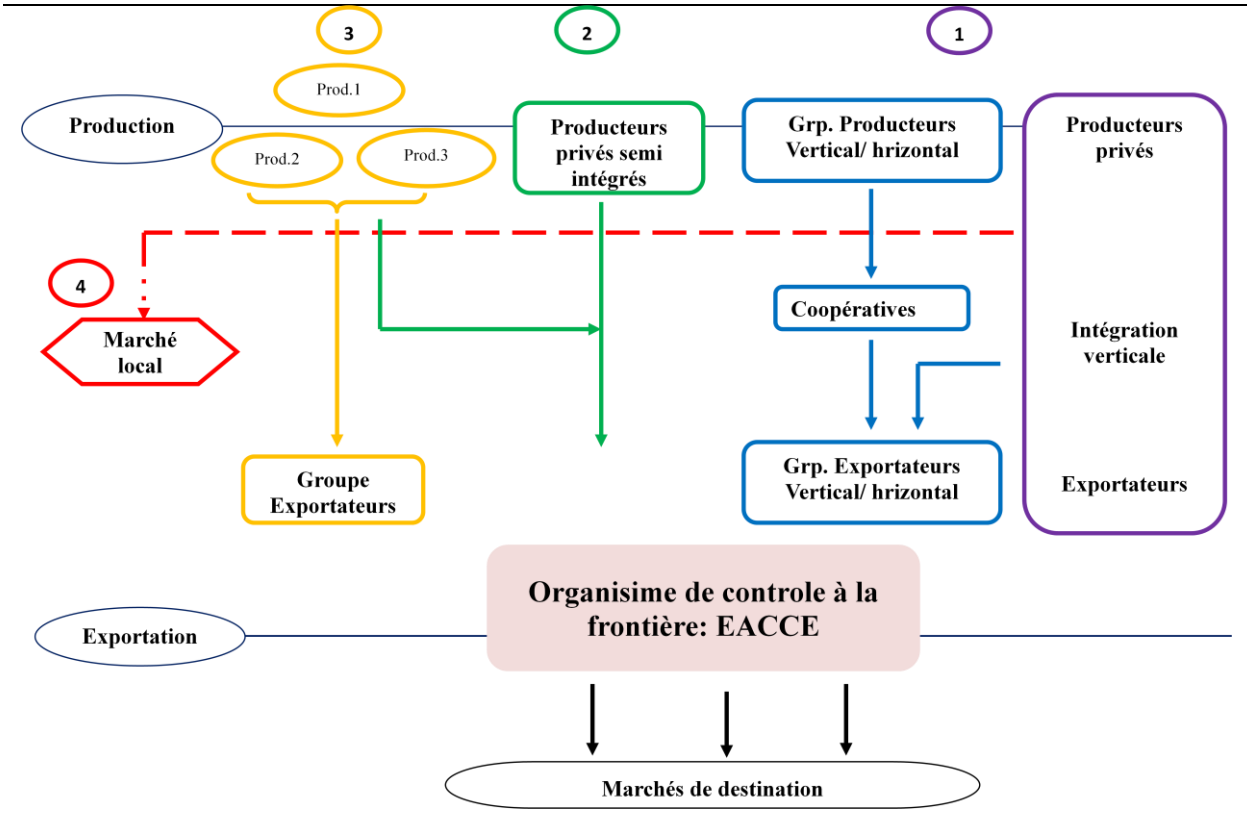
3.3.2 Citrus supply chain

At the production level, citrus producers are, in general, large size farms. The total number of producers is approximately 13,000 on a total of 92,000 hectares. Modern groves are located in the Souss-Massa area (Agadir). 47% of groves are equipped by an irrigation system while the rest still use furrow irrigation, which wastes considerable water.

At the packing houses level and according to the EACCE report (2012), there are 51 packing houses that process citrus. They are supplied either by their own members or by nonaffiliated farmers. Farmers' affiliation to cooperatives is a complicated issue and constitutes a source for many disputes particularly when it comes to phyto-sanitary and quality standards issues. Some manager claim that a high percentage of the export rejection comes from nonaffiliated farmers.

At the export level, there are the export groups that trade actively and principally in citrus. The main important groups are "Maroc Fruit Board" (MFB) and "Maroc Fresh Fruit" (MFF) whose primary mission is to ensure maritime logistics and marketing management.

Figure 7. Fruit and vegetable Supply chain organization



3.3.3 The role of organization at the export level for both citrus and vegetable producers

3.3.3.1 Farmers

From an ownership point of view, there are three typologies of actor: producers-exporters, cooperatives and exporter groups. According to these three typologies of actors, we can identify between four types of organization:

- Groups specializing in tomato production: the actors performing in this category are vertically integrated, and show enough of expertise in the field of production and export. They provided a highly admired competitiveness.
- Cooperative groups: inside of this typology, two categories of players coexist (producers-exporters). The first one include producers adhered to a large cooperative that marketed their products through its platform on the international market (Saint-Charles). This platform is founded by a partnership with a French importer. The second category is a large cooperative formed by small and medium producers. In this latter category a number producers oriented to diversify their products and show a high level of adaptation to European sanitary and phyto-sanitary regulation (SPS).

- Groups specialized in citrus production: by the strategic alliances, these players show a high level of integration in upstream of the supply chain.
- The last typology is represented by trade exporters: these actors play an intermediate role between loss organized producers (upstream) and importers (downstream).

3.3.3.2 Packing houses

In 2010/2011, the EACCE identified 1319 operating exporters in which 774 packers/manufacturers and 545 wholesalers. It should be take in consideration that some units can be packaged several products at the same time (see box down). These packaging houses are agreed by the local authorities (EACCE) and the international bodies. They are engaged to respect the requirements of all market destinations as like SPS – Agreement. Most of them are certified 'BRC' and apply the 'hygiene package'. Certifications help them to improve that their products are conform to international requirements (publics or privates).

Table 3. Number of packing houses and their localization

Product categories	Number of packing houses	Zone of localization		
		Souss-Massa	Centre	Oriental
Citrus	51	20	19	12
Vegetables	158			
- Tomatoes	58	44	12	2
- Potatoes	21	3	18	-
- Various fruits	70	30	39	1
- Various vegetables	120	78	35	7
Total	209	-	-	-

Source: own elaboration on the EACCE report (2012)

According to AMFL[27] (2008), exporting groups account 16, and packing houses account 209 in which 29 cooperatives.

3.3.3.3 Exporting groups

At the export level, the early fresh vegetables is developed by the large private groups more structured or aggregated into agricultural organizations with private actors or into professional organization with high managerial capacities. As mentioned above, exporting groups account 16 units, whose mission to manage and/or play an intermediate role between upstream and downstream supply chain. Recently, there tow mains exporter groups was created

[27] *Association Marocaine des Fruits et Légumes*

that are “Maroc Fruit Board” (MFB) and “Maroc Fresh Fruit” (FFM) whose primary mission is to ensure maritime logistics and marketing management.

3.3.4 Role of public authorities and private actors

The development of the fruit and vegetable sector is conditioned by the organization of Inter-profession (private sector) on the one hand, and increasing of state role in supporting, coaching and mentoring. These measures are necessary to detach the problems of maladjustment of the relationships between State and local and professional actors. This requires institutional strengthening at the local level, a good governance of partnerships 'public-private', a strengthening role of professional and local organizations and also the role of agricultural credit.

Given the diversity of national agriculture, the Green Morocco Plan as presented previously adopted two Pillars:

According to Pillar I, it’s based on the following axes:

- Inter-profession organization of chains (the State has established an organizational framework that encourages professionals in the same industry to organize themselves into pole, even solve its inherent problems, and participate with State to preparation of development plans in the sector)
- Program contracts that set professional commitment and the State

To achieve these objective professionals are committed to:

- Protect and promote the interests of the industry at the regional and national levels;
- Coach farmers through technical and managerial training;
- Organization of sector in terms of input supply, logistics, processing and marketing

State concurs to:

- Create an innovative incentive framework (subsidies)
- Ensure preferential financing,
- Partnerships with research institutes.

Pillar II aims to insist actors to aggregation in groups associated basing on the social structure of operators (cooperatives, associations, professional associations, NGOs) who will

assume the role of locomotive. In these terms, the aggregation is a model of partnership 'win-win' and provides the following benefits:

Concerning aggregator, this operation allows:

- Access to large-scale land without excessive mobilization of capital,
- Reach a critical size in the upstream though limiting risks to production,
- Securing a large supply base for major capital investments,
- Risk sharing with aggregated;
- Securing supply through higher volumes, more regular with better quality
- Development of trade capacity to conquer international markets most important, given the direct relationship with the producer.

Concerning the aggregate, this type of organization can:

- Enhancing the value of production (improving the quality of production and access to a reliable market),
- The transfer of skills and new technologies,
- Input supply as a means of financing,
- Creating a link between small farmers and markets,
- Securing a broader base of supply for major industrial investment,
- Risk sharing with the aggregator,

The final scope is to reach a governance model based on the principles of effectiveness, efficiency, accountability, and accountability is likely to strengthen and consolidate the relationship between the State and its decentralized services and local and professionals' actors for a sustainable agriculture and rural development.

3.4 Dynamic of fruit and vegetable exports

In this section we will analyze the flows of export/import of Morocco-World basing on the UN-COMTRADE data classified in SITC Rev.3 in the period 2000-2010. Products analyzed are:

- Vegetable and processed vegetable category 054 and 056
- Fresh fruit and processed fruit category 055 and 057.

3.4.1 Dynamic of fruit and vegetable exports-imports: Morocco-world

Fruit and vegetable exports have increased considerably since the last decade and have significantly affected positively the agri-food trade balance. So, Morocco's fruit and vegetable exports amounted to US$ 1,358.2 million, while import reached US$ 231.36 million in 2009/2010. These performances gave a normalized balance of 71%, while this latter. Fresh vegetable exports were US$ 617.52 million in 2009/10, representing 45.5% of fruit and vegetable exports highlighting a consistent growth comparing to 2000/2001 year in which this item represent 33.4% of the total of fruit and vegetable exports. Fresh fruit exports amounted US$ 494.62 million (as average in 2009/2010) versus only US$ 227.62 million (average 2000/2001). Processed fruit and vegetable exports were US$ 246.06 million, representing 18.1% of fruit and vegetable exports (12.6% for processed vegetables and 5.5% for processed fruits), while imports reached US$ 42.88 million. In terms of normalized balance, processed fruits and vegetables registered both a modest performance which reduced from 90% to 68% for processed fruits and from 87% to 77% for processed fruit.

Analysis of fresh vegetables trade shows that exports increased in value passing from US$ 174.62 million as an average in 2000/2001 to US$ 617.52 million as an average for 2009/2010 and from 227.04 million for fresh fruits to 494.62 million (see table 4).

Table 4. Dynamics of fuits and vegetables import-export Morocco-World

	Average 2000/2001			Average 2009/2010		
	Imports Value (mln $)	Exports Value (mln $)	Normalized balance	Imports Value (mln $)	Exports Value (mln $)	Normalized balance
Fresh vegetables	44,42	174,62	0,59	67,56	617,52	0.80
Fresh fruits	15,96	227,04	0,87	120,92	494,62	0,61
Processed vegetables	4,78	95,14	0,90	33,15	171,50	0,68
Processed fruits	1,89	26,59	0,87	9,73	74,56	0,77

Source: Own elaboration on the UN-COMTRADE data

3.4.2 Dynamic of fruit and vegetable exports-imports: Morocco to UE-27 (table 5)

The Moroccan fruit and vegetable exports on the UE (27) market amounted to US$ 1041.58 million, while imports accounted for US$ 71.75 million (average of the 2009 and 2010 years) with a normalized sold of 87.1%. Comparing to the average of imports-exports of the 2000 and 2001 years, exports amounted to US$ 382.37 million, while imports accounted for US$ 26.63 million, with a normalized sold of around 87%. Although imports of fruit and vegetable was increased from US$ 26.63 million (average 2000/2001) to US$ 76.75 million

(average 2009/2010), the exports are also highly increased from US$ 382.37 million to US$ 1041.58 million for the same period. These performances in terms of exports agree the Moroccan exporters to conserve their market share and still performing on the UE market.

Globally, the evolution of normalized balance between 2000/2001 and 2009/2010 remains almost unchanged. These performances in terms of normalized balance qualify Morocco as an export country of fruit and vegetables.

Analyze by product categories shows that the exports of fresh vegetables are increased considerably amounting from US$ 151.87 million (average 2000/2001) to US$ 566.08 million (average 2009/2010), while imports are increased from US$ 20.11 million to only US$ 36.80 million. In fact, the normalized balance is increased from 77% in 2000/2001 to 88% in 2009/2010. That means Morocco export more fresh vegetables than imports (net exporter on fresh vegetables)

Concerning fresh fruits, the market share on the UE (27) amounted to US$ 292.54 million (average 2009/2010) versus US$ 144.16 million (average 2000/2001), while imports amounted 13.55 million US$ versus US$ 2.95 million for the same period. Furthermore, the normalized balance shows a positive trend in both 2000/2001 and 2009/2010 years with respectively 97% and 91%. The decrease in terms of normalized balance between these two times from 97% (2000/2001) to 91% (2009/2010) means Morocco export less of fresh fruits to UE market.

For processed vegetables, they registered the same trend, in terms of value, increasing from US$ 61.02 million (2000/2001) to US$114.61 million (2009/2010), while in terms of normalized balance decreasing consecutively from 91% to 75% for the same period. Despite this result in terms of normalized balance, Morocco remains exporter of these products to UE market.

Regarding processed fruits, Morocco's exports amounted US$ 68.35 million (2009/2010) versus only US$ 25.32 million (2000/2001). While normalized balance was decreased consecutively from 91% to 88% for the same period.

Hence, Morocco's fresh vegetable exports are mainly intended to France (52.39% in value), followed by Spain, Netherland, Mauritania and United Kingdom. The exports to Italy represent 3% of the total exports of fresh vegetables in value.

Table 5. Dynamics of fruits and vegetables import-export Morocco-UE

	Average 2000/2001			Average 2009/2010		
	Imports Value (mln $)	Exports Value (mln $)	Normalized blance	Imports Value (mln $)	Exports Vale (mln $)	Normalized balance
Fresh vegetables	20,11	151,87	0,77	36,80	566,08	0,88
Fresh fruits	2,41	144,16	0,97	13,55	292,54	0,91
Processed vegetables	2,95	61,02	0,91	16,40	114,61	0,75
Processed fruits	1,16	25,32	0,91	4,30	68,35	0,88

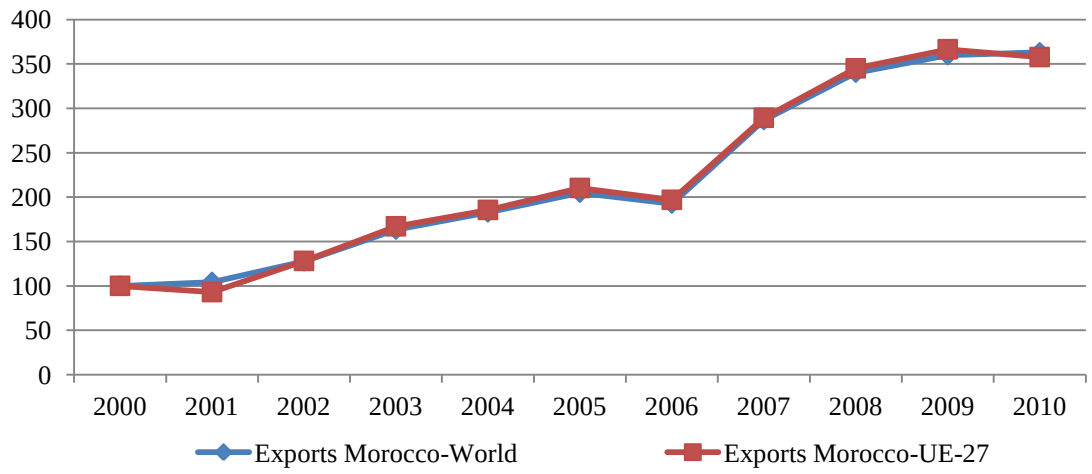
Source: Own elaboration on the UN-COMTRADE data

3.4.3 Evolution of fresh vegetable exports: Morocco-Monde, Morocco-UE (2000-2010)

Basing on the year 2000, Morocco's fresh vegetables trade exhibits limited market diversification. The UE-27 absorbs an average of 91.5% during the last decade (2000-2010) of the total trade of fresh vegetables. The follow graph shows the global trend of trade of fresh vegetables during 2000-2010. According to the graph, it appears clear that fresh vegetable exports are increased highly. In 2009/2010 average, this category of products recorded an increase of 2.5 times compared to 2000/2001 average. This result explains that the Moroccan actors are more integrated to worldwide export concerning these product categories.

The figure below (figure 8) shows that fresh vegetables exports Morocco-World and Morocco-EU are positively correlated (basing on the 2000 = 100 value). This correlation means that such positive evolution of Moroccan fresh vegetable exports is driven by the EU market. The figure also shows that Moroccan fresh vegetable exports are almost doubling from some 329 million U.S. $ in 2006 to 620 million U.S. $ in 2010.

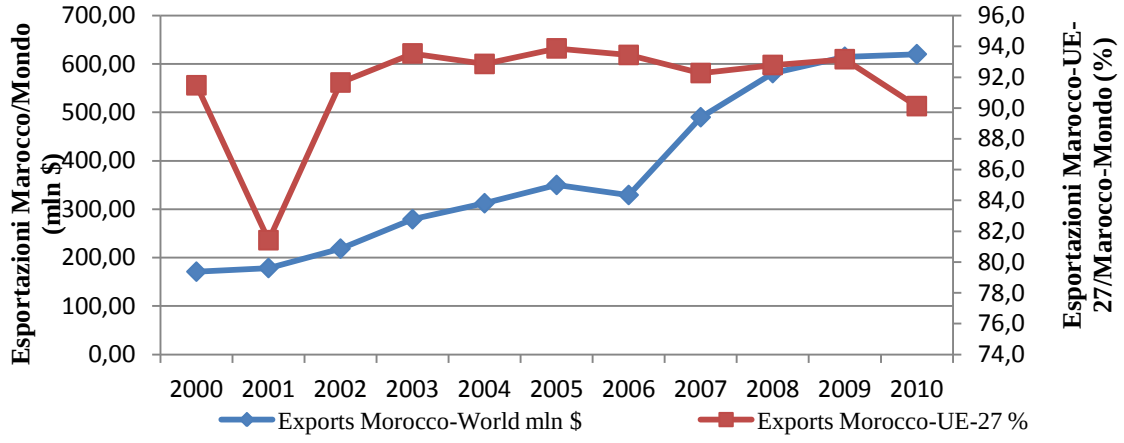
Figure 8. Evolution of fresh vegetable exports (2000=100)



Source: Own elaboration on the UN-COMTRADE data

As we mentioned previously, the UE market remains the main partner of Morocco and absorbs the large part of Moroccan fresh vegetable exports. According to the below figure (figure 9), and despite to the decline EU/world market share observed in 2001, exports of fresh Morocco's vegetables continue to perform well on this market (UE-27). These performances are reflected in the positive improvement of the competitive position of Morocco on the market for the relevant category. This improvement in competitive position may be explained by the effect of 'product range' and the ability Moroccans actor to keep large quotas in the EU market.

Figure 9. The EU incidence on the Morocco's fresh vegetable exports



Source: Own elaboration on the UN-COMTRADE data

3.4.4 Evolution fresh fruits exports Morocco-World/ Morocco-UE

The dynamics of trade flows of fresh fruit Morocco-world and Morocco-EU changing in the same direction with a positive improvement (in terms of value) from 2000 to 2005 (2000 = 100). In 2006, Morocco's exports on both the worldwide and EU markets are taken to decrease in terms of value and recovery again in 2008 but with a decline terms of value on the EU market (see figure 10).

Figure 10. Evolution of fresh fruit exports (2000=100)

Source: Own elaboration on the UN-COMTRADE data

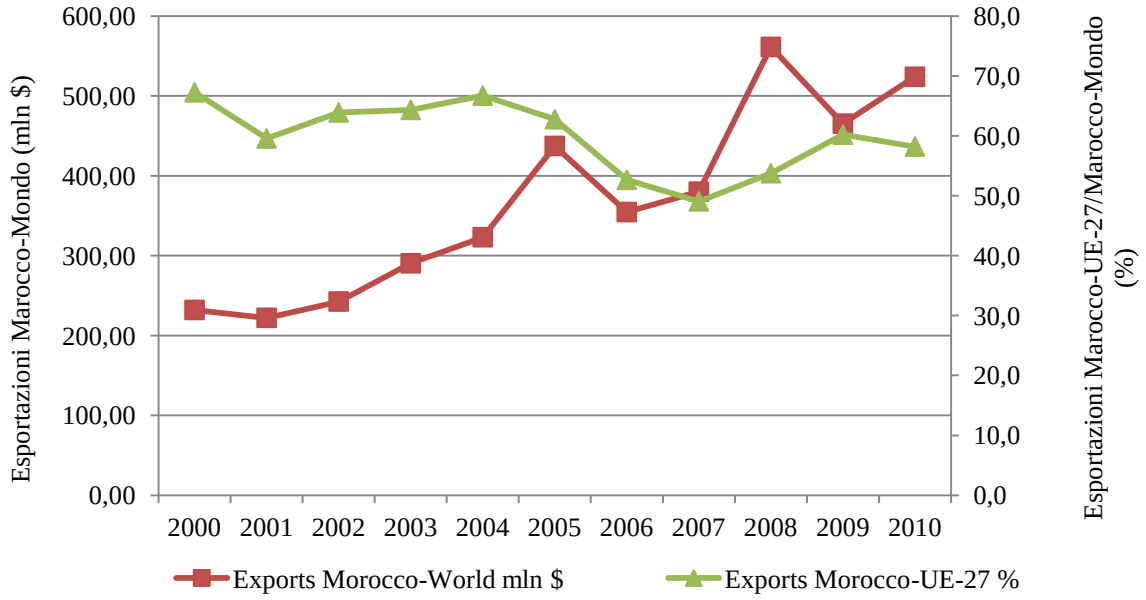
Therefore, the analysis of following figure (figure 11) shows clearly the incidence of the EU market on Morocco's fresh fruits exports compared to the global market. So, in the early 2000s, Morocco's fresh fruit exports (in terms of value) focused on the EU-27 market with percentages varied between 67% in 2000 and 62% in 2005 (except 2001 when the percentage fell below 60%, exactly 59.6%).

From 2006, Morocco's fresh fruit exports (in terms of value) begin to decline and fell below 60% with 49.1% as minimum (in 2007) and 58.2% as maximum (in 2010) except 2009 wherein the percentage of value exceed little 60%.

It follows, therefore, a reduction (in value terms) of Morocco's fresh fruit exports on the EU-27 market. This reduction implies a decline of quotas and a deterioration of the competitive position of Morocco on this market (EU-27). This improvement in negative terms (or against performance) may be explained by a decline in demand for Moroccan fruits on the EU market, either by improving the competitive position of certain competing countries of

Morocco (Spain, Egypt, Turkey, etc..), or by diversifying destination markets (Russia, Canada, Scandinavia countries, etc.).

Figure 11. The EU incidence on the Morocco's fresh fruit exports



Source: own elaboration on the UN-COMTRADE

3.4.5 Analysis of dynamics product portfolio Morocco-World, Morocco UE

The Morocco's fruit and vegetable exports are concentrated in three main products (tomatoes, leguminous vegetables, mandarins, oranges) that represent around 69.64% of the total export in value (US$ 774.55 million on a total of US$ 1112.15 million). We also noticed a phenomenon of diversification of products portfolio with a significant increase in weight of products with high value added (beans, zucchini, melons, berries, grapes). According to 'Maroc export', Morocco is the first largest exporter of beans in the world, the fifth largest exporter of tomatoes, the eighth largest exporter of strawberries and 13th largest exporter of melon (Maroc export, 2012). So, the relative annual change of world market share shows a good performance for Morocco's fruit and vegetable exports (10%), especially for fresh vegetables (14%). The corresponding value for fresh fruits is 8%. On average (2009/2010), fresh vegetables represent 55.53% of the total traded on the global market, while fresh or dried fruits represent 44.47%.

Regarding fresh vegetables, the annual average rate change for the period 2000/2010 amount to 13.8%. For tomatoes, the AARC shows a positive evolution with 13.86%, for

leguminous vegetables 22.28%. So, tomatoes and leguminous vegetables are the main products in this group with shares of 49% and 21.4%, respectively on the total of fresh vegetables.

Concerning fresh or dried fruits, the annual average rate change for the same period (2000/2010), account 10.66% for mandarins, 27.47% for grapes, 20.70% for melons & papayas. For this category, the main products are mandarins with shares of 45.1%, oranges with 23.7%, melons & papayas with 13% and berries with 19.1% on the total of fresh and dried fruits.

Comparing with the world trade, UE market absorbs 91.63% of the total exports of fresh vegetables. The quotas of tomatoes on this market amount to 93.12% in terms of value, the same market (EU-27) absorbs almost all leguminous vegetables with a quota of 99.98% in value terms.

Concerning fresh fruits, 59.14% of the total traded was traded on the UE market. The quota of the UE market on melons and papayas, berries, and grapes is more than 98% for each product.

Table 6. Morocco's exports to the World by main products

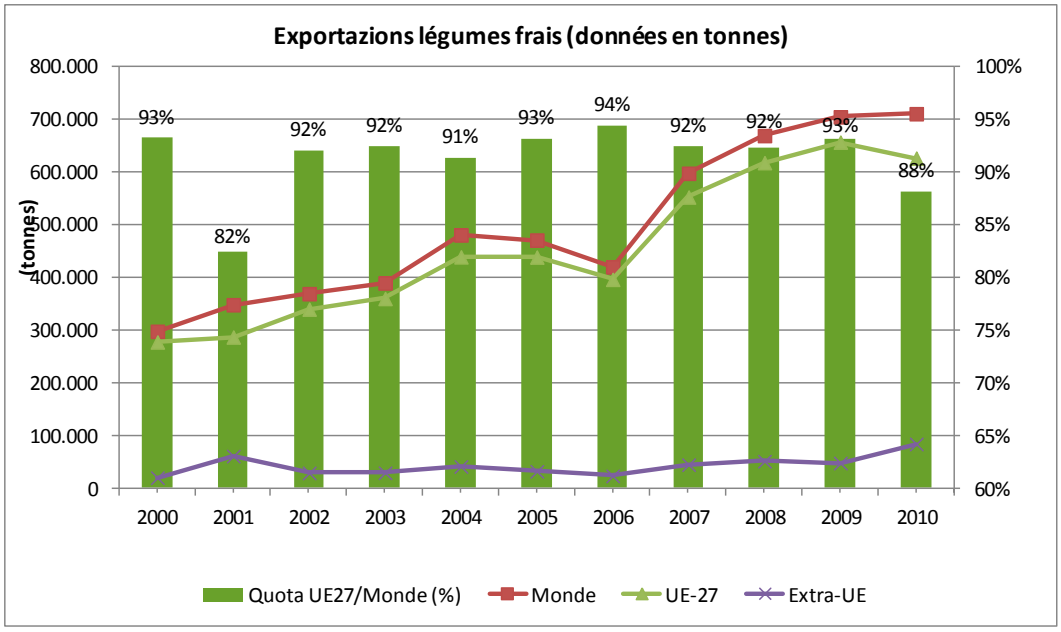
Product category	Average 2009/2010 Value (mln $)	TVMA 2000/2010 %	Average 2009/2010 Incidence %	UE/World Incidence %
Fresh vegetables	617,52	13,8	55,53	91,63
In which:				
Tomatoes	301,85	13,86	27,14	93,12
Leguminous vegetables	132,44	22,28	11,91	99,48
Other vegetables	94,99	23,80	8,54	93,51
Vegetables provisionally preserved	24,64	2,67	2,22	75,83
Vegetable products of a kind used chiefly for human foods	21,46	4,54	1,93	95,03
Fresh or dried fruit	494,62	8,49	44,47	59,14
In which:				
Mandarins	223,21	10,66	20,07	35,15
Oranges	117,05	1,68	10,52	56,67
Melons & papayas	64,11	20,70	5,76	99,20
Berries	44,93	9,45	4,04	99,94
Grapes	17,24	27,47	1,55	98,04
Total of fruit and vegetables	1 112,15	11,02	100,00	77,18

Source: Own elaboration on the UN

3.4.6 Morocco fresh fruit and vegetable exports by country and product

The analysis of Morocco trade flows of fresh products showed a major role of the EU27 countries for fresh vegetable exports. However, we can observe during the period, the EU-27 has slightly reduced its importance as a target market rising from 93% to 88% of fresh vegetable exports and from 64% to 51% for the fresh fruit. Within the EU, France has reduced the market share of fresh vegetables and fresh fruit exports, as well as Italy, while increasing the share of Spain, the Netherlands and the United Kingdom.

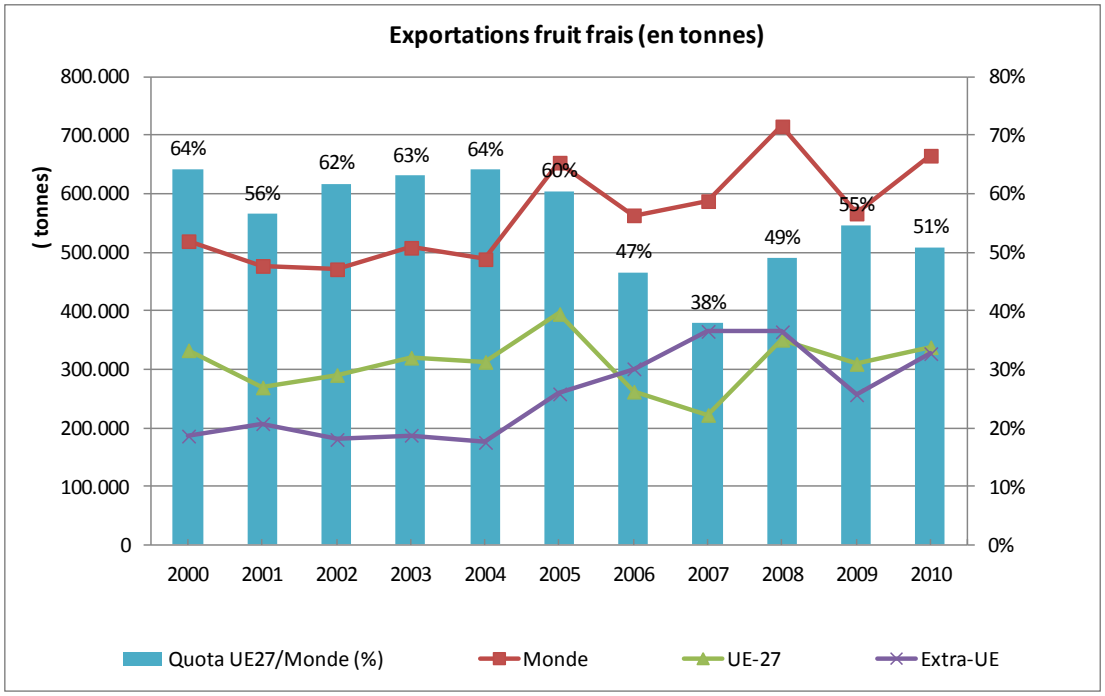
Figure 12. Evolution of fresh vegetable exports by destination area (in tons)



Source: own elaboration on UN-COMTRADE data

The extra-EU markets, therefore, seen to increase the presence of Moroccan fruit and vegetables products, especially with regard to the fresh fruit. Among the main target markets are the fastest growing Russia, the United Arab Emirates, USA and Canada.

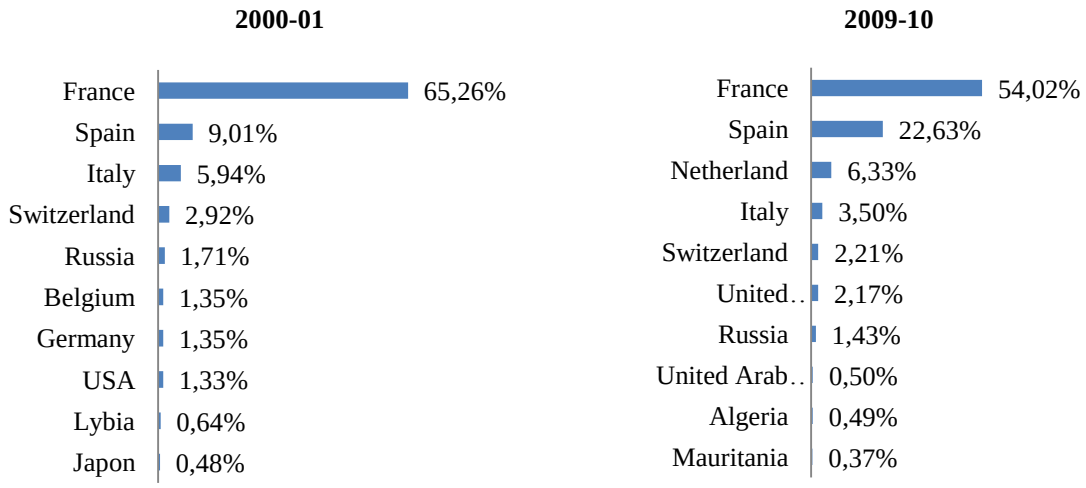
Figure 13. Evolution of fresh fruit exports by destination area (in tons)



Source: own elaboration on UN-COMTRADE data

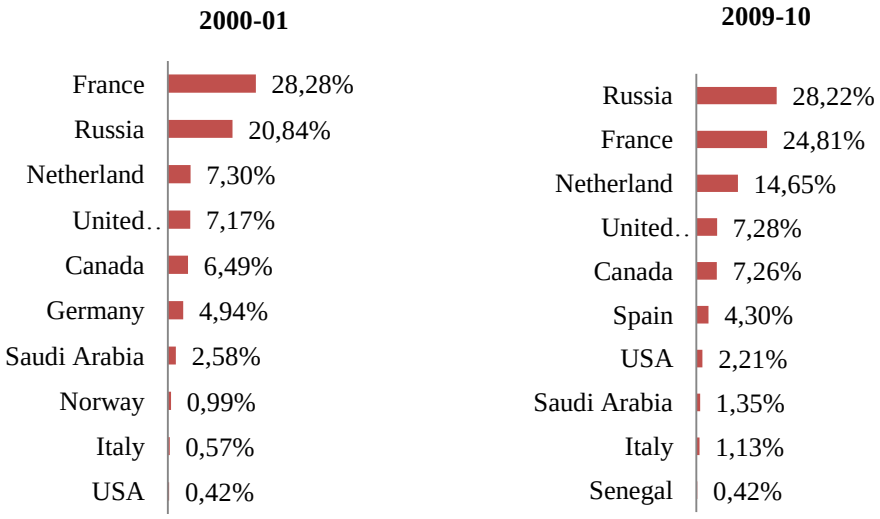
For Morocco, therefore, there is a phenomenon of diversification of export markets, compared to the "traditional" target markets, with an increase in the relative weight of "new markets", in particular Russia, Netherlands, Spain and USA market share, while reducing the traditional markets share such as France, Italy and Germany.

Figure 14. Main destination countries of fresh vegetable exports



Source: own elaboration on UN-COMTRADE data

Figure 15. Main destination countries of fresh fruit exports



Source: own elaboration on UN-COMTRADE data

Almost half of Morocco's fresh vegetable exports go to European countries, especially the United Kingdom, the Netherlands, France and Spain both in 2000-01 and in 2009-10. Among non-European countries, the main partners for imports of fresh vegetables were, in 2009-10, Canada, Egypt, China and the U.S.

3.5 Conclusion

The agricultural sector plays an important role in Morocco. However, the sector is subject to considerable volatility as a result of erratic climatic conditions. This production risk affects the growth of GDP growth and, as a result weakens the entire economy. Policies and programs aimed at helping the agricultural sector cope with production risk will help mitigate this weakness.

Regarding fruit and vegetable supply chain, the 'Morocco Green Plan' (PMV) through its ambitious strategy provides strong support to the development of the export sector with high added value, with particular attention to the fruit and vegetables and olive oil sector. For these sectors, Morocco has a considerable comparative advantage in the production of both fresh and processed fruits and vegetables. However, fresh products have a large competitive edge.

At the export level, and concerning fruit and vegetable sector, analysis of Morocco's exports on the international markets reveals an improvement in their competitive position. The European Union market remains the mains traditional client and absorbs 77% of Moroccan fruit and vegetable exports in terms of value (average 2009/2010).

Concerning the fresh vegetable exports in terms of value, the results show that the competitive position of Morocco on the international market is the result of improving its competitive position on the European market. In the fact, Morocco's fresh vegetable exports are driven by the EU market.

By cons, exports of fresh fruits, despite the good performance globally, their share of the EU market is in decline which deteriorates their competitive position. These anti-performances may be explained on the one hand, by increased competition on this market, and secondly by a decrease in market demand in product imported from Morocco. Another cause could be orientation to other markets other than EU (Russia, Canada, Scandinavia, golf countries...).

In the end, the agricultural sector in Morocco has a strategy that defines for medium and long-term goals and outcomes. To succeed this strategy, it is vital to unite all the forces of the nation who are interested and working in the agricultural sector and to enroll in logic of efficiency, effectiveness and performance, requiring the development of a participatory approach to strengthen country capacity to establish a results-based management.

The main measures to be taken to achieve the 'Morocco Green Plan' are in fact a draft to initiate reflection on a fundamental issue related to performance in achieving the objectives of the plan. Indeed, the ability to plan, manage and implement strategies and take in consideration their results is essential for the achievement of development, from analysis to implementation, and monitoring evaluation.

En the end, must be emphasized that for an agricultural sector is organized and efficient to meet the challenge of competitiveness at the international level requires that markets access (information system and price system), the role of State in controlling and coordinating the involvement of farmers' organizations well as the organization and coordination of sector activities between different actors are taken into account in any future reorganization of a given sector.

4 Methodological aspect and sample analysis

In order to carry out the supply chain organization, we are mainly based on the global value chain approaches. In the fact, GVC approach allows updating powerful and unexplored mechanisms in the way in which the companies reorganized the production processes on the worldwide scale. It offers an original point of view on the forms of governance that govern the globalization of value chains, while allowing a variety of perspectives according to normative concerns' and theoretical affinities of the currents of research which make it up.

Focusing on value creation in general, this approach is somewhat broad in scope and allows for the analysis of input material, production processes, technologies, standards, regulation, products and markets.

4.1 Why the global value chain approaches?

The value chain framework allows for the comprehensive analysis and allows outlining the main results and key answers of several questions more raised recently, especially these related to food quality scares. Among these questions, on a general level, what are the main impacts of private standards in global value chain and why do standards impact the value chain? How and why do governance mechanisms and chain structures change in global value chains as a result of standards being implemented? How do standards impact small producer and exporter participation in a value chain? How do standards enhance or hinder upgrading opportunities (e.g. vertical/horizontal integration) for producers/exporters? To what extent is the sharing of compliance cost along the value chain affected by standards?

In these conditions, value chain analysis is important because, first, value chain connect producers to markets and determine whether producers participate in global trade; second, the specificities of a chain determine to what extent producers benefit from participation ; third, it helps clarify the role of standards in creating competitive advantages in global value, and fourth, it provides a holistic perspective on how standards influence the conditions of making business for producers and exporters in developing countries.

The methodology for constructing analytical GVC is to trace material flows from raw material processing to marketing of the product, in order to characterize the input-output sequence while identifying organizational arrangements in terms of specialization and coordination inter-firm, geography chains and their socio-institutional embedding. This approach allows accounting for specific chains across products and countries considered while identifying common principles underlying their development. Through this approach, the theoretical discussion has explored the explanatory potential of diffusion theory for the analysis. However, with respect to the shortcoming, especially for developing countries, discussed in first chapter, the perspective of performance and governance in agri-food GVCs has been modified in order to make it facilitate to recognize the nature of relationships between buyers (downstream) and suppliers (upstream) and the institutional environment.

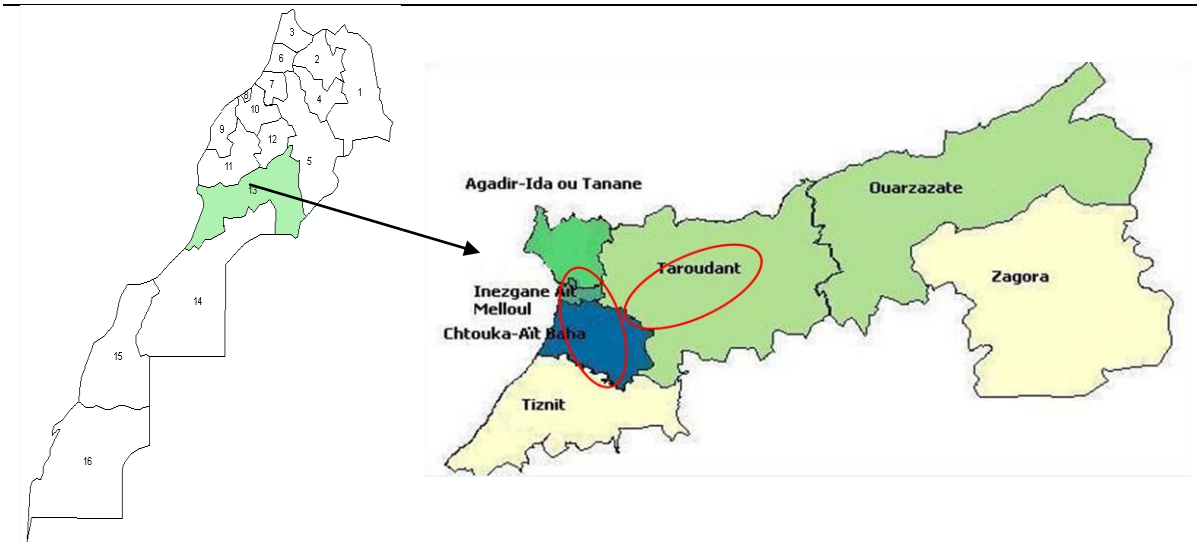
4.2 Methodology and data collection

4.2.1 Preliminary investigation

To reconstruct the Moroccan fruit and vegetable supply chain, we conducted, in a first time, a preliminary investigation by contacting several ministerial departments as the Agricultural Ministry (Agence pour le developpement Agricole “ADA”, Office Nationale de Sécurité Sanitaires des Aliments “ONSSA”, Division de Développement des Filières de Production “DDFP”, Etablissement Autonome de Contrôle et de Coordination des Exportations “EACCE”, Office Régional de Mise en Valeur Agricole “ORMVA”, Direction Régionale de l’Agriculture “DRA”, etc.), academics and researchers institutes (Institut Agronomique et Veterinaire Hassan II “IAV”, Ecole Nationale de l’Agriculture “ENA”), horticultural associations (APEFEL). The goal of this preliminary request is delimiting the supply chain confines. For to accomplish our knowledge of basic regulations that affect the agri-food value chain organization, the web sites of international agencies (as like GlobalGAP, WTO, WTH, FAO...) were also consulted.

Through preliminary investigation, we have identified the main production area. To conduct our study, we chose the Agadir area (Souss-Massa) as sample. The choice of this region is not casual because more than 70% of total fresh fruits and vegetables, especially tomato and citrus, export come from this zone, and also provides criteria for representativeness and feasibility studies of this kind.

Figure 1. Delimitation of the sample area



Source: Maps extracted through Google image

4.2.2 Elaboration of survey

4.2.2.1 Typology of questions

The survey is organized into several types of questions. The first type is open question in which no modality response proposed. The interviewed actors answer freely. The second category concerns the closed questions with a unique choice. In this case, several answer modalities are proposed (at least two), but only one answer is possible. Closed questions with multiple choices, in this case multiple response modalities are proposed and several answers are possible.

The fourth category contains closed questions interval. The modalities of answers are presented in order to measure a graduated attitude, preference, etc. The measurement is made on a Likert scale that was marked from 1 to 5. Note 1 expresses the highest level of measurement to be made (very high, very important, very demanding, etc.), and note 5 expresses the contrary, the lowest level of measurement to be made (not at all high, not at all important, not exigent, etc.), while note 3 expresses the average level (middling).

Some metric questions for expected answers in numbers such as volumes in tons, area in hectare and frequencies in%, etc. has been inserted.

This typology of questions will enable us to bring different types of analyzes:

- Flat analysis which treats question by question (flat table)

- Analysis of questions groups (table group), especially for metric questions or these measured on the Likert scale.
- cross- tabulations of questions (cross-tables)
- Bivariate and multivariate analyzes (statistical tests) for further analysis that involve two or more questions which we will cross the answers. In this case the choice of setting tests depends on several factors:
    - Number of variables putting in relation
    - Status of the variables analyzed (nominal metric measurements on Likert scale, etc.).

4.2.2.2 Targeted actors

Targeted actors are all these involved directly and performed in the sector (producers-exporters, cooperatives, exporters). Furthermore, we targeted also the concerning bodies on quality control at the local level (especially the EACCE and ONSSA).

4.2.3 Structure of survey

To study and analyze the agri-food supply chain (e.g fruits and vegetables), it is necessary to adopt the survey to various stage of the supply chain from inputs to marketing of product passing by production, primary treatment, packaging. To respond to these needs, the survey is structured as follow:

- General characteristics of enterprises (companies legal form; evolution and trend of profitability, incomes and turnover)
- Production system (primary production and primary treatment of products as cleaning, sorting, grading, packaging, packing, the main comparative advantages, and main constraints to production),
- Supply chain logistics (transport and cold chains),
- Supply chain organization costumer/supplier relationships focusing on the upstream/downstream relationships. The study lead to this level serves to highlight the interrelationships can be existed between the different actors in the chain from upstream to downstream and the power relations that govern them.
- Dynamic of export flows expressed in volume or percentage of volume.
- Quality and safety standards
- Market access and border rejections.

4.2.4 Data collection

4.2.4.1 Sample of study:

The selection of our sample is based on a set of criteria for the reliability of the results. These criteria are:

- Export involvement: the actor or the company contacted must be exports and on a regular basis and not occasional.
- The field of activities should be production and export of fruits and vegetables
- Geographical location: This criterion allowed us to select the most representative regions: Souss-Massa (Agadir). This region produces more than 70% of fruit and vegetables on the national level (especially tomato and citrus).

Basing on this process, we identified about a hundred companies that, therefore, constitute our basic sample to which our questionnaire was administered. The final sample consists of 35 players, of which 34 provided a satisfactory answer.

Research data were collected in August-September 2010 and completed in November-December 2011 by conducting semi-structured interviews with 35 Moroccan fruits and vegetables producers/exporters in which 30 perform in both production and export level and 5 are pure exporters (perform only at the export level).

Although, all respondents (Moroccan actors) were remarkably open in their discussions, it was agreed that confidentiality should be maintained.

4.2.4.2 Constraints faced at the field level

To join the actors who agreed to participate in the interview, we faced several difficulties. Actors in question are scattered in space, which requires better coordination in setting appointments. To solve this problem, we organized with the 'EACCE' consultants, who know well the area, our planning meeting with producers-exporters and exporter groups.

4.2.5 Data elaboration

Data collected through the survey have been validated and classified basing on the Excel software. In the chapter 5, data are presented mostly for single questions or group of questions with some valuation (mostly Likert scale) and in some cases by crossing results between to questions basing on the actor typology. While the chapter 6, all results are based on the crossing data between more than two questions.

4.3 Sample description

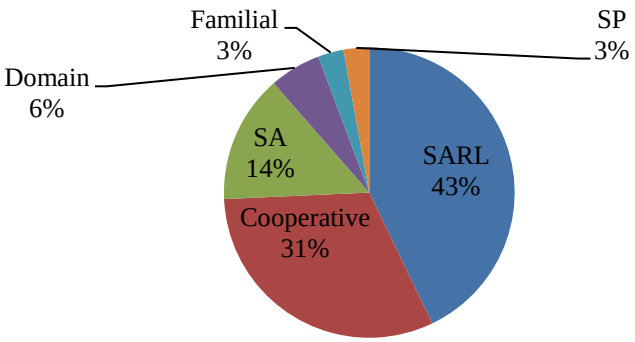
4.3.1 The general characteristics of sample at production level

The sample dimension is limited to 35 actors who completed the survey. 11 of them have a cooperative status (31.4%), and 19 are producers-exporters (54.3%), while 5 are pure exporters (14.3%).

4.3.1.1 Distribution of companies (enterprises) by legal form

According to legal form of enterprises, we find that 42.9% of them (15 enterprises) have a 'SARL' status (Company with Limited Liability), followed by cooperatives group with 31.4% (that to say 11 cooperatives), and 14.3% have an anonym company status (5 companies). Other legal forms exist as 'Domains' (5.7%), society of persons and familial enterprises with 2.9% each.

Figure 2. Distribution of companies (enterprises) by legal form



Source: own elaboration

However, the future trend is the move towards aggregation forms by organizing into large groups of producers responding to the ambitious strategy of the Green Morocco Plan (PVM) (third fundament, third development axis). As regard to these 11 cooperatives, the aggregate memberships amount more than 438 members.

4.3.1.2 Distribution by field of activity

The sample analysis shows that 14 actors (or 40%) produce and market citrus (6 cooperatives and 8 producers-exporters) and 20 of them (57.1%) are specialized in early vegetables (in which 80% of them (16 actors) produce and market vegetables, while 20% perform only at the export level (4 actors knows as exporters)) and one actor perform only at the export level and market both citrus and vegetable products. Such diversity in terms of products qualifies the area of Agadir as a model of Moroccan agriculture. Then the Agadir area

has a very-high payroll (important socio-economic role). The following table describes more in detail the distribution of actors by field of activity. Thus, 45.5% of cooperatives produce vegetables (early) and 54.5% produce citrus. Concerning producers-exporters, it appears that 57.9% produce vegetables while 42.1% produce Citrus (table 1).

Table 1. Distribution of actors by field of activity

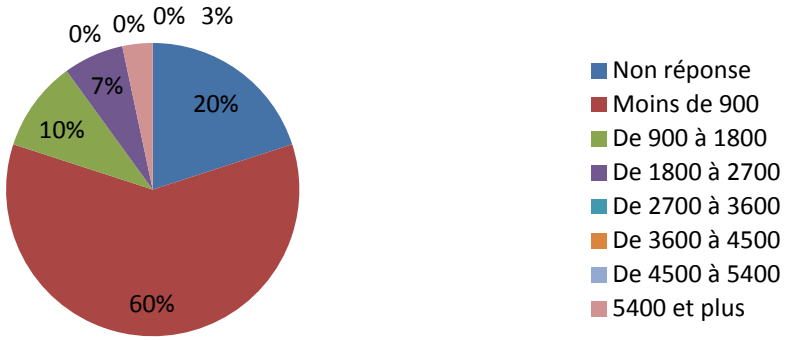
	Vegetables	Citrus	Citrus & vegetables	Total
Cooperatives	45.5% (5)	54.5% (6)	0.0% (0)	100.0% (11)
Producers-Exporters	57.9% (11)	42.1% (8)	0.0% (0)	100.0% (19)
Exporters	80.0% (4)	0.0% (0)	20.0% (1)	100.0% (5)
Total	57.1% (20)	40.0% (14)	2.9% (1)	100.0% (35)

Source : own calculation on the survey data

4.3.1.3 Distribution of areas by class of interval

On total number of the sample, 30 actors that are operate at the production level. Because of the lack of the information on the acreage cultivated by a certain number of actors, we cannot predict it exactly. But we can give some information with the available data. However, basing on the available data, we can group the actors into equal amplitude classes (7 classes) concerning the distribution of areas (Figure 1).

Figure 3. Distribution of actors by acreage (in %)



Source : own elaboration on survey data

We are also interested to know if the actors have their own land or lease a part of this latter, the result shows that about 33% make use of the land rental. The percentage of leased lands varies from 2% to 100% (total rent). According to these actors, the issue of land lease allows them to increase the production volume and involves additional labor, thus there is creation of new job opportunities (socio-economic role).

As part of the mobilization and encouraging the off shoring of foreign capital, just over 16% of operators with partnership, in which 60% have an international origin. The integration of international actors therefore allows, in one hand, to increase the capital invested, and secondly, also allows the transfer of technical know-how and new technology.

4.3.2 The general characteristics of sample at the export level

At the export level, we have the same typology of actors that export their products directly or through exporting groups. The result shows that there is various export manners. At this level we find actors exporting directly without intermediaries, others export through exporting groups. Concerning actors that export directly, some of them export at least a part of it production through exporting groups. The same ascertainment is observed also concerning actors who export through exporting groups; some of them export at least one part directly.

Table 2. Typology of actors by export manners

Typology / Export	No answer	Direct	Exporting groups	Total
Cooperatives	0.0% (0)	0.0% (0)	100% (11)	100% (11)
Producers-exporters	5.3% (1)	36.8% (7)	63.2% (12)	100% (20)
Exporters	0.0% (0)	100% (5)	20.0% (1)	100% (6)
Total	2.9% (1)	34.3% (12)	68.6% (24)	100% (37)

Source: own elaboration

Dependence is very significant. Chi2 = 13.57, df = 4, p-1 = 99.12%. The chi2 is calculated on the table quotes (marginal effective equal to the sum of the actual rows / columns). The % of variance explained (Cramer's V): 19.38%.

As illustrates by the table above, it seems that all cooperatives (100% of them) and 63.2% of producers-exporters export through exporting groups, while all exporters (100%) and 36.8% of producers-exporters export their products directly toward destination markets. Basing on the global result, it seems that 68.6% export through exporting groups against 34.3% that export directly.

The main exporting groups cited are ‘Maroc Fresh Fruits’ (7 citations), ‘Agri-Souss’ affiliated to group ‘Maroc Fresh Fruit’ (10 citations) and ‘Maroc Fruit Board’ (9 citations).

5 The Moroccan fruits and vegetables export supply chain organization: the results of survey

5.1 Introduction

The fruit and vegetable supply chain is a sector where small producers are able to participate because of its low demand of land (area) and high labor requirements (C. Chemnitz, 2007). In Morocco, the fruit and vegetable sector (especially, fresh fruit and vegetables) is characterized by a strong influence of climatic factors (such as drought, erratic rainfall, climate change). Moreover, the sector is affected by global economy trends (impact of quotas on prices and volumes exported to the EU, export calendar, especially for tomatoes, increasingly greater international competition and the protectionism effect). Moreover, progressively strict food safety and quality requirements restrict the access to the international (and especially European) market and significantly affect exports.

Despite the impact of these constraints, which could be considered negative in one way (actors weakly organized) or positive (actors fairly well organized) in the otherwise, the fruit and vegetable sector in Morocco remains a fully dynamic supply chain with high added value and a strong contribution to the formation of global GDP[28]. It could be considered as a model at least compared too many competitor countries.

Identified in the plan of emergence as a most important component of the Economy, the fruit and vegetable sector receives a special attention with an intensive development program (PMV) both for fresh and processed produce. It therefore provides a reinforcement chain that has a high value-added export (third fundament of the Green Morocco Plan, Pillar I)[29]. This

[28] *GDP : Gross Domestic Product*

[29] *La stratégie II ou aussi pilier II concerne l'agriculture solidaire située en zones de montagnes, oasiennes et le Bour défavorable et ce ci dans un contexte de l'agriculture pour tout sans exclusion.*

strategy provides a strengthening of modern agriculture with high added value and thus affects the irrigated and favorable Bour[30].

The realization of Pillar I regarding the modern agriculture focuses on three development axes. The first axis concerns the inter-professional organization, that mean to say organization into poles for solving inherent problems within supply chain, and participation with State to elaborate development plans in the supply chain. The Second axis concerns program-contracts supply chain that should be concluded between State in one hand and professionals of supply chain in the other hand. The third axis concerns the aggregation of small and medium farmers (SMF) into groups.

The second development axis illustrates State commitments (defending and promoting the chain interests at regional and national scale, grants, provide preferential financing, partnerships with research institutions) and professional commitments (defending and promoting chain interests, farmers training, chain organization especially on the input supply, logistics, processing and marketing). Thus, the private sector is called to play a locomotive role responding to PMV ambitious strategy. As a consequence to the PMV strategy's, a number of program contracts were ready signed and concern Citrus, early products (vegetables), Olive, cereal, etc.

5.2 Production of fruits and vegetables

In 2006, the total production of the studied sample amounts to 537,282 tons. This volume increased to 645,028 tons in 2009 thus registering a positive trend overall by 20%. Note that the production activity of certain actors only began in 2009. The main early vegetable products listed are tomato and zucchini and for citrus are Clementine and Moroc-Late.

Distribution of volumes produced by class of interval (with equal amplitude) is given by the following table (all products combined).

[30] *Set of dry soils cultivated that depending on runoff rainfall. Three areas can distinguish: a Bour favourable, sufficiently watered, a Bour unfavourable arid and an intermediary Bour.*

Table 1. Distribution of volumes produced by class of intervals between 2006 and 2009

Volume traité en tonne	2006	2009
Less than 10000	46.70%	40.00%
10000 to 20000	23.30%	16.70%
20000 to 30000	6.70%	23.30%
30000 to 40000	10.00%	10.00%
40000 to 50000	6.70%	3.30%
50000 to 60000	0.00%	0.00%
60000 and more	6.70%	6.70%
Total Obs.	100%	100%

Source : own elaboration on the survey data

5.2.1 Production by product- typology

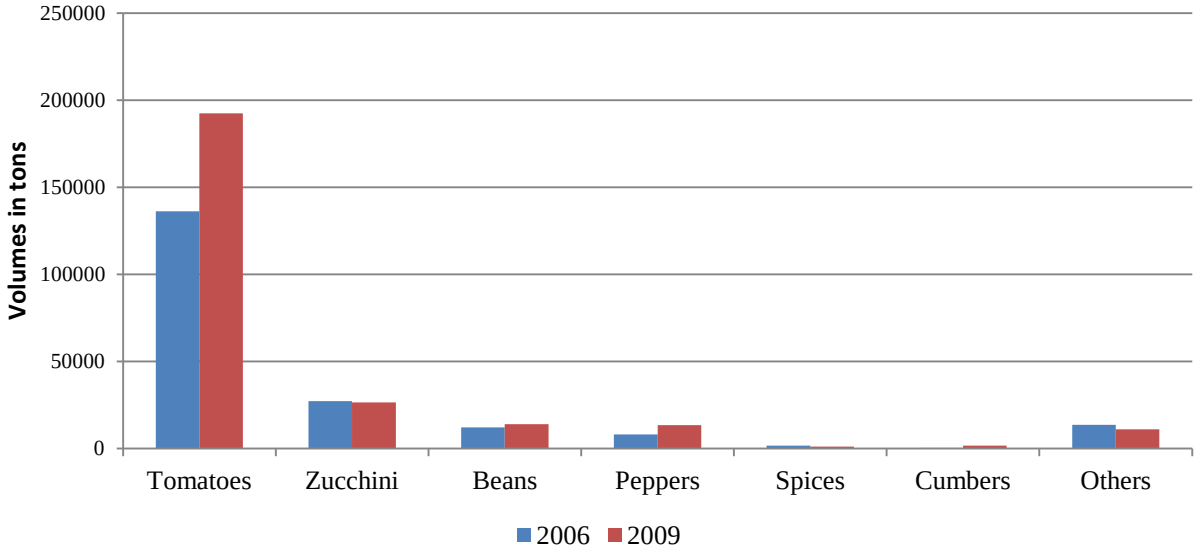
5.2.1.1 Production of Early vegetables

The main most crops cited in this area (Souss-Massa or region of Agadir) are: tomatoes, zucchini, beans, peppers. There are also other product categories but with relatively low volumes such as cucumbers, spices. In this category are included (in volume) also other products like melons, peaches, nectarines and corn. But the production of corn concern 2006 season only. These products are grouped in the category "other" in the graph belows.

Basing on the sample, the early vegetable production amounted to 259,683 tons in 2009 versus 198,774 tons in 2006 with an increase rate of 30.6%. This positive evolution is due to higher volumes of tomatoes and peppers (see graph 2). The tomato, alone, registered an increase of 41.4%, the peppers with about 65% and cucumbers, which have seen their share increase by 3.4 times (340%) between 2006 and 2009.

The positive trend for these products is explained by the increase in global demand that should stimulate, consequently, an increase in global supply (population growth at the national and international level). This increase in terms of volume may be also explained by the existence of new entrants in the sector (production activities started from the 2009), and by an increase of productivity of existing operators.

Figure 1. Evolution of Early vegetables' production between 2006 and 2009 in tons



Source: own elaboration on the survey data.

On the total of 30 actors performing on the production level, the share of each product is given in the table below. Tomatoes lead with about 74.1% of production in 2009 (roughly 3/4 of total) against 68.5% in 2006, followed by zucchini, despite the decline in 2009 with 10.1% against 13.7% in 2006 (see table 3). Also note that the values in the table are column percentages for each variable.

For tomatoes, key product in the Souss-Massa area, one actor dominates at the production level and produce little more than 31% in 2006. This volume increased by 20.25% in 2009, with a 38% share of the global production (sample). The importance of the tomato, not only at the international but also at national level (opportunities for marketing production, especially during the holy month of Ramadan) and its contribution to the GDP in generating currency (significant revenues) encourage producers to increase their production volumes. It seems that the key drivers of this increase are primarily explained by the introduction of new production methods (technical and technological transfer, managerial know-how...).

Table 2. Evolution of Early vegetables' production between 2006 and 2009 in percentage of volume

Product	2006	2009	Average	Var 2009/06 (%)
Tomatoes	68.5%	74.1%	71.7%	41.4%
Zucchini	13.7%	10.1%	11.7%	-3.1%
Beans	6.1%	5.4%	5.7%	15.9%
Peppers	4.1%	5.1%	4.7%	64.7%
Spices	0.8%	0.4%	0.6%	-33.2%
Cucumbers	0.2%	0.6%	0.4%	340.0%
Others	6.8%	4.2%	5.3%	-18.2%
Total	100%	100%	100%	30.6%

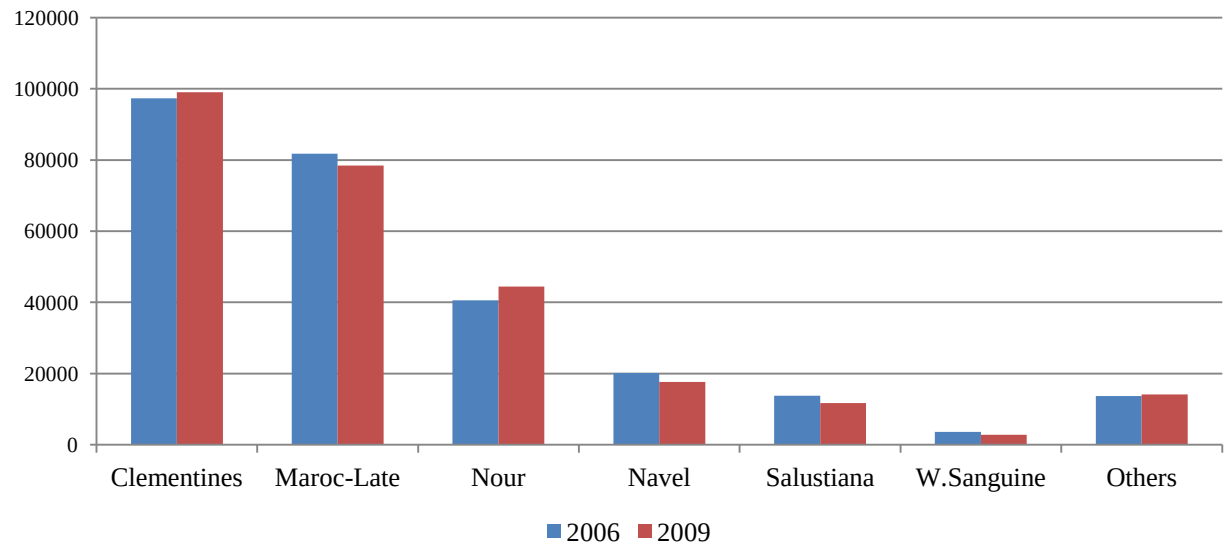
Source : own calculations on the survey data

5.2.1.2 Production of Citrus

Citrus is a major component of Moroccan fruits and vegetables production. Citrus production experienced a slight increase between 2006 and 2009 with only 9.8% compared with early vegetables. This small increase is due to the increase of production of Clementine and Nour, while other varieties have declined in terms of production volumes (see Figure 3).

The decrease in volumes of these varieties (Maroc-Late, Salustiana, Navel and W. Sanguine) can be explained by the decline of international demand and may be also partially explained by the aging of existing plantations. This latter requires upgrading and rehabilitation of citrus yard with new plantations and new selected varieties.

Figure 2. Evolution of Citrus production between 2006 and 2009 in tons



Source : own elaboration on the survey data

The following table shows that Clementine has led to the production of citrus followed by Moroc-Late. Clementine showed a slight increase from 34.5% in 2006 to 36.5% in 2009. However, the volumes of Moroc-Late are stagnated for the same period (2006 and 2009) with 28.8% (see table below).

Table 3. Evolution of Citrus production between 2006 and 2009 in percentage of volume

Products	Share in % 2006	Share in % 2009
Clementine	34.5%	36.4%
Nour	11.4%	13.6%
Maroc Late	28.8%	28.8%
Salustiana	4.0%	3.2%
Navel	6.9%	5.3%
W. Sanguine	1.8%	1.5%
Other citrus	12.6%	11.2%
Total	100%	100%

Source : own calculations on the survey data

Another consequence shows that on the 30 operators surveyed (working at the production level), 56.7% of them claimed that the differential between the cost of production for export and the production cost for local market is between 80% and 100%. This means that the overall production is oriented to export.

5.2.2 Evolution and forecasting: production, turnover and profitability

In general, and over the last three years (2007-2009), it seems that the production recorded a positive evolution for 82.1% of respondents, while 14.3% experienced fluctuations, and only 3.6% declared a constant trend over the period. Turnover has seen a positive evolution for 67.9% of the respondents and even profitability for 53.6% of the respondents. Globally, the results show that almost 68% of the respondents confirm that these three parameters tend to be increased, while around 20% confirm a variable trend.

Table 4. Evolution of production, turnover, and profitability over the last three years (2007-2009)

---	Increase	Decrease	Constant	Variable	Total
Production	82.1%	0.0%	3.6%	14.3%	100%
Turnover	67.9%	0.0%	10.7%	21.4%	100%
Profitability	53.6%	3.6%	17.9%	25.0%	100%
Total	67.9%	1.2%	10.7%	20.2%	100%

Source : own calculations on the survey data

To forecast and predict the trend concerning the same parameters studied above (production, turnover and profitability), the same question was asked concerning the over next five years (2010-2014).

As illustrated by table 5, the result shows that production, turnover, and profitability forecasts tend to positive. On the total number of respondents, 76.7% declared an increasing trend for production, 66.7% for turnover, and 63.3% for profitability. 23.3% declared that the production forecast tend to be constant. 23.3% declared that profitability forecast tend to be variable in the next five years. Globally, almost 69% of respondents declared a positive trend for the whole set of parameters in the next five years, while 15.6% declared a constant trend, and 14.4% a variable trend.

Table 5. Production forecast trend, turnover and profitability over the next five years (2010-2014)

---	Increase	Decrease	Constant	Variable	Total
Production	**76.7%**	0.0%	23.3%	0.0%	100%
Turnover	**66.7%**	0.0%	10.0%	23.3%	100%
Profitability	**63.3%**	3.3%	13.3%	20.0%	100%
Total	68.9%	1.1%	15.6%	14.4%	100%

Source : own calculations on the survey data

Moreover, we were interested in measuring the quality of workforce employed in the different companies/firms of the sample. Based on the number of citation percentages of each modality, it seems that 66.7% of respondents employ skilled labor (skilled technicians, skilled workers), and 22.2% involve a super skilled labor (engineers, super skilled technicians), while about 8% say they involve unskilled labor (ordinary workers). It should be noted that the difference between the involvement of skilled labor and unskilled labor is very significant in terms of added value.

5.2.3 The main comparative advantages and constraints at the production level

We are now interested in evaluating the main comparative advantages enjoyed by the actors. To elicit the judgments of respondents regarding the comparative advantages, a list of 4 items was provided: production costs, product quality, transport costs, and services. Respondents were asked to score each of these items on a five-point Likert scale from ‘very important’ to ‘not important. As illustrated by table 8 below, it seems that product quality is

very important for 60% of respondents, services offered is quite important for 40%, while low transport costs and low production cost is judged to be 'average' for respectively 53.3% and 36.7% of respondents.

Table 6. The main comparative advantages at the production level

---	Very important	Quite important	Average	Little important	Not important	Total
Production costs	20.0%	23.3%	36.7%	10.0%	10.0%	100%
Product quality	60.0%	26.7%	3.3%	10.0%	0.0%	100%
Transport costs	3.3%	10.0%	53.3%	26.7%	6.7%	100%
Services	23.3%	40.0%	30.0%	6.7%	0.0%	100%
Total	26.7%	25.0%	30.8%	13.3%	4.2%	100%

Source : own calculations on the survey data

However, several constraints at the production level have been pointed out. As illustrated by the table 7 below, energy costs, raw material costs, and water were judged to be "very high" by 36.7%, 26.7%, and 23.3% of respondents respectively. 40% judged raw material costs as quite high. Labor has been judged to be "not very high" by 40% of respondents. Finally, the less important items ("not at all high") were judged to be the packaging material (53.3% of respondents), equipment (53.3%), raw materials (50%), lack of energy (46.3%), and services (43.3%).

Table 7. Assessment of main constraints to production

---	Very high	Quite high	Average	Not very high	Not at all high	Total
Raw materials	10.0%	6.7%	16.7%	16.7%	50.0%	100%
Packaging material	6.7%	3.3%	3.3%	33.3%	53.3%	100%
Raw material costs	26.7%	40.0%	23.3%	10.0%	0.0%	100%
Lack of energy	0.0%	16.7%	20.0%	16.7%	46.7%	100%
Energy costs	36.7%	30.0%	20.0%	13.3%	0.0%	100%
Services	0.0%	6.7%	20.0%	30.0%	43.3%	100%
Water	23.3%	16.7%	26.7%	13.3%	20.0%	100%
Labour	3.3%	10.0%	36.7%	40.0%	10.0%	100%
Equipment	3.3%	20.0%	6.7%	16.7%	53.3%	100%
Total	12.2%	16.7%	19.3%	21.1%	30.7%	100%

Source : own calculations on the survey data

On the total number of respondents, 8 actors allocate a part of their production to the processing industry. According to these confirmed that they allocate a portion to processing

industry, it seems that 62.5% of them allocate less than 15% of their total production (5 actors), and 25% allocate a portion between 15% and 30% (2 actors), while 12.5% (one actor) allocate more than 30% of its total production. In general, the volumes intended to processing industry are from deviations after sorting and selection of export products.

The result shows also that the total of respondents (except for 2 actors) declared that their products are subject to a primary treatment such cleaning, sorting, packaging, calibration, packaging, preservation, etc. All respondents give more importance to primary treatment and they are also more committed to invest more at this level.

According to this result, the volumes treated in 2006 and 2009 are grouped into classes (unit ton) following the achievements of actors (table 8).

Table 8. Evolution of volumes treated between 2006 et 2009

Treated volume	2006	2009
Less than 10,000	46.70%	40.00%
10,000 to 20,000	23.30%	16.70%
20,000 to 30,000	6.70%	23.30%
30,000 to 40,000	10.00%	10.00%
40,000 to 50,000	6.70%	3.30%
50,000 to 60,000	0.00%	0.00%
60,000 and more	6.70%	6.70%
Total Obs.	100.00%	100.00%

Source : own calculations on the survey data

As illustrates by table 8, and according to the 2009 data, it seems that the class which deals less than 10,000 tons represents 40% (against 46.7% in 2006) followed by the class which deals a volume between 20,000 tons to 30,000 tons with 23.3% (against 6.7% in 2006). In the third place come the class that deals between 10,000 tons to 20,000 tons representing 16.7% (against 23.3% in 2006). Only a few numbers of actors deal more than 60,000 tons in 2006 and 2009. This class only represents 6.7% of the total number of respondents. It appears also that the class dealing between 30,000 tons and 40,000 tons seems unchanged in both 2006 and 2009 with a rate of 10% of the total respondents. Finally, the analysis of the distribution of actors by classes of volumes pointed out that a large number of producers/exporters deal small quantities, whilst a few number deal medium-large quantities.

5.3 Management of logistic and cold chains

For the reminder of the chapter, we will take into consideration also the five exporting groups and the sample size will thus increase from 30 to 35 actors.

5.3.1 Management of the logistic chain

A good supply chain management is a crucial point for a company. However, there seems to be a gap between supply chains dedicated to the export, which seem to be efficient at the cold chain level, and those oriented to the domestic market. Transport of fresh produce (especially for export) is, despite penalized by the transit time, freight costs and deficit in infrastructures.

If a company has its own transport, this will enable it to gain a competitive advantage by reducing the overall costs (cost and time advantages). This is the reason why an excellent logistics along the chain allows players to gain in terms of time (just-in-time), costs (low transport costs), and to maintain and strengthen their relationships with their downstream customers.

In Morocco, the transport is consolidating by improving road infrastructure (highway Agadir-Tangier and Fez-Oujda) and ports (new port Anza of Agadir, Tangier-Med Port, Casablanca...). This advance in terms of basic infrastructure is therefore a strong point for goods to flow more quickly to their final destinations and improves, in fact, the global performance of the sector. Table 9[31] illustrates the distribution of respondents according to the nature of transport (own means of transport, location, others).

Table 9. Distribution of actors by nature of transport

Transport	Nb. cit. (row 1)	Freq.	Nb. cit. (row 2)	Freq.	Nb. cit. (row 3)	Freq.	Nb. cit. (sum)	**Freq.**
Own means	26	74.3%	0	0.0%	0	0.0%	26 (2.23)	**74.3%**
Location	7	20.0%	25	71.4%	0	0.0%	32 (2.03)	**91.4%**
Others	2	5.7%	0	0.0%	0	0.0%	2 (0.17)	**5.7%**
Total Obs.	35		35		35		35	

Source : own calculations on the survey data

As shown by Table 9, 74.3% of respondents mobilize their own transport means, and 91.7% borrow rental transportation to sell their goods on the destination markets. Also it is

[31] *The table illustrates the numbers for each row and the sum. See that the number of citations is greater than number of observations due to multiple responses (up to 3), the average rank of each modality quotes in brackets in the last column.*

worthy to notice that companies with their own transport means are used to rental transportation to better fulfill requirements of downstream customers.

Another finding is that the majorities of companies have their own means of transport but also opt to employ other means. The combination of the use of these two means reflects the objective of players to meet the needs of their customers downstream. The objective is to export as much as possible, as soon as possible, and in an appropriate quantity and quality. Hence, the actors seek to maintain their relationships with downstream customers in a long-term strategy context, positioning on the markets with high added value, enhance their competitiveness, etc.

When products are perishable in nature, transport must be mobilized with refrigerators to allow products to keep up as much as possible their initial nutritional and organoleptic characteristics. However, data do not reveal a clear trend between the rate of transport with own fridge available to each company. In general, the lease of transport means concern those with fridge. For this reason we find only a few numbers of actors (about 3%) that have between 60% and 100% own refrigerated trucks.

The distance bringing by product to its final destination from the delivery point varies depending on whether the goods are delivered at the port of Agadir or the Tangier-Med, or even farer destinations, when the upstream actor has own delivery platforms in the target countries or markets. This distance varies from a few kilometres for reaching the Agadir port to several hundred kilometres (about 900 miles) to reach Tangier, or even more if the actor itself has to go beyond the local border. The most common means used to satisfy this need are trucks for 100% of responses, followed by boats (97.14%), containers (11.43%), or in some cases even planes (2.86%) (Products intended to Gulf countries).

According to survey results, the degree of supply chain efficiency (basic infrastructure) may affect the smooth transport operation, described as "crucial" in the product cycle. Therefore, only 20% of participants felt that there is a lack of efficiency at this level (9 actors). The main findings that have been cited concerning the lack of efficiency are diverse, for example, a lack of efficiency in maintaining temperatures during transport, bad management of goods at ports level, lack of sophisticated logistics to achieve some faraway destinations, etc.

The various difficulties that have been highlighted, which strongly affect the supply chain efficiency, concern variability of services at the port of destination, accompanied by a weak management for some players. However, a significant improvement was observed, in

general, by the majority of players (especially after the establishment of the highway "Agadir Marrakech" and port "Tangier-Med").

The transport cost is estimated from the total turnover of company. This finding will allow us to predict the impact of logistics along the transport chain on the performance of actors. The result is given in the table 10 below.

Table 10. Distribution of firms by transport costs/ total turnover

Transport costs in %	Nb. cit.	Freq.
No answers	8	22.9%
Less than 4%	1	2.9%
4 to 6	2	5.7%
6 to 8	1	2.9%
8 to 10	0	0.0%
10 to 12	4	11.4%
12 to 14	1	2.9%
14 and more	18	51.4%
Total Obs.	35	100.00%

Source : own calculations on the survey data

In table 10, the characterization of firms according to transport costs is given by intervals of equal amplitude (same width). It is clear that the class, for which transport costs represent 14% or more of the total turnover is just over a half of the sample (51.4% exactly), followed by the class 10%-12%. Overall, we can state that the average cost spent to maintain the transport chain good enough varies from 10% to 15% of the total turnover of a company.

5.3.2 Cold chain management

The study of cold chains in Morocco is necessary. On the social front, this need stems from the role of temperature in determining of food supply chains performance. Indeed, the failure temperature is the second factor of food-borne illness. On the economic front, the profitability of supply chains for fresh produce is highly dependent on the reduction of weight loss products. Finally, on the environmental front, for everything concerning the food waste and resource implemented to produce.

Indeed, the perishable nature of fresh products requires adequate treatment in good structured spaces with high-level skills (buildings, equipment, professional workforce...). In Morocco, several food chains are deficient in the cold chain. The case of food products is interesting because it allows us to identify logistical problems in an area, where the

requirements are crucial for the fulfillment of the quality of perishable product, because any break in the cold chain automatically leads to the loss of the cargo (or freight).

Management of the cold chain in packaging and storage units is provided by technicians "fridges" and/or professional engineers or, if necessary, by skilled workers. Usually, the number of professionals mobilized by different operators to accomplish this mission depends on the size of the managing unit.

It should be noted that a number of players invest in two components. First component aims to meet the needs required by their customers (best conditions of packaging and storage). Second component aims to provide a complementary service to other actors, who do not have pack-house and storage of their goods before shipment to the final destination.

Indeed, the management of the cold chain is another parameter that is not less important than transport. Cold chain plays a crucial role at stations and packaging, transport chain and at platforms to destination level. It allows the product to retain the maximum possible it's qualitative and taste characteristics (nutritional, organoleptic...).

In order to qualify the intensity of the cold chain efficiency at the platforms to destination, the table below shows that only 22.9% of respondents (4 cooperatives, 3 producers-exporters and 1 exporter) expressed that they are not satisfied with the services provided at the platforms level. For these latter, this lack of efficiency comes especially from the lack of means used for chill-down at this level. Indeed, the essential efforts should be combined to overcome this challenge by rapid (re)structuring of these places views their importance in the receipt of goods in better conditions.

Table 11. Distribution of actors according to cold chain inefficiency at the platforms level to destination

Inefficiencies in cold chain	Nb. cit.	Freq.
Yes	8	22.9%
No	27	77.1%
Total Obs.	35	100%

Source : own calculation on the survey data

On average, the cost incurred to manage the cold chain at packing stations and along the transport chain is approximately 6.5% of total turnover. Based on the data table below, the class of actors that spends a cost between 3% and 5% represents approximately 43% of the

total surveyed, while the class of actors who spend between 8% and 10% of their turnover represents 25.7% of the respondents (table 12).

Overall, the costs involved in the cold chain managing lie in a level fairly enough for the majority of players. This result shows that the sector is fairly organized at this stage.

Table 12. Distribution of actors by cold chain cost/total turnover (relative importance of answers)

% Cost of cold chain / turnover	Nb. cit.	Freq.
Less than 3%	5	14.3%
3 to 5	15	42.9%
5 to 8	5	14.3%
8 to 10	9	25.7%
10 to 13	0	0.0%
13 to 15	0	0.0%
15 and more	1	2.9%
Total Obs.	35	100%

Source : own elaboration on the survey data

Therefore, it's obvious that compliance with management and handling of cold chain is essential for proper preservation of perishable goods. Hence the need for monitoring the temperature of cold chain from production sites to consumption.

This need has resulted in reducing of time between harvest, harvesting, slaughters, capture or cooling processes of products: the early cold. This requirement has also been made possible by the separation of cooling and storage, design of cooling systems and intelligent conservation and the design of integrated cooling links to control the atmosphere parameters by the availability of warehouses, transport and adapted places to sale these perishable products. If consumers tend to be equipped with refrigerators, we must constantly develop upstream cold chains leading to it.

Concerning fruit and vegetable sector, cold chain plays a double strategic role in the process reliability of production/marketing. It allows, on the one hand, the preservation of the quality of products between harvesting and marketing time. On the other hand, it makes possible the long-term storage of products, from four to eight weeks.

At the national level, there is a gap between the functioning of food supply chains related to export activities and those serving the domestic market. The former are relatively well structured and efficient, even if bottlenecks persist at several levels. Much of exporters

have developed capabilities and organize to circumvent problems to meet the logistical requirements of their customers at the cold chain (citrus, vegetables, fish, etc.). Hence, transporters that operate on the main export axes in Morocco are, in turn, able to provide relatively reliable and efficient connections, and provide a range of logistics services to their customers in Morocco and especially in Europe. In terms of exports, the cold chain allows to regulate the supply to demand by adjusting the quantities to commercialize, depending on harvest periods.

Despite all efforts being made, the gaps in the fruit and vegetable chains have many limitations related to the lack of supply chain cold control, the product flow from production sites to consumption, the large number of chain stakeholders, and lack of coordination and also a very tight calendar of the production period.

The main bottlenecks in the export fruit and vegetables sector for are due to multiple problems:

- Transport timing between Morocco and Europe ;
- A high maritime transport costs;
- Inadequate service dedicated to container cold chains due to insufficient volumes in programming chartered from Agadir (considered as largest emitter pole of fruit and vegetables from Morocco), despite the efforts of some ship-owners (IMTC, Mearsk, etc.).
- Inadequacies in refrigerated infrastructures, specialized handling and safety (slow operations and product damage).

5.4 Exports

At supply chain downstream the customer/supplier relationships are very delicate and the balance of power is in favor of the "leading" actor. At this level, marketed product must demonstrate its route (equipped with all documents deemed necessary): '*product traceability'*. Therefore, the downstream player (usually, the importer) is the key player in the supply chain. He imposes its preferences and sets minimum requirements, which the commercialized product must comply with. The power of these requirements varies depending on the downstream customers' type (usually the importer). Downstream actor maybe large commercial companies (as modern organized distribution), the large agro-industrial companies or unorganized wholesalers (intermediaries, resellers, Commissionaires ...).

The questionnaire results showed that the main downstream actors are importer groups (which can be either unorganized wholesalers or platforms of upstream actors located in the international market, actors who show downstream integration), the modern organized distribution (large central purchasing companies) as other exporter groups. Customers/suppliers relationships are governed by different mechanisms.

5.4.1 Evolution of exports by product-typology

The Moroccan fresh fruit and vegetables are concentrated on Citrus (Clementine and Oranges) and tomatoes. Recently diversified product portfolio is well established, with a significant increase in fresh produce with high value added (as Zucchini, Peppers, Beans, etc.). The Moroccan exports of these products to Italy are very limited (around 0.6% of the total export made by the present analyzing sample).

In 2009, the five key fresh products exported by volume are respectively Tomatoes, Clementine, Maroc-Late, Nour and Zucchini. The three first products represent about 70% of total exports in volume in the same year (2009).

5.4.2 Evolution of fruit and vegetable exports by destination market

The identification of the various destination countries based on the total exports by the sample in 2009 is shown in the following table (table 13)

Table 13. Dynamic of fruit and vegetable exports in 2006 and 2009 in volume (tons) and in percentage

	2006	Rate in %	2009	Rate in %	Var 2009/06
UE	226,925.128	48.4%	326,995.064	54.7%	**44.1%**
ALENA	59,859.3826	12.8%	63,012.1932	10.5%	5.3%
Arabic countries	2,098.3	0.4%	1,899.7588	0.3%	-9.5%
African countries	452.0206	0.1%	2,406.6636	0.4%	**432.4%**
Russia	160,206.354	34.2%	183,823.2	30.7%	**14.7%**
Rest	19,372.8146	4.1%	19,893.1208	3.3%	2.7%
Total	468,914	100.0%	598,030	100.0%	**27.5%**
No answered(*)	6,000		7,000		
Total	474,914		605,030		

Source : own calculations on the survey data

(*) One operator does not answer concerning export volume to destination market

The table above shows that the Morocco's fruit and vegetable exports are concentrated on the EU market. The volumes exported to this market increased from 226,925 tons in 2006 to 326,995 tons in 2009 with a positive trend of 44.1%. Then comes the Russian market. The

volume traded on this market amounted 160,206 tons in 2006 and 183,823 tons in 2009, with a positive trend of 14.7%. Another finding very important is the expansion of trade between Morocco and Africa. The trade with African countries has registered an increase of more than 400%. However, Morocco-Arab countries trade is marked by a decline with -9.5%. On the NAFTA market, a low increase in exports of 5.3% is recorded. However, the global performance of the country grew by 27.5% between 2006 and 2009.

5.4.3 Evolution of fruit and vegetable exports by destination countries

Concerning trade flows dynamic towards the main partner countries, the following table highlights the quota of each country in 2009. As illustrates in the table follow, Russia absorbs 33.7% of the total export by sample. France absorbs 26.6% of the total volume exported by sample and leads the EU importing countries. This dynamic flow to France is the result of the colonial heritage. Canada absorbs 9.3% followed by UK and Netherland with 8.5% each.

Dynamics of Moroccan exports toward Italian market remains very low, with only 0.5% of the total exported by the analyzed sample. This does not mean that Moroccan products entering the Italian market with very low volumes, but direct trade in fruit and vegetables between the two countries (Morocco and Italy) are limited. But we can say that the Moroccan product (fruits and vegetables) arrives on the Italian market through Commissionaires located at the main importing countries (especially France).

The Over-dominance of the French market can be also explained by the fact that many actors are French in origin or promoted by Moroccan-French partnerships.

Table 14. Dynamic of fruit and vegetable exports in volume (tons) by mains destination countries in 2009

	Volume in 2009	Rate %
Russia	16,7127.2	33.7%
France	132,098.818	26.6%
Canada	46,327.4748	9.3%
UK	42,680.2894	8.6%
Netherland	42,332.2106	8.5%
Germany	15,669.44	3.2%
USA	14,680.7184	3.0%
Spain	9,266.8564	1.9%
Italy	**2,544**	**0.5%**
Belgium	2,020.994	0.4%
Arab countries	1,892.5588	0.4%
African countries	1,632.6636	0.3%
Rest	18,270.7768	3.7%
Total(*)	496,544	100.0%
No answered	108,486	
Total	605,030	

Source : own calculations on the survey data

(*) Concerning countries destination, four actors not answered to the relating question. These four actors have marketed a volume amounting to 108,486 Tons (around 18% of the total of sample)

5.4.4 Evolution of exports by typology of product and destination market

5.4.4.1 Evolution of fresh fruit exports by destination market

In general, fruits are composed of citrus beside a minority of other products (bananas, grapes...). Morocco exports citrus on the four corners of the world. The large part goes on the Russian market (see Table 15).

Table 15. Dynamic of fruit exports (especially citrus) by destination market in 2006 and 2009

	Volumes (T) 06	Rate in %	Volumes (t) 09	Rate in %	Var 09/06
UE	68,194.528	23.8%	101,284.464	29.6%	48.5%
ALENA	58,429.3826	20.4%	60,712.1932	17.7%	3.9%
Arab countries	1,878.3	0.7%	1,349.7588	0.4%	-28.1%
African countries	452.0206	0.2%	2,406.6636	0.7%	432.4%
Russia	143,156.954	49.9%	1,60050.8	46.7%	11.8%
Others	14,872.8146	5.2%	16,893.1208	4.9%	13.6%
Total	286,984	100.0%	342,697	100.0%	19.4%

Source : own calculations on the survey data

The results of this table allow us to confirm that the Russian market alone holds the lion's share of Moroccan citrus exports and tops the list of importing countries despite the

observed decline in percentage in 2009. Volume absorbed by Russian market is almost 47% in 2009 against 50% in 2006. This observed decline in terms of percentage on the Russian market can be explained by a positive evolution of volumes (in percentage) intended toward EU market. On the latter, the quantities of citrus absorbed in 2006 amount 24.7% of the total volume. This amount goes to 37.2% of the total in 2009.

5.4.4.2 Evolution of fresh vegetable (early) exports by destination market

Early vegetable exports are mainly tomato. This latter product is the key of early vegetables. However the tomato exports, product with higher added value, are subject to quotas especially on the EU market. To overcome this technical constraints (technical barriers to trade "TBT"), the Moroccan actors are called to move other market niches in one hand, and diversify their portfolio-products with high added value in other hand. The table 16 illustrates the main destination markets of fresh vegetables.

Table 16. Dynamic of vegetable (early) exports by destination market in 2006 and 2009.

	Volume 06 (T)	Rate in %	Volume 09 (T)	Rate in %	Var 09/06
UE	158,730.6	87.2%	225,710.6	88.4%	42.2%
ALENA	1,430	0.8%	2,300	0.9%	60.8%
Arab countries	220	0.1%	550	0.2%	150.0%
African countries	0	0.0%	0	0.0%	0.0%
Russia	17,049.4	9.4%	23,772.4	9.3%	39.4%
Others	4,500	2.5%	3,000	1.2%	-33.3%
Total	181,930	100.0%	255,333	100.0%	40.3%

Source : own calculations on the survey data

The table above shows that the Moroccan traditional customer on the vegetables (early) remains the EU market. In 2009 this market absorbs 88.4% of the total early vegetable's volume exported (the market share is 87.2% in 2006). The variation ratio of 2009/2006 recorded a strong performance with an increase of 42.2%. The evolution of exports of these products on the Russian market remains almost stagnant recording a 9.3% in 2009 against 9.4% in 2009 on the total volume exported. The variation ratio of 2009/2006 has been a very good evolution with 39.4%. While the volumes intended to NAFTA[32] market not exceed 1% of the total volumes exported in both 2006 and 2009.

Moroccan actors implement trade policies that allow them to diversify their destination markets with large volumes exported (especially on the EU and Russian market) by creating of

[32] *North American Free Trade Agreement*

exporter groups (MFB[33] and FFM[34] and Agri-Souss). The creation of these groups allow them in targeting distant markets (Europe, Scandinavia, Russia, Canada, USA and Gulf countries, etc.).

5.4.5 Turnover and export volumes evolution

The following table shows that many stakeholders confirmed that their export volumes and turnover tend to increase with respectively 60% and 57.1%. Overall, the interviewed stakeholders' pronounced tendency to the evolution of their export volumes and turnover with a global percentage of 58.6%.

Table 17. Turnover and export volumes evolution

---	No answers	Increase	Decrease	Constant	Variable	Total
Export volumes	8.6% (3)	60.0% (21)	8.6% (3)	2.9% (1)	20.0% (7)	100% (35)
Turnover	8.6% (3)	57.1% (20)	11.4% (4)	2.9% (1)	20.0% (7)	100% (35)
Ensemble	8.6% (6)	58.6% (41)	10.0% (7)	2.9% (2)	20.0% (14)	100% (70)

Source : own calculations on the survey data
chi2 = 0,17, ddl = 4, 1-p = 0,33%.

5.4.6 Competitors by destination market

In this section we will identify the main competitors for the main three products exported. Each actor will mention three products for which it is the subject of competition, on determining which market, especially on which country and types of distribution channel (either modern organized distribution "DMO" or unorganized wholesalers "GNO"). The study concerns the first three key products for each actor.

The first key products most indicated are tomatoes followed by Clementine. These products are more concurrence on the EU market (25 citations) and Russian market with 12 citations. Moreover, and inside the EU market, it seems that France is the first country on which these products are subjected to the highest competition (16 citations), followed by UK (6 citations). They are subject to competition also on the Russian market with 11 citations. According to results, it seems also that these products are subjected to competition especially on the DMO channel (26 citations against 16 citations for the GNO channel). The most

[33] *'Maroc Fruit Board' (groupe exportateur créé en 2000 fédère les principaux producteurs exportateurs de fruits et légumes du Maroc, et regroupe sept membres : GEDA, COPAG, DELASSUS, SALAM, GKB, SOGECAP et OCE).*
[34] *Fresh Fruits Maroc.*

important competitors are identified in Spain (26 citations), Egypt (9 citations) and Turkey (7 citations).

Concerning the second key products, the most concerned are peppers (4 citations) and Nour (citrus) with 4 citations also. The main markets on which the second key products have concurrence are EU at 17 citations and Russia at 4 citations. This concurrence is most observed on France (11 citations), UK (4 citations) and Netherlands and Russia with 3 citations for each one. The concurrence is most observed on the DMO channel with 15 citations while GNO channel at 8 citations. The most competitor countries identified are always Spain (15 citations), Egypt (6 citations) and Turkey (4 citations).

In the end, the most third key products are Zucchini, peppers and Maroc-Late (citrus) with 3 citations for each one. The concurrence is mainly observed on the EU market (8 citations) and Russian market (5 citations). Concurrence is most observed in France (7 citations) and Russia (5 citations). Hence, the concurrence concern mostly DMO channel (10 citations) while only 3 citations for GNO channel. The main competitor countries are Spain (8 citations), Egypt (6 citations) and Turkey (3 citations).

According to these results, the products concerned can be funded in the first category, second or third key products. The concurrence is mostly observed on the EU market main destination market of Moroccan products, especially France (most cited country). Concurrence concerned more the DMO channel. In the end, the main competitor countries funded are Spain, Egypt and Turkey (see table 18).

Table 18. Main competitor countries by destination market/country/channels for three key products

	Coop.	Prod.Exp	Exp	Total
Product 1				
Tomato	5	5	0	10
Zucchini	0	1	2	3
Beans	0	0	2	2
Peppers	0	1	0	1
Clementine	4	2	1	7
Citrus	1	3	0	4
Maroc-Late	1	1	0	2
Oranges	0	2	0	2
Total	***11***	***15***	***5***	***31***
Market (product 1)				
EU	9	11	5	25
Russia	5	7	0	12
NAFTA	1	1	0	2
Total	***15***	***19***	***5***	***39***
Country (product 1)				
France	6	7	3	16
Russia	4	7	0	11
UK	3	2	1	6
Netherland	3	1	0	4
Germany	1	1	0	2
Spain	0	0	2	2
EU(*)	1	1	0	2
Belgium	1	0	0	1
Canada	1	0	0	1
USA	0	1	0	1
Total	***20***	***20***	***6***	***46***
Market segment				
DMO	7	10	3	20
GNO	6	8	2	16
Total	*13*	*18*	*5*	*36*
Competitors				
Spain	10	11	5	26
Egypt	3	5	1	9
Turkey	4	3	0	7
Israel	1	1	0	2
Germany	0	1	0	1
Greece	1	0	0	1
Netherland	0	1	0	1
Total	***19***	***22***	***6***	***47***

	Coop.	Prod.Exp	Exp.	Total
Product 2				
Peppers	0	3	1	4
Zucchini	2	0	0	2
Beans	0	1	1	2
Melons	0	1	0	1
Spices	0	0	1	1
Win	0	1	0	1
Nour	3	0	1	4
Clementine	1	1	0	2
Oranges	1	1	0	2
Maroc-Late	0	1	0	1
Total	***7***	***9***	***4***	***20***
Market				
EU	5	8	4	17
Russia	3	1	0	4
NAFTA	2	0	0	2
Total	***10***	***9***	***4***	***23***
Country				
France	3	6	2	11
UK	1	3	0	4
Netherland	2	1	0	3
Russia	2	1	0	3
Canada	2	0	0	2
EU(*)	1	0	1	2
Germany	1	0	0	1
Spain	0	0	1	1
Total	***12***	***11***	***4***	***27***
Market segment				
DMO	5	8	2	15
GNO	2	4	2	8
Total	*7*	*12*	*4*	*23*
Competitors				
Spain	4	7	4	15
Egypt	2	3	1	6
Turkey	3	1	0	4
Israel	1	1	0	2
France	1	0	0	1
Greece	1	0	0	1
Netherland	0	1	0	1
Total	***12***	***13***	***5***	***30***

	Coop.	Prod.Exp	Exp.	Total
Product 3				
Zucchini	0	3	0	3
Peppers	1	1	1	3
Beans	1	0	1	2
Maroc-Late	3	0	0	3
Salustiana	0	1	1	2
Total	***5***	***5***	***3***	***13***
Market				
EU	2	4	2	8
Russia	3	1	1	5
Total	***5***	***5***	***3***	***13***
Country				
France	2	4	1	7
Russia	3	1	1	5
Spain	0	0	1	1
Total	***5***	***5***	***3***	***13***
Market segment				
DMO	4	4	2	10
GNO	1	1	1	3
Total	***5***	***5***	***3***	***13***
Competitors				
Spain	2	4	2	8
Egypt	3	1	2	6
Turkey	2	1	0	3
Israel	0	1	0	1
Netherland	0	1	0	1
Tunisia	1	0	0	1
Total	***8***	***8***	***4***	***20***

Source: own elaboration

5.5 Structure and export supply chain organization

5.5.1 Typology of actors

As illustrated by table 19, on the total of sample, we can distinguish between three typologies of actors: Cooperatives representing 31.4% (11 cooperatives), "producers-exporters" with 54.3% (19 actors) and "Exporters" at 14.3% (5 actors). Hence, 53% of the total performs on the vegetables (early) field while 47% operate on the citrus field. This result is consistent somehow categorization made by Rastoin (2008) and Chemnitz (2007).

Table 19. Distribution des acteurs à l'exportation par typologie

Typology	Nb. cit.	Freq.	Vol.2009 (in tons)	Answered	Rate in %
Cooperatives	11	31.4%	190,218	11	31.4%
Producers-exporters	19	54.3%	313,617	18	51.8%
Exporters	5	14.3%	101,195	5	16.7%
Total	35	100%	605,030	34	100%

Source :own calculations on the survey data

In 2009, the total volume traded by these three typologies of actors' amount 605,030 tons. It should be noted that the total is the sum of volumes from the 34 players who responded to this question. The volume traded by cooperatives amount 190,218 tons representing 31.4% of the total traded, and producer-exporter's volume amount 313,617 tons with 51.8% of the total, while exporter's volume amount to 101,195 tons representing 16.7% of the total.

5.5.2 Upstream relationships and supply modes

Fruit and vegetable sector in Morocco is the field where small producers can draw a profit margin, more or less according to their degree of involvement. It is characterized by a variety of operators (heterogeneity on the means or production, packaging or even an asymmetry in downstream activities). Actors are called to be organized into cooperative groups in the context of aggregation in response to the ambitious strategy of the 'Green Morocco Plan'. Private actors with professionalism are expected to play a locomotive role in coaching small and medium producers, or as groups of exporting producers or small private producers scattered and poorly organized.

Table 20. Distribution of actors by nature of suppliers

Mean suppliers	Nb. cit.	Freq.
Own firms	18	51.43%
Cooperatives	12	34.29%
Producers	18	54.29%
Intermediates'	4	5.71%
Total Obs.	35	

Source : own calculations on the survey data

(Note: frequency is calculated based on the number of citations of the total number of observations that are 35 observations)

The table above illustrates the distribution of actors by nature of upstream suppliers. However, reported frequencies do not explain the global trend of supply because there are players who handle their own production (case of a number of producers-exporters and all cooperatives), but cooperatives supply other actors (producers-exporters and exporters). Indeed, what we can conclude from the table is that at least a part of the production comes from each supplier listed on the table. The main suppliers are 'producers', 'producers-exporters' with 54.29% of respondents and 'cooperatives' with 34.29% of respondents, while the supply through 'intermediaries' represent only 5.7% of respondents.

In other hand, the volume allocation by origin of production is as follows: 37.1% following the own farms, 32.4% from cooperatives, 26.2% comes from other producers and only 4.2% through intermediaries. Among the number of players who use the supply way for at least a part of products exported, 73.68% are producers-exporters (i.e. 14 players) and the rest (26.32%) represent exporters (exporters or 5), as shown in the table below.

Table 21. Distribution of actors by supply sources (relative importance of responses)

	Own firms		**Cooperatives**		**Producers**		**Intermediates**	
	Nb. cit.	Freq.	Nb. cit.	Freq.	Nb. cit.	Freq.	Nb. cit.	Freq.
No answer	10	28.60%	14	40.00%	7	20.00%	14	40.00%
Less than 10	9	25.70%	9	25.70%	11	31.40%	17	48.60%
10 to 20	0	0.00%	0	0.00%	2	5.70%	2	5.70%
20 to 30	0	0.00%	1	2.90%	2	5.70%	0	0.00%
30 to 40	1	2.90%	0	0.00%	3	8.60%	0	0.00%
40 to 50	3	8.60%	0	0.00%	1	2.90%	0	0.00%
50 to 60	0	0.00%	1	2.90%	2	5.70%	1	2.90%
60 & more	12	34.30%	10	28.60%	7	20.00%	1	2.90%
Total Obs.	35	100%	35	100%	35	100%	35	100%

Source : own calculation on the survey data

We will try to differentiate between supplier's typology basing on the product's origin (that is to see if the product comes from own farm at 100 % or only a part). This differentiation aim's to define different possible classes of vertical integration basing on the percentage of the product that comes from 'own exploitation'. The following table sets out the various possible classes.

Table 22. Mesure du degré d'intégration verticale des acteurs (importance relative des réponses)

	Maximum of vertical integration (*)	$100 < I \leq 60$	$60 < I \leq 40$	$40 < I < 0$	No integration	**Total/ typology**
Cooperatives	*100.0%*	-	-	-	-	*100.0%*
Producers-exporters	*26.3%*	*42.1%*	*15.8%*	*5.3%*	*10.5%*	*100.0%*
Exporters	-	-	-	-	*100.0%*	*100.0%*

(*) Soit 100% propre exploitation, soit 100% producteurs associés ; I = intégration
Source : calculs des auteurs

As illustrated by table 22, cooperatives show a maximum of vertical integration upstream (vertically integrated 100%) while only 26.3 of producers-exporters show a maximum of vertical upstream integration . Exporters (i.e. 100% of respondents) and 10.5% of producers-exporters show a lack of integration upstream. While 42.1% of producers-exporters are fairly integrated and approximately 16% of these latter show a medium level of integration.

According to this result, and focusing on the upstream, we can define three classes of vertical integration. The first class includes actors who show maximum integration (100% integrated upstream). The second class includes actors who are not integrated upstream (lack of vertical integration). The third class includes all actors that represent an intermediate state (more or less integrated). The maximum integration facilitates upstream actors who belong and is therefore distinguished from weakly organized actors who are generally small and medium producers.

On the total of sample, 14 actors that (less or no integrated) purchase at least a part of their traded products choose to upstream supply for the following main reasons:

- Concerning producers-exporters, 50% of respondents justify the recourse to purchase by a lack of supply. For these latter, the aim is to complete their quotas on the market (its share in the international market). While 29% of respondents choose purchasing in order to diversify their offerings in the destination markets, while 14% of respondents have recourse to supply because of the lack of land to produce, while for the remaining

participants (7%), the product quality of their upstream suppliers is the main motivation for buying from them.

- Concerning exporters, as their name suggests, they provide an intermediary role between producers and importers. In reality, these actors provide a non-agricultural function, but capture a large part of the profit margin. This finding confirms that the value depends increasingly on non agricultural farm.

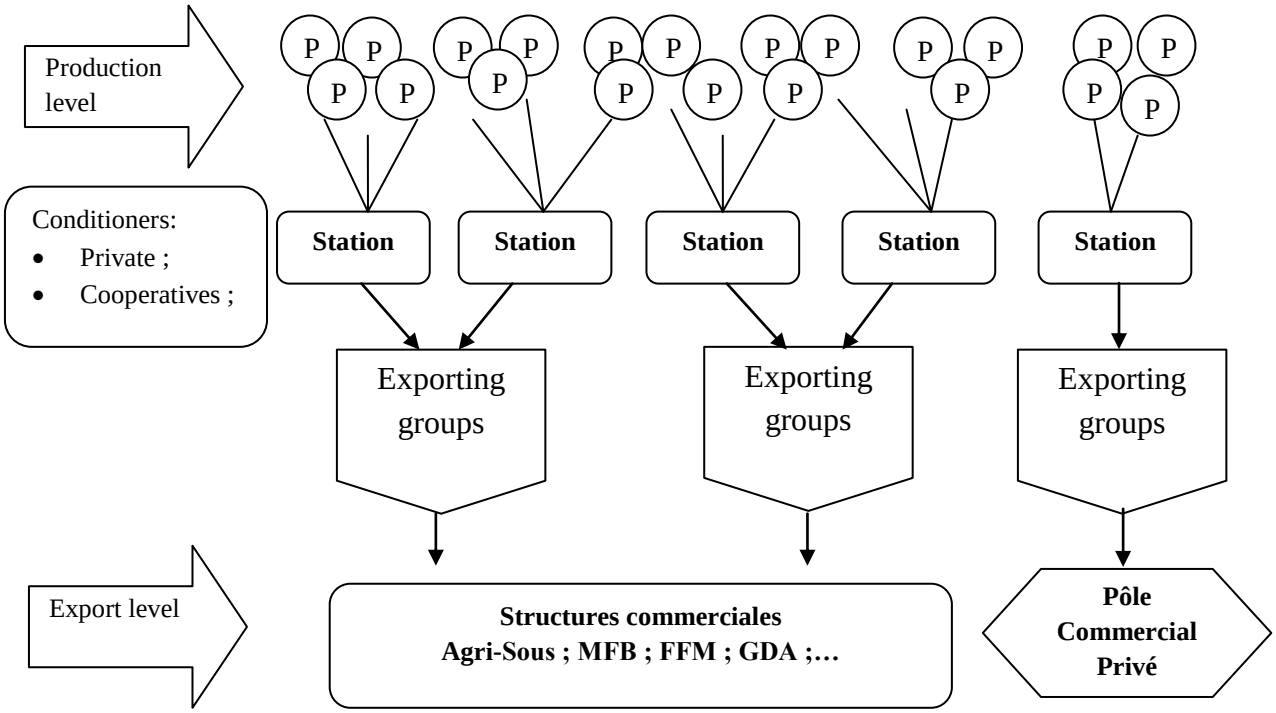
5.5.2.1 A simplified representation of upstream vertical relationships

The upstream/downstream relationships can be illustrated by the following figure. At the production level, producers organized by cooperatives group or large private producers. At the production level, we find three forms of actors: private producers, associated producers, and independent growers (figure 3).

At the packing level, private producers-exporters have their own packing units. Also the associated producers are grouped into cooperatives with their own packing units, while independent growers supply producers-exporters or exporters that have their own packing houses.

At the export level, a number of producers-exporters/exporters manage directly their export products, while the rest export through exporting groups that play this central role, especially by managing their exports to distant markets.

Figure 3. The upstream vertical relationships



Source: own elaboration

5.5.2.2 Factors affecting the supply mode choices

Concerning the supply from other actors, several questions arise at this level, why actors make supply decision? How do they select upstream suppliers? And what are the strategies for selecting upstream suppliers (upstream agricultural suppliers)? Basing on which criterion the actors' choose their upstream suppliers?

Concerning the first question, different motivations were mentioned: actors who cater to complete their quotas (the share of the export market), actors seeking to increase the profitability of their packing stations, others cater for satisfying needs of their customers downstream, high quality of products offered by suppliers while maintaining standards of quality and safety required by downstream customers and lack of land to produce is, perhaps, one of the reasons to get supplies.

These are the main motivations for the players to purchase from other suppliers. The strategy (or strategies) adopted by each player depends on relationships typology with its suppliers upstream. Among the main procurement modes practiced, comes first contractual mode with 28.6% of responses. Alternatively, the two parties engage in a "program-contracts"

framework between them. The actors establish contractual relationships with upstream suppliers which they undertake to comply with contract terms set (i.e. 100% of 'contractualized' suppliers).

The second supply mode with about 23% of responses is to purchase directly from suppliers upstream (without commitment between the two partners). In this case the key actor may exercise its power in choosing of suppliers and can also act on price determination and desired volume between them. While approximately 11.4% prefer to purchase through intermediaries and can apply the same strategies as previous actors on their upstream suppliers.

We look now to the question about the selecting criteria of suppliers upstream, one time the actor decided to purchase; it must take into account a number of criteria. In our case, we made a list of key criteria addressed to interviewed stakeholders. The targeted actors have only assessed these criteria according to their degree of importance and priority for each criterion. The follow table illustrates the result:

Table 23. Characterization of actors by supply criteria (relative importance of responses).

---	Very important	Quite important	Medium	Little important	Not important	Total
Supply proximity	15.8%	57.9%	15.8%	5.3%	5.3%	100%
Low purchase costs	52.6%	31.6%	10.5%	5.3%	0.0%	100%
Low transport costs	31.6%	42.1%	15.8%	5.3%	5.3%	100%
Reliability in quantity, quality and time	73.7%	26.3%	0.0%	0.0%	0.0%	100%
Product range	57.9%	36.8%	0.0%	5.3%	0.0%	100%
Health safety & environment impact	78.9%	21.1%	0.0%	0.0%	0.0%	100%
Ensemble	51.8%	36.0%	7.0%	3.5%	1.8%	100%

Source : own calculation on the survey data

La dépendance est peu significative. chi2 = 29,88, ddl = 20, 1-p = 92,81%.

Noting that the analysis is done on the players who have confirmed they purchase. According to the table results, it seems that the selection criteria of supplying the most important actors are respectively the safety and environmental impact at 78.9%, reliability in quality, quantity and time at 73.7% followed by range of products presented with 57.9% and low purchase cost with 52.6%. The proximity of suppliers comes in second place with a level fairly important at approximately 57.9% of responses.

The analysis of this table allowed us to distinguish between different types of relationships that can be existed between the various supply chain actors as well as the possible

schemes of supply chain. It is therefore necessary to distinguish between "international chain" or export sector and a "national industry" or domestic chain. This latter is introduced here to show that a part of the product is intended to local market (usually deviation after primary treatment operation of products intended to export).

It may be also that the players move away to the local market due to an excess of product (supply exceeds demand, confrontation to potential competitors on the destination markets, lower prices on the international market, high costs of transport to destination market, etc.).

5.5.3 Downstream relationships

At this level, we are interested to measure the degree of involvement of respondents at export. For this, we will analyze the players by typology versus channel of distribution (Wholesaler unorganized, Modern Organized Retail, and Other Exporters). The analysis at this level will be based on the percentage of the volume (or quantity of product) marketed in each channel or market segment. The percentage of volume sold will allow us to define different classes of actors on each segment. Market segments are defined as follows:

- Wholesalers unorganized "GNO": this term 'unorganized wholesalers' does not mean that the actors are not organized. 'GNO' is used here to differentiate between actors operating on this market/market segment compared to the “modern organized distribution” (DMO). This market segment includes wholesale buyers or forwarders generally located at the destination platforms (international market). The actors representing this segment act as direct distributors to final consumer, retailer or also to large distribution (supermarket large agro-industry companies, etc.).
- Exporters (exporting group): The actors performing on this segment are local but have relationships with downstream players (importers). These actors can be identified also at the international market, and they show the same characteristics as wholesalers unorganized.
- The third market segment identified relates to 'Modern Organized Distribution "DMO" (large surface of distribution, agro-industrial complexes, supermarkets,). Choosing to operate on segment or on the other depends on the requirements of downstream actors that are mainly 'buyer-driven chains'.

The percentage of volume traded in each market segment will inform us about the degree of involvement of export in response to the requirements set by such 'buyer-driven

chains'. Also note that the upstream actors can operate on more than one market segment. For this, we considered two periods, 2006 and 2009.

Table 24. Distribution of actors by typology and channel (volumes in tons)

	DMO		GNO		EXP		Total	
	2009	var2009/06	2009	var2009/06	2009	var2009/06	2009	var2009/06
Cooperatives	28,409.00	*-27.13%*	102,123.60	*-16.97%*	59,685.40	*58.72%*	190,218.00	*-4.69%*
Producers-exporters	114,706.00	*30.72%*	87.680.00	*69.92%*	22,096.00	*11.90%*	224,482.00	*41.10%*
Exporters	32,110.00	*146.62%*	34,975.00	*41.82%*	34,110.00	*4.79%*	101,195.00	*44.09%*
Total	175,225.00	*25.38%*	224,778.60	*12.81%*	115,891.40	*28.91%*	**515,895.00**	*20.28%*

Total respondents: 33. Quantité correspondante au total réponse 2009: 515.895,00
Source : own calculations on the survey data

According to table above, the result shows that producers-exporters and exporters share show a significant improvement in volume on the "GNO chain" with respectively an improvement of 69.9% and 41.8% against a decrease of -17.0% cooperative groups on the same market segment. Hence, on the “exporter chain” we find a high concentration of cooperative groups with a significant improvement of 58.7% of sales (in volume).

Concerning the “DMO chain”, producers-exporters still continue to demonstrate their performance with a positive evolution at 47.4% of the volume exported between 2006 and 2009. Exporting groups show also very important result with 146.6% from 2006 to 2009 (approximately 1.5 times the volume exported in 2006). However, cooperatives’ group recorded a negative trend with a decline of -27.1% between the two years considered.

But overall, the volumes sold by the actors show a positive trend on the three market segments between the two years with 12.8% (GNO), 28.9% (EXP) and 35.9% (DMO). The result shows also that there is a tendency to move towards more lucrative market segments, as 'DMO'.

In 2009, producers-exporters sold a little more than half of the volume exported (or 51.8% of the total), followed by cooperatives with 31.4%, while exporting groups have marketed only 16.7%.

Table 25. Distribution of players by country of destination and market segments

Market segment	Product 1		Product 2		Product 3		Total
Countries	DMO	GNO	DMO	GNO	DMO	GNO	
Italy	2.2%	1.4%	0.0%	1.8%	0.0%	2.2%	1.5%
France	23.3%	16.2%	31.8%	21.4%	34.8%	21.6%	22.3%
Spain	2.4%	4.1%	5.0%	4.9%	5.6%	4.4%	4.2%
Germany	7.5%	6.5%	5.4%	8.3%	7.9%	5.7%	6.9%
Netherland	9.5%	13.7%	7.8%	12.7%	11.2%	15.5%	12.3%
United Kingdom	11.5%	5.4%	10.1%	4.3%	9.6%	5.1%	6.9%
Belgium	0.1%	5.6%	0.0%	5.4%	0.0%	4.4%	3.5%
Canada	15.9%	8.2%	14.7%	9.4%	11.2%	8.8%	10.8%
USA	4.9%	6.8%	3.9%	7.2%	0.0%	6.6%	5.8%
Russia	17.2%	20.1%	13.6%	15.4%	14.0%	16.8%	17.0%
Arabs	3.3%	5.0%	3.9%	3.6%	0.0%	4.4%	3.8%
African	0.0%	4.2%	0.0%	3.6%	0.0%	2.2%	2.3%
Others	2.2%	2.8%	3.9%	1.8%	5.6%	2.2%	2.7%
Total	100%	100%	100%	100%	100%	100%	100%

Source : own calculations on the survey data

The analysis of upstream/downstream relationship typologies between actors is given by the following table:

Table 26. Distribution des acteurs par nature des relations aval dans le marché de destination

---	Casual relationship	Personal acquaintance	Trade agreements	Official contract	Partnership	Total
Italy	0.0%	0.0%	50.0%	50.0%	0.0%	100%
France	2.9%	17.6%	**50.0%**	26.5%	2.9%	100%
Spain	14.3%	14.3%	**57.1%**	0.0%	14.3%	100%
Germany	9.1%	9.1%	**63.6%**	18.2%	0.0%	100%
Netherland	0.0%	11.8%	**58.8%**	29.4%	0.0%	100%
United Kingdom	6.7%	6.7%	**60.0%**	26.7%	0.0%	100%
Belgium	16.7%	0.0%	**66.7%**	16.7%	0.0%	100%
Canada	0.0%	0.0%	20.0%	**80.0%**	0.0%	100%
USA	0.0%	14.3%	28.6%	**57.1%**	0.0%	100%
Russia	4.0%	0.0%	24.0%	**72.0%**	0.0%	100%
Arab countries	0.0%	0.0%	**60.0%**	40.0%	0.0%	100%
African countries	50.0%	0.0%	**50.0%**	0.0%	0.0%	100%
Rest	12.5%	12.5%	25.0%	**50.0%**	0.0%	100%
Ensemble	5.8%	8.3%	44.9%	39.7%	1.3%	100%

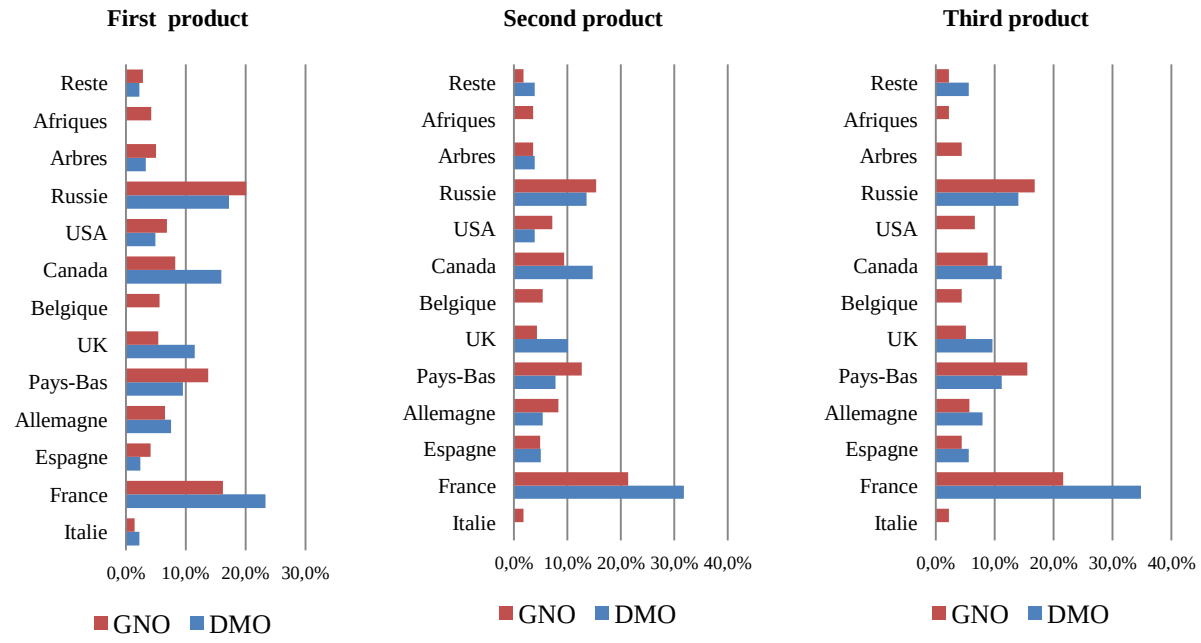
Source : own calculations on the survey data
(La dépendance est significative. chi2 = 72,46, ddl = 48, 1-p = 98,71%.)

The result thus obtained shows that there is a dependency relationship between destination country and type of relationship upstream/downstream. The EU market is characterized by a dominance of trade agreements (France, Spain, Netherlands, UK, and Belgium). However, the NAFTA market (USA and Canada) and the Russian market are characterized by a dominance of formal contracts between upstream and downstream actors. In other hand, we see the emergence of upstream/downstream relationships through trade agreements between Morocco is some Arab countries (especially the Gulf countries).

Overall, upstream/downstream relationships are dominated by trade agreements with a global score of almost 45% (especially on EU market), followed by relations through formal contracts with 39.7 % (especially on Russia and NAFTA markets). Other types of relationships exist but with very low incidences (see table 26).

According to the nature of relationships between upstream/downstream actors, the follows figure shows that the three key products prevailing more DMO channel than GNO channel on the France, UK, Canada, while on the Netherland, USA and Russia they prevail more GNO channel than DMO channel. While on the other countries the typology of prevailing channel depends on the nature of product as for example on Belgium these three key products prevail only GNO channel, and on the Germany the first and third product prevail DMO channel while the second prevail GNO channel (figure 4).

Figure 4. Countries destination by market segments for the three key products

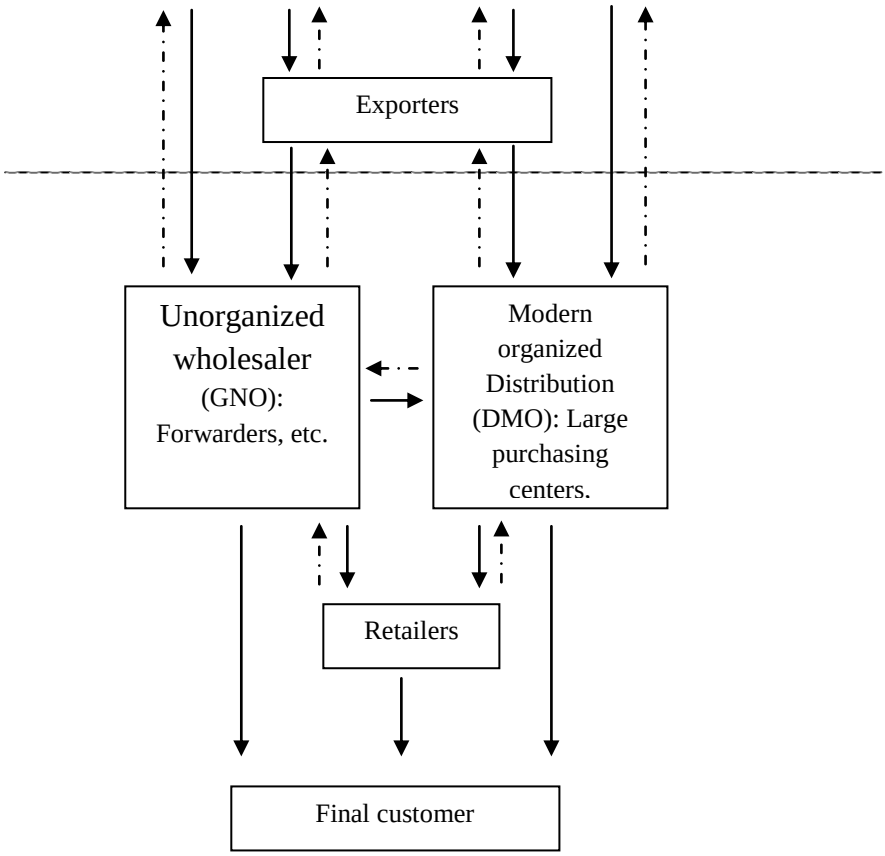


Source : Own elaboration

5.5.3.1 A simplified representation of downstream vertical relationships

Downstream actors have been identified in the previous paragraph (see paragraph 5-5-3). These are 'unorganized wholesaler' (GNO), other groups of exporters' and 'modern organized distribution' (DMO) as the major purchasing centers, etc. The simplified downstream vertical relationships may be summarized as follows (see Figure 5)

Figure 5. Downstream relationships



key *:*

⟶ Flow of goods
- · → Flow of information

Source : own elaboration on the survey data

In the figure, the bold arrows explain the direction of good flows from upstream to its final destination (consumer) downstream. In general the flow of goods is the result of agreements or contracts established between agents in the chain "producer-exporter-importer."

5.5.3.2 Nature of vertical relationships with customers and intermediate price negotiation

It appears that the intermediate price of goods (fruit and vegetables in our case) intended to export depends on the typology of distribution channel. In other words, it depends on the typology of the downstream customers that are unorganized wholesale (GNO) or modern distribution organized (DMO) as the large surfaces of distribution and supermarket, or other exporters.

Various manners to set the price are possible. As illustrates by the follow table, it can set by clients, negotiated between suppliers/customers or set by market itself (see table 27).

Table 27. Intermediate price negotiation

Price	Nb. citations	Frequencies
Set by client	4	11.43%
Negotiated	31	88.57%
Set by market	10	28.57%
Total Obs.	35	

Source : own calculation on the survey data
Note: Le nombre de citations est supérieur au nombre d'observations du fait de réponses multiples (3 au maximum).

Thus, the above table shows that the intermediate price is negotiated between suppliers-customers for 68.6% of responses (31 citations), set by the market for 28.6% of respondents (10 citations) while it is set by the client for 11.43% of respondents (4 citations). Also note that the price can be set through the three types of terms (that is to say, set by the customer, negotiated and fixed by the market). It's also important to note that a number of products considered sensitive (especially tomatoes) are subject to quotas and therefore subject to entry prices in the framework of association or free trade agreements "Morocco-EU " or as "GATT[35] price entry" (World Trade Organization" WTO "). In this context, an export calendar is defined by the importing partner countries (especially EU countries) with respecting to entry price. All actors confirm that they respect this calendar at 100%.

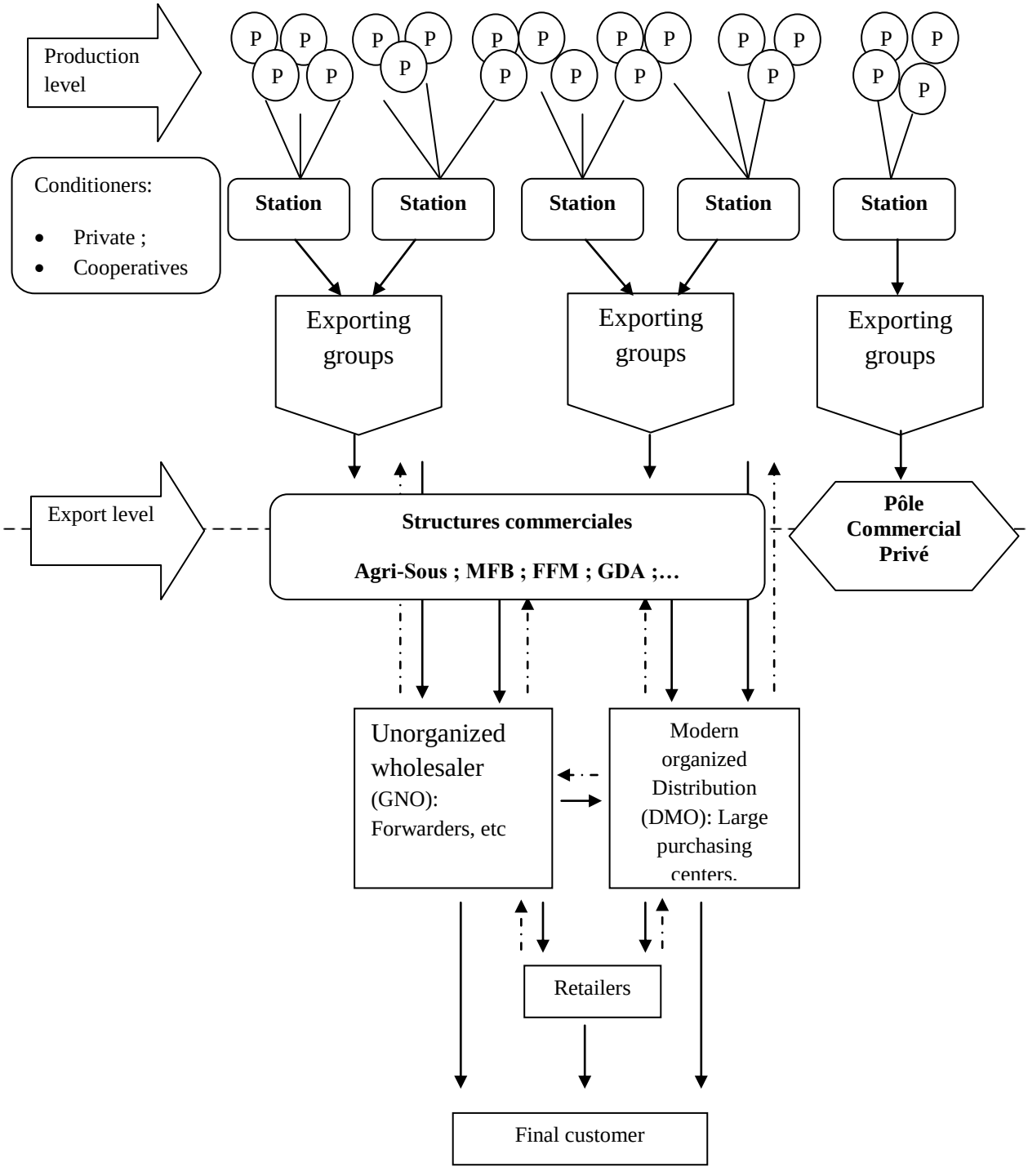
5.5.4 A general schematic of upstream/downstream interrelationships between actors of the export sector

The following diagram summarizes the upstream/downstream relationships between different actors of the sector. The continue arrows correspond to goods flow while discontinuous arrows represent the flow of information. The exchange of information from downstream to upstream industry gives to supply chain a mode of control named 'buyer-driven'

[35] *General Agreement on Trade and Tariffs*

structure. Also the exchange of information allows upstream actors to better adapt to downstream customers' needs.

Figure 6. Upstream/downstream relationships between all actors



Key :

⟶Flux de la marchandise

- - →Flux informationnel

Source : own elaboration on the survey data

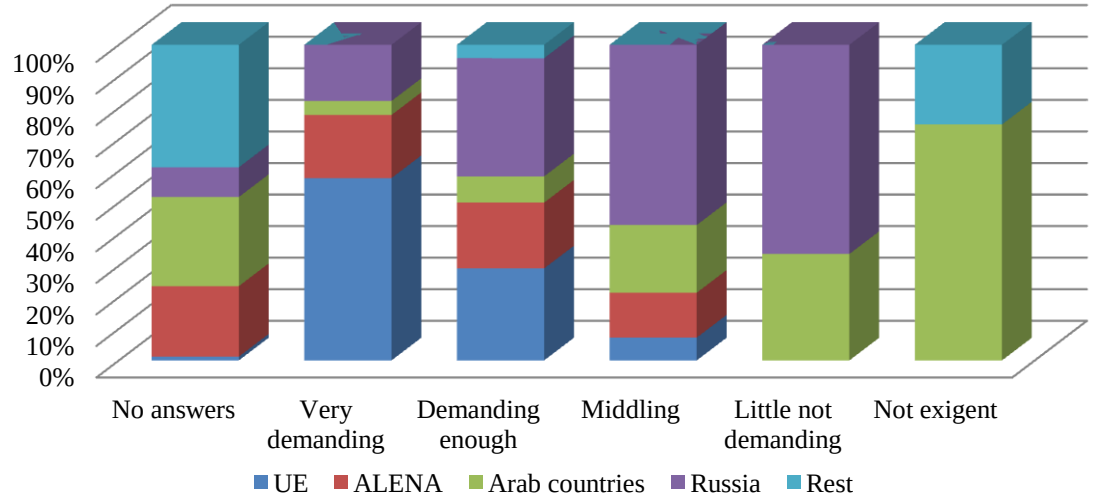
5.6 Food quality and safety norms and standards and global market access

5.6.1 Heterogeneity of global chains, heterogeneity of norms

5.6.1.1 Classification of destination markets by quality and food safety requirements

First, it is necessary to describe the nature of the destination markets that are EU, NAFTA, the Arab market, Russian market and the rest of the world. The counting of responses is given in the following figure:

Figure 7. Classification of destination markets by norms of quality and food safety standards



Source : own elaboration on the survey data
Dependence is very significant. chi2 = 121.69, df = 20, 1-p = >99.99%.

According to the result of the graph, we see that the EU market is perceived as the most exigent market in terms of quality and food safety requirements. This result is confirmed by little more than 75% of answers concerning this market. Around 25.7% of answers also confirm that the ALENA market is very demanding on quality and food safety. However, the Russian market is considered pretty exigent for 25.7% and middling exigent for about 23% of actors. Hence, actors operating on the Arab market, the majority of them described the market as being not required.

Despite the high level of quality standards and health safety requirements for about 63% of actors, largely, the global trend of Moroccan exports confirms that the EU market remains the largest market for the Moroccan fruit and vegetable exports.

This result, considered as positive for the country's exports, shows clearly that supply players have been able to adapt well to global economy changes, especially the EU market changes.

5.6.1.2 Importance of the UE importers on their upstream suppliers (2006-2010)

In the upstream level, the actors (cooperatives, producers-exporters, exporters) must meet the downstream requirements (importers) for ensuring an outlet to their production. The importers determine and impose minimum requirements that the product must meet for to be agreeing to buy the production or a part of the production from its upstream suppliers. This is ideal because the importers must also meet the final consumer requirements and preferences and bringing for him a quality product safe and healthy.

To assess the importance of requirements imposed by the EU importers of Moroccan actors (cooperatives, producers-exporters and exporters), we made a list that summarizes the main requirements i.e. traceability, food safety, certification, delivery time, good agricultural practices / maximum residue limit (harmful substances) and the range of products offered and the volume (see table 28)

Table 28. Evaluation des principales exigences imposées par les importateurs de l'UE sur les acteurs marocains (producteurs-exportateurs/exportateurs) sur la période 2006-2010

---	Very demanding	Demanding enough	Middling	Little demanding	Not exigent	Total
Traceability	85.70%	11.40%	2.90%	0.00%	0.00%	100%
Health safety	85.70%	8.60%	2.90%	2.90%	0.00%	100%
Certification	54.30%	34.30%	11.40%	0.00%	0.00%	100%
Delivery	28.60%	45.70%	22.90%	2.90%	0.00%	100%
GAP/MLRs	77.10%	17.10%	2.90%	0.00%	2.90%	100%
Variety/volume	20.00%	37.10%	20.00%	20.00%	2.90%	100%
Ensemble	58.60%	25.70%	10.50%	4.30%	1.00%	100%

Source : own calculations on the survey data
Dependence is very significant chi2 = 84, 24, df = 20, 1-p = >99 99%.

The table shows that food traceability at 85.7%, health safety at 85.7% and the adoption of good agricultural practices/MRLs (77.1%) are the main requirements imposed by the EU importers on their suppliers. In other hand, to obtain a certification is considered as very demanding for 54.3% of sample, while for the delivery and the range of products offered (variety / volume) are classified in a fairly demanding, with 45.7% and 37.1%, respectively.

5.6.2 Norms and difficulties to access the international markets

Access to international markets is also limited by a certain number of constraints that may be more/lower high depending on the degree of restructuring operators. In our case, we have sent a list summarizing the main difficulties that may be experienced (see table below).

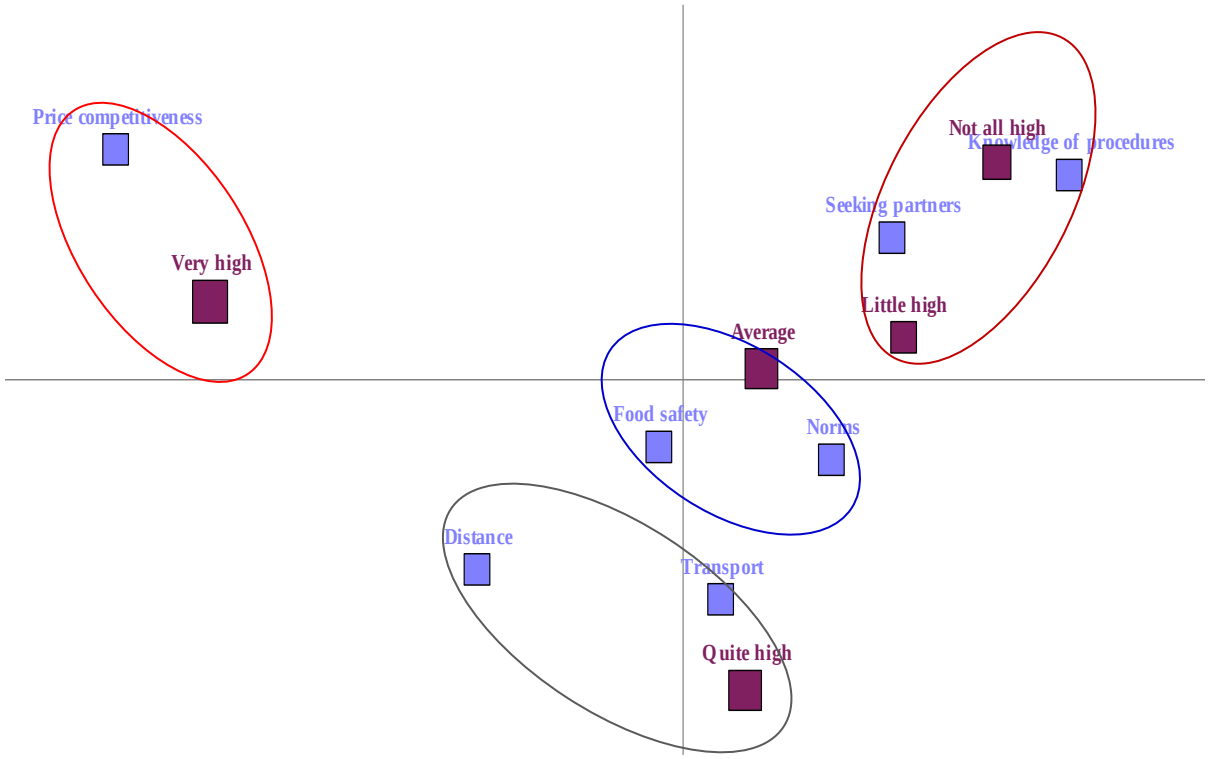
Table 29. Main market access constraints: the role of norms

---	Very high	Pretty high	Middling	Little high	Not all high	Total
Norms	17.10%	28.60%	20.00%	11.40%	22.90%	100%
Food safety	25.70%	25.70%	20.00%	11.40%	17.10%	100%
Price competitiveness	**57.10%**	5.70%	17.10%	8.60%	11.40%	100%
Knowledge of procedures	8.60%	11.40%	28.60%	20.00%	31.40%	100%
Seeking partners	17.10%	14.30%	22.90%	20.00%	25.70%	100%
Transport	20.00%	31.40%	20.00%	20.00%	8.60%	100%
Distance	**31.40%**	28.60%	25.70%	8.60%	5.70%	100%
Ensemble	25.30%	20.80%	22.00%	14.30%	17.60%	100%

Source : own calculations on the survey data
Dependence is very significant. chi2 = 47.76, df = 24, p = 1-99.73%

According to this table, it is clear that the price competitiveness appears as a major constraint that restricts access to the international market with 57.1% of responses followed by distance (from product origin to destination markets) with 31.4%. These two constraints are qualified as very high. To understand the impact of these constraints we will rely on the follow factorial map of correspondences (AFC):

Figure 8. Factorial map summarizing the available different constraints



Source : own elaboration on the survey data

Basing on this map, we can see clearly that price competitiveness is classified as a very high, while distance is between very high and high enough, the transport effect, on the other hand, is placed in a high enough level, quality standards and food safety are at a medium level. This map highlighting the disposal of various constraints with respect to different stipulations mentioned thus effectively identify and locate each according to compel or not the market access.

5.6.3 Norm typologies

5.6.3.1 Public norms

Concerning compliance with Good Agricultural Practices (GAPs), all actors confirm that they perform with compliance to those GAPs. In terms of GAPs nature, 14.30% are conforming to the local GAPs, and 97.10% with international GAPs (table 30). This result shows that all players have a strict orientation to apply the GAPs.

Table 30. Compliance with Good Agricultural Practices (GAPs)

GAP	Nb.	%
Yes	35	100%
No	-	-
Total obs.	35	100%
GAP Local/International		
Local	5	14.3%
International	34	97.1%
Total obs.	35	100%

Source: own calculations on the survey data

On the total sample, 91.4% of the total actors have certification. On the total, 57.1% say they have certified more than 5 years versus 34.3% that they have certified less than 5 years. In other hand, and concerning certification, 62.9% of the total of players confirms that their production is totally certified versus 28.6% in which production is partially certified (table 31).

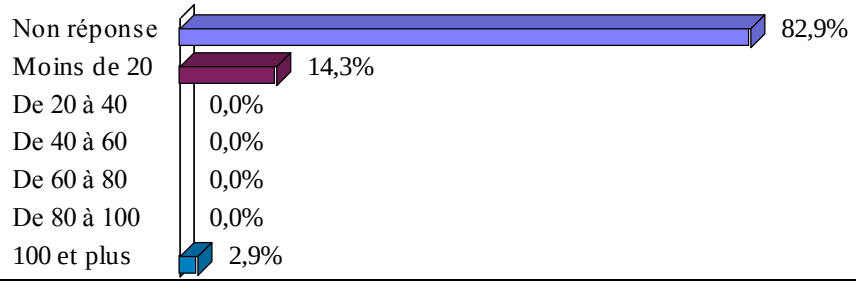
Table 31. Compliance with Certifications and ratio certified/total production

Cert.	**No.**	**(%)**	**Years**	**No.**	**(%)**	**Prod. cert.**	**No.**	**(%)**
Yes	32	*91.40%*	<5 years	12	*34.30%*	Total	22	*62.90%*
Non	3	*8.60%*	>5 years	20	*57.10%*	Partial	10	*28.60%*
n.a.	-	-	No cert.	3	*8.60%*	No cert.	3	*8.60%*
Total Obs.	35	*100%*	Total Obs.	35	*100%*	Total Obs.	35	*100%*

Source: own calculations on the survey data

Concerning the organic certification, only 2.9% have totally production certified as organic versus 14.3% that they have only less than 20% of their products certified “Bio”.

Figure 9. Rate of organic certification



Source : own elaboration on the survey data

The table down shows the certification bodies which deliver the certification after control and audit in the field (when farms are concerned with certification) and/or packing houses. It’s obvious that Moroccan actors are relying more to be certified by IsaCert Body (32.1%), followed by NakAgro’s body at 14.3%, EcoCert and SygmaCert at 10.7% for each.

Table 32. Certification bodies

Body	Cita.	Freq.
Isacert	9	32.10%
NakAgro	4	14.30%
Ecocert	3	10.70%
Sygmacert	3	10.70%
CMI	2	7.10%
Integracert	2	7.10%
ENAC	1	3.60%
IMC	1	3.60%
Integraferme	1	3.60%
SGS	1	3.60%
TVU	1	3.60%
Total(*)	28	100.00%

(*)Note: one actor can be certified by several bodies, and then the total observed in the box (28) refers to number of citation for each certification body.

Source: own calculations on the survey data

The follow table illustrates the public certifications obtained by nature by different actors interviewed:

Table 33. Compliance with public Norms

	No.	(%)
HACCP	7	20.00%
ISO/9001	6	17.10%
ISO/22000	5	14.30%
PCI/PIAQ	8	22.90%
n.a.	15	42.90%
Total Obs.	35	

Source:own calculations on the survey data

The results obtained allow making two remarks:

- A group of stakeholders who have a (or more) public certification norms (HACCP, ISO/9001, ISO/2200 and / or local public standard PCI / PIAQ.
- Another group that did not respond to the question posed on the public norms certification. But obviously, we can't say that they do not have public certification norms. The reason could be that they have paid more attention to private standards.

  This result could be confirmed by analyzing the results obtained in the following paragraph.

5.6.3.2 Private standards

The survey data shows that 94.3% of the total interviewed applies a private standard versus only 5.7%. These results confirms the behavior of all actors in responding to international market needs and improve their efforts to comply with standard with success. Hence, 94.3% of the total are certified GlobalGAP at the farm level, and 68.6% are certified BRC at the packing houses level. There are also other types of certification as TESCO at 8.6%, IFS at 5.7% and Fai Trade and MCDO at 2.9% for each.

Basing on these results, it's evident that GlobalGAP is the most private standard adopted by Moroccan actors. In the future, maybe both GlobalGAP and BRC tend to be the most relevant private standards in Morocco because the first concern farm level (GlobalGAP) and the second concern the packing house's level (BRC).

Table 34. Adoption of private standards

	No.	Frequencies
Private standards		
Yes	33	94.3%
No	2	2.7%
Total Observation	*35*	*100%*
Type of standard		
Global GAP	33	94.3%
BRC	24	68.6%
TESCO	3	8.6%
IFS	2	5.7%
Fair Trade	1	2.9%
MCDO	1	2.9%
No answers	2	5.7%
Total observation	*35*	

Source: own calculations on the survey data

5.6.4 Compliance costs, norms and private standards

Compliance with standards, particularly private voluntary standards (PVS) exposes developing countries actors with serious problems. The compliance process involves additional costs (Henson et al, 2007) that actors must endure during their compliance process. In Morocco, as in other countries, operators are faced with constraints, technical in most cases, to meet the requirements of the destination market. This statement is confirmed by the actors themselves as well as public bodies operating in the sector (particularly the EACCE). In a country as well as agricultural vocation and fresh fruits and vegetables exporting, this problem should be overcome. Indeed, to assess the degree of difficulty of Moroccan actors to comply with a given standard was addressed to different actors through the questionnaire to evaluate the difficulty of complying especially with private standards.

Table 35. Intial investement cost

Coût d'investissement / chiffre d'affaire (%)	No.	(%)
Moins de 15	4	11.40%
De 15 à 30	4	11.40%
De 30 à 45	4	11.40%
De 45 à 60	1	2.90%
60 et plus	1	2.90%
Non réponse	21	60.00%
Total Obs.	35	100%

Source: own calculations on the survey data

According to result showed by the survey (table down), it clear that 48.60% feel that compliance costs with standards applied in a middling level versus 22.90% that consider it little high. Measuring the degree of initial investment in different resources of enterprises, it seems that is very high at 54.3% in infrastructures, at 45.7%, in equipments and at 40.0% in their technical competencies (table 36).

Table 36. Initial investment to compliance with standards

---	No answers	Very high	Quite high	Middling	Little high	Not high	Total
Compliance costs/ standards applied	5.70%	17.10%	22.90%	48.60%	5.70%	0.00%	100%
Equipments	0.00%	45.70%	34.30%	20.00%	0.00%	0.00%	100%
Infrastructures	0.00%	54.30%	28.60%	17.10%	0.00%	0.00%	100%
Technical skills	0.00%	40.00%	28.60%	20.00%	11.40%	0.00%	100%
Labour	0.00%	25.70%	34.30%	25.70%	8.60%	5.70%	100%
Ensemble	1.10%	36.60%	29.70%	26.30%	5.10%	1.10%	100%

Source : own calculations on survey data

5.6.4.1 Compliance constraints, norms heterogeneity and certification costs

To comply with a given standard, actors may encounter certain difficulties related to compliance with norms/standards. Overall, the results of the survey showed that 57.1% of actors interviewed have encountered some constraints to meet the given norms/standards, while 42.9% confirmed that they have not encountered any problems related to compliance with norms/standard selected to comply with. Indeed, of the 57.1% who positively confirmed they have encountered difficulties in compliance, 95% of them claim that these difficulties are qualified meddling, while only 5% say that they are high.

Table 37. Compliance constraints, norms heterogeneity and certification costs

	No.	Frequencies
Compliance constraints		
Yes	20	57.1%
No	15	42.9%
Total	*35*	*100%*
Degree of constraints		
High	1	5.0%
Medium	19	95.0%
Low	0	0.0%
Total	*20*	*100%*
Heterogeneity of norms		
Yes	24	68.6%
No	11	31.4%
Total	*35*	*100%*
Degree of heterogeneity		
High	5	20.8%
Medium	18	75.0%
Low	1	4.2%
Total	*24*	*100%*
Costs of more certification		
No answers	4	11.4%
High	11	31.4%
Medium	8	22.9%
Low	12	34.3%
Total	*35*	*100%*

Source : own calculations on the survey data

Another important issue is the heterogeneity of international standards, which generates a proliferation of certifications. In general, 68.6% of actors confirm positively that they have encountered difficulties related to heterogeneity of standards internationally, while only 31.4% who confirmed opposite (it means they did not feel difficulties on the heterogeneity of standards at the international level).

Regarding those who made the difficulties related to standard heterogeneities, the results show that three quarters (75%) of the actors have thoroughly trained these constraints as medium, and very high for 20.8%, while the degree of these difficulties is low for only 4.2%.

On the other hand, a number of actors have more than one certification (in our sample we find some actors with four certifications of private standards apart from certifications by public bodies as like ISO or HACCP). Therefore, it is very useful to evaluate the costs

involved for to get the second or third certification. The survey results show 31.4% felt that costs involved for to get a second or third certification are very high, medium for 22.9%, while these costs are qualified low for 34.3%.

5.6.4.2 Sharing of compliance costs

At the supplier level, on the total of our sample, 85.7% of actors confirmed that they have encouraged their suppliers in upstream to the importance and the high role of compliance of their products. However, only 65.7% who contribute to process compliance and support their suppliers to comply with required standards by destination markets. It follows from these results that a large number of actors sharing the compliance cost with upstream suppliers.

Table: 38. Sharing of compliance costs

	Encouraged suppliers to compliance		Support suppliers to compliance	
	Nb. cit.	Fréq.	Nb. cit.	Fréq.
No answer	5	14,30%	10	28,60%
Yes	30	85,70%	23	65,70%
No	0	0,00%	2	5,70%
Total Cit.	35	100%	35	100%

Source: own calculations on the survey data.

Concerning downstream level, 74.3% of the total actors' interviewed confirm that the importers contribute to process of compliance with standards required when producers/exporters (in upstream) engaged to respect their requirements. The means requirements cited are to produce respecting the specification books, quality of products, traceability. Others cited also that they must respect the MLRs, food safety, hygiene package, etc.

5.6.5 Benefits of compliance with standards

According to the table below, it clear that improving relationships with existing customers (74.3% of the total) and improving access to remunerative markets (at 71.4% of the total) are the most benefits when actors are complying with standards. These benefits are qualified in an admirable level. In second row, comes improving of competitiveness with 42.9%. As a consequence, this result should be incentive for other actors (producers/exporters) to react positively on the compliance of their products and their process.

Table 39. Evaluation of compliance benefits with standards

---	Admirable	Very good	Good	Passable	Bad	Total
Price	22,90%	28,60%	25,70%	17,10%	5,70%	100%
Volumes	17,10%	25,70%	28,60%	20,00%	8,60%	100%
Competitiveness	42,90%	37,10%	8,60%	11,40%	0,00%	100%
Customer relationships	74,30%	20,00%	5,70%	0,00%	0,00%	100%
remunerative markets	71,40%	22,90%	2,90%	0,00%	2,90%	100%
Productivity	34,30%	22,90%	25,70%	8,60%	8,60%	100%
Ensemble	43,80%	26,20%	16,20%	9,50%	4,30%	100%

Own elaboration on the survey data.

For to better understand which component that allows the increased of productivity, a number of actors argue that by the increased yields per unit of production (46.3%) and the greater involvement of workforce (35.2%), however, and despite its importance, involvement of capitals represent only 9.3% of the total answers.

Table 40. Benefits in terms of productivity

	Nb. cit.	Fréq.
No answer	5	9,30%
Involvement of capitals	5	9,30%
greater involvement of workforce	19	35,20%
increased yields per unit of production	25	46,30%
TOTAL CIT.	54	100%

Sources : own calculation on the survey data

5.6.6 The phenomenon of border rejection: impact on export performance

All actors interviewed confirm that they are subject to the export controls. The control at this level is ensured either by public or private bodies or also by the customers themselves. It is important to note that the actors at the export level can be controlled by both public and private bodies or also by these three (public and private bodies and customers). In the fact, 97.14% are controlled by public bodies, 85.71% controlled by private bodies and 25.71% controlled by customers themselves.

Concerning control at borders, it is done in various ways. The control can be visual or documentary and, if it is necessary, analysis of samples at laboratories competent. In the fact, on the sample analyzed, it seems that 97.1% of the total interviewed confirms that they are subject to a visual control at borders, and 82.9% are under documentary control, while only 62.9% underwent laboratory analysis of samples. In other ways, and in many cases, the actors can be subject to a double or triple control in the same time (visual, documentary and

laboratory analysis). The aim of these controls is to verify that these marketed products are healthy and conform to market destination requirements.

Hence, the border control can lead most often rejection of goods in the case of non-compliance of products to the requirements of markets targeted, especially when the EU market is concerned. The results of our survey show that over the last three years, only a few number of actors confirmed that they have suffered the rejection of a limit quantity of their goods or only a written about the poor quality of their products by their customers in downstream supply chain. In the fact, the rejection rate of the total exported by (only) declaring actors' suffered rejection varies but does not exceed a rate of 4%, and the average rate is approaching to 1.5% in 2009 year.

The main causes of the phenomenon of rejection are multiples, its return in some cases to sanitary and phyto-sanitary issues (SPS), or the inefficient on the control system, it can be also return to commercial standards (as like size of products, dimension, or color), causes can be also maximum residue limits (MRLs) and heavy metals or 'penicillin' and poor quality of some products. But also don't neglected the distance from Agadir (area of production) to Tangier; because the transport by road can be also one of the most causes, especially concerning quality of perishable goods as like for example tomatoes.

Globally, the results show that the majority of actors are very efficient concerning their control systems at the local level.

5.6.7 Accompaniment and support devices at the local level

5.6.7.1 Public support to compliance with standards

The ambitious strategy of 'Green Morocco Plan' has been at the heart of agricultural development export supply chains with high added value (Pilaster I of the 'PMV'). To achieve this objective, the government pursues a policy of supporting and coaching actors especially these poorly organized (small and medium producers). Through the Agricultural Development Agency (ADA), the State is part of the 'program-contracts' with supply chain actors and encouraging them to organize themselves within the aggregations' in large groups' of producers or cooperatives.

The results of the survey show that almost half of actors confirm positively the support by public authorities especially at the products compliance level. The results show also that the majority of beneficiaries from the public authorities support are cooperative groups.

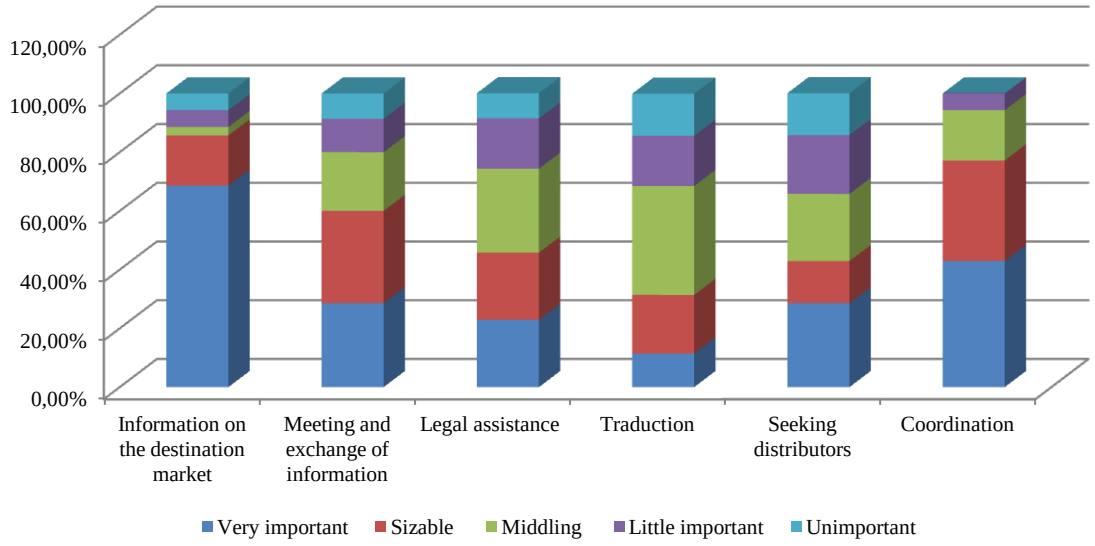
Accordingly, this result joins the objective of the 'PMV' by encouraging the aggregation of small and medium producers.

According to the stakeholders interviewed, it seems that the main public authorities involved in the process of accompaniment to compliance of products are the Autonomous Establishment of Control and Coordination of Exports (EACCE) which comes first is given that its main task is control and coordination of exports, the Ministry of Agriculture through its various departments such as the Department of Production Sectors Development (DDFP), the National Office for Hygiene and Food Safety (ONSSA). At these entities also adds the National Office of Vocational Training and Employment Promotion (OFPPT), etc.

5.6.7.2 The export assistance

To analyze the importance of actors' expectations at export level, we will rely on the following graph and factorial map (see figure and map below)

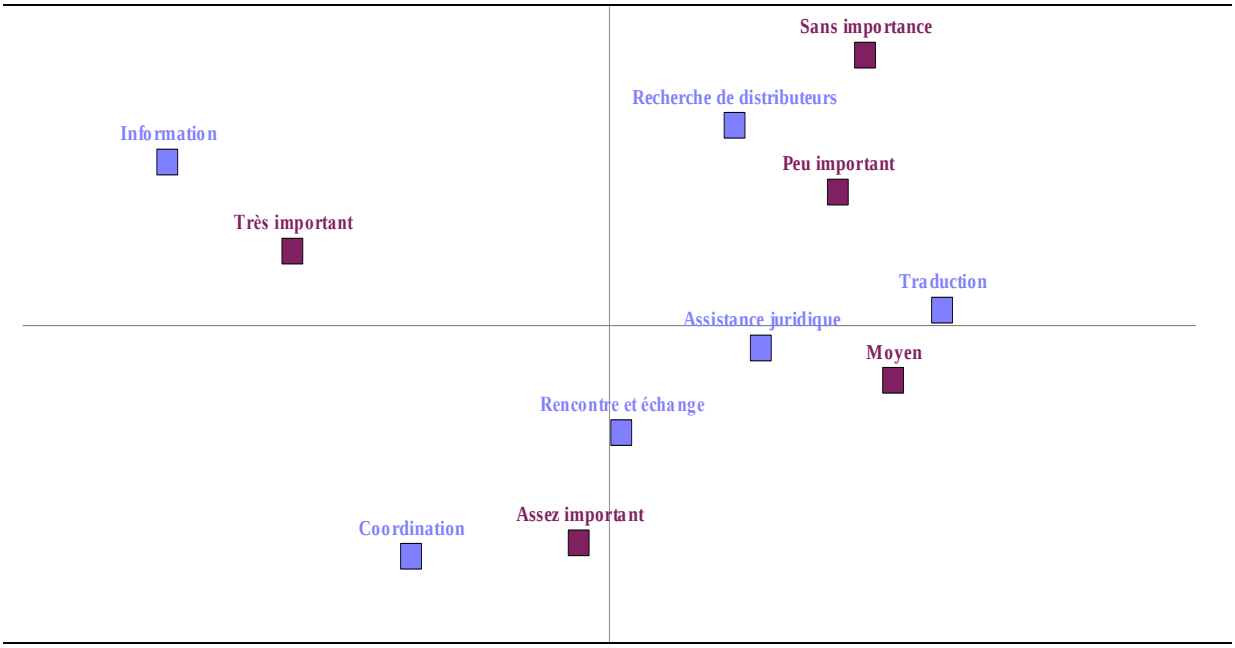
Figure 10. Importance of actors' expectations in terms of export assistance



Source : own elaboration on the survey data

Hence, the follow factorial map shows clearly the possible combinations between each expectation and modality associated.

Figure 11. Factorial map analysis of the different actors' expectations for export



Source : own elaboration on the survey data

The explanatory analysis of the results shows that mostly actors need information and news about destination markets. This parameter is very important for 68.6% of participants, followed by upstream/downstream coordination of relationships (very important for 42.9% of players). The direct contact and exchange of information between actors' in upstream and downstream is classified as a fairly significant with 31.4% of responses. Translation meanwhile is positioned in a medium level with 37.4% of answers. For the remaining modalities, the actors give them medium or low importance.

5.6.7.3 Local border control

At the local level, stakeholders confirm that they are subject to multiple inspections on their production sites (farms level) and packaging (at stations). This result is confirmed by 97.1% of players. According to stakeholders, control is provided by several agencies depending on the standard to which the actor chooses to comply (public norms or private standards).

Control is done through regular and periodic visits of competent agencies (public or private, local or international) and in some cases through the clients themselves. Among the agencies mentioned, there are EU committees, ISO, HACCP and local public authorities (EACCE, ONSSA, DDFP, DPVCTRF, etc.). Concerning private bodies, actors cited auditors of GlobalGAP, BRC, Natures Choice, etc. Other actors have managed to set up a system of self

control as 'quality management system' (SQM) and are subject of same controls by the competent authorities. Commercial structures are involved also through stringent controls at production sites (farms level).

The ultimate goal of this whole range of controls is to preserve the reputation of the marketed products by the actors and build trust between upstream/downstream actors and repositioning on the existing markets.

5.7 Conclusions

The agri-food chains in general and fruit and vegetable in particular, are a good example to illustrate a downstream driven chain. Downstream customer imposes on upstream suppliers (whether fresh or processed) preferences (usually these preferences are other than consumer preferences which must be met) and sets minimum requirements which the product must satisfy to market.

Also note that the frequencies reported in the tables of this chapter (concerning upstream supply) do not explain the overall trend of supply (i.e. distribution of suppliers), because there are actors who handle only their own production (case of a number of producers-exporters and cooperatives). Indeed, what we can conclude from the table is that at least a part of the production comes from each supplier listed on the table.

Indeed, at the end of this analysis, it is necessary to draw the following conclusions. It appeared that the results, despite their interests, do a partial assessment concerning nature and quality of relationships between upstream and downstream customers. This assessment should not be limited to this level of analysis; other parameters for measuring the performance will be studied in the next chapter. Our contribution is not intended to be exhaustive and should be extended to include other factors and parameters that are used to better measure the performance of the sector.

At this level, we can conclude that producers-exporters are better positioned on the DMO market segments more organized than cooperatives. From another point of view, it marks a presence of exporting groups on the DMO segment (channel) that becoming increasingly more consolidated.

So, the results show that the majority of interviewed actors showed a major upstream integration, especially ‘producers-exporters’ typology. These obtained results confer to the

actors' a major ability to negotiate their interests' vis-à-vis their downstream customers (negotiation of the intermediate price, sharing of compliance costs, etc.)

In global terms, the actors interviewed show the better export performances (volumes exported) and compliance with norms and quality standards. In addition, the most private standards adopted are respectively GlobalGAP (at the farms level and BRC at the packinghouses level). From this point of view, the majority of actors show a strong orientation towards compliance with private standards that enable them to secure more lucrative opportunities and better stability of relationships with their downstream customers by developing trust spirit and encouraging informational exchange, etc.

Compliance with norms and quality standards allows the actors to improve positively their access to international market with a strong capacity to penetrate markets/market segments more lucrative. This is confirmed by a great number of actors operating on the UK DMO segment more demanding in terms of quality and food safety. Another result most important show that the possession of compliance certification with quality standards promotes significantly exports growth.

Indeed, the degree of involvement of these three typologies of actor at the export, based on the survey results, a comprehensive evaluation of fruit and vegetable performances in Morocco must consider, too, the role of the experience of such typology (or actors) at international level. It is also necessary to analyze the impact of norms/standards of quality and food safety of export products on the actors' performance at various levels. It is also necessary to take into consideration both the level of market diversification and the degree of competition. In the end, analyze the problems related to international markets access and the phenomenon of rejection at the frontier with respect to different standards applied. The analysis of these points will be discussed in the next chapter.

6 Morocco's fruit and vegetable export supply chain and food safety and quality standards

6.1 Introduction

As described in the first chapter, if one the one hand the raise of food safety and quality standards may significantly hinder exports by reducing export volumes and smallholders' insertion in high-value global chains, compliance, when achieved, allows actors to improve their access to high-value global chains. It thus appears that compliance gives the opportunity to access to more exigent (quality- and safety-discerning) and more lucrative markets.

Several studies in the empirical literature highlight that both horizontal coordination (producers and/or exporters' cooperatives and associations) and vertical coordination between upstream and downstream agents (exporters, importers, and retailers) have an influence on developing countries' export performance (see for example, Hellin et al., 2009; Kalaitzis et al., 2007; Garcia Martinez and Poole, 2004; García-Alvarez-Coque et al., 2003). Notably, a good degree of both horizontal and vertical coordination among supply chain actors may constitute a key success factor to improve safety and quality in the export supply chain and thus accomplish the requirements of destination countries (Briz et al., 2000).

Considering the South Mediterranean countries as an example, opposite results registered for Morocco and Israel, on the one hand, and Turkey and Syria, on the other hand, may be explained in the light of export supply chain characteristics.

For example, Morocco's export performance is likely to be explained by a successful integration in European high-added value supply chains characterized by strict public regulations and private standards. Hence, several studies illustrate the importance of supply chain coordination in determining the level of compliance of exporting countries and take the case of Morocco as a successful example (Hellin et al., 2009; Garcia Martinez and Poole, 2004). As noted by Garcia Martinez and Poole (2004), Moroccan export infrastructure and procedures show a degree of collaboration and vertical integration, which has facilitated the

international success in the EU market. As for horizontal coordination, both producers and exporters are organized in cooperatives and exporting groups or exporters associations. Notably, we can mention the association of fruit and vegetables producers and exporters (APEFEL, which groups nowadays five hundred producers/exporters and accounts for 70% of fruit and vegetable exports), the "Morocco Fruit Board" (marketing platform). In addition, other export related institutions are Morocco export promotion centre and the Autonomous Establishment for export control and coordination, which carries out inspections, export related controls and certifications (Kalaitzis et al, 2007). Furthermore, suppliers and exporters, who operate in a highly coordinated supply chain, are likely to be supported by importers in the implementation of standards. Good export performance is also registered for Israel, which is mainly oriented to high-value products' exports (Kalaitzis et al., 2007). Fruit and vegetable exporters are highly concentrated (three leading exporters and around twenty small-medium ones operate in the sector) and have, in some cases, sales offices established in high-value European markets (for example in the UK).

On the contrary, Turkey exports supply chain is characterized by a high level of atomization, multi producers/exporters relationships and a scarce degree of vertical integration (Garcia Martinez and Poole, 2004; Garcia Martinez et al., 2003). Even though, in some cases, Turkish exports are integrated in high-value international supermarket-driven supply chains, this country's exports seem to be particularly addressed to low-value markets, which are less exigent in terms of food safety and quality requirements (notably spot European markets), as pointed out by Garcia Martinez et al. (2004). This trend is likely to be even more exacerbated in the case of Tunisia (Garcia Martinez and Poole, 2004) and, to a lower extent, in the case of Egypt (Kalaitzis et al., 2007). Similar considerations may apply to Syria. According to García-Alvarez-Coque et al. (2003), the fruit and vegetable export supply chain in Syria is characterized by fragmented marketing channels and is mainly oriented to traditional outlets. The exporters' procurement is realized through wholesale markets and commission agents. As a result, markets lack price transparency and exporters are not in full control of product quality. As underlined by the authors, Syria's likelihood to access the European fruit and vegetable market depends on marketing organization, which in turn is "a precondition for enhancing export performance".

Hence, the ability for exporting countries to meet food safety standards imposed by importing countries is endogenously determined by several factors. Namely, wider attention should be given to the role of the regulatory environment and official controls' systems and the

export supply chain organization, notably, the nature of vertical relationships among supply chain participants and the related effects on export performance.

In this Chapter, starting from the survey's results, we aim at illustrating the main relations that emerge between the export supply chain organization (typologies of actors and the nature of upstream and downstream relationships) and the compliance process with food safety and quality standards (types of norms and standards adopted, perceived compliance benefits and costs).

We show that the costs and benefits of compliance with norms and standards seem to depend on the type of actors (producers/exporters, cooperatives, exporters), on the nature of downstream relationships (in particular, on the relative incidence of the 'DMO' channel), on the nature of upstream relationships, namely on the degree of upstream vertical integration and modes of procurement (full vertical integration versus contracting with other suppliers on the upstream production stage, that is producers, cooperatives, independent growers, etc.).

Furthermore, we highlight that a relatively high incidence of the 'DMO' distribution channel (that is, of the buyer-driven chains) does not systematically imply higher compliance difficulties and constraints. Similarly, a relatively high incidence of the 'DMO' distribution channel (buyer-driven chain) may give access to relatively higher benefits of compliance: access to more lucrative markets, competitiveness, etc. This result is consistent with a series of studies showing that addressing high quality-discerning and high-value global chains does not necessarily reduce market access and compromise the long term insertion of DCs' operators in international markets (see Chapter 1 for a more detailed description of those studies concerning Kenya, Ghana, Senegal, and Morocco, etc.). Interestingly, a series of studies shows the successful insertion of Moroccan fruit and vegetable export supply chain in high-value GVCs.

6.2 Typologies of actors and type of food safety standards

In this section, we analyse the typologies of food safety norms and standards according to the actors' typology (cooperatives, producers-exporters, and exporters).

As it will be detailed below, the analysis of food safety standards by actors' typologies highlights that the category of producers/exporters is characterized by the highest relative incidence of international GAPs and certification with respect to cooperatives and exporters. They are also characterized by the highest relative incidence of operators that are certified since *more than 5 years* and for whom certification covers the *total production*. With respect to

the other typologies, producers/exporters are also characterized by the highest relative incidence of PSs and PS's heterogeneity.

Table 1 below illustrates the typologies of GAPs by type of actors. The highest relative incidence of international GAPs is registered for producers/exporters (89.5% against 85.7% on average), followed by cooperatives (81.8%) and exporters (80%). Up to 18.2% of cooperatives and 10.5% of producers/exporters comply with local *and* international GAPs.

Table 1. Type of actors and typologies of food safety standards: Good Agricultural Practices

	Cooperative		**Producer - Exporter**		**Exporter**		**Total (responses)**	
	No.	***(%)***	**No.**	***(%)***	**No.**	***(%)***	**No.**	***(%)***
Type of GAPs								
Local	-	-	-	-	1	*20,0%*	1	*2,9%*
International	9	*81,8%*	17	***89,5%***	4	*80,0%*	30	*85,7%*
Local and International	2	*18,2%*	2	*10,5%*	-	-	4	*11,4%*
Total	11	*100,0%*	19	*100,0%*	5	*100,0%*	35	*100,0%*

Total No. of responses (n=35).

As shown by Table 2 below producers/exporters are characterized by the highest relative incidence of certification with respect to cooperatives and exporters. Up to 94.7% of producers/exporters are certified against 91.4% on average. Moreover, they are also characterized by the highest relative incidence of operators that are certified since more than five years (72.2% against 62.5% on average), followed by cooperatives (70%). Exporters are all certified since less than 5 years. When analysing the incidence of certified production on total production, up to 88.9% of producers/exporters declared that the total production is certified (against 68.8% on average), followed by cooperatives (50%) and exporters (25%).

Table 2. Type of actors and typologies of food safety standards: Certification

	Cooperative		Producer - Exporter		Exporter		Total (responses)	
	No.	***(%)***	**No.**	***(%)***	**No.**	***(%)***	**No.**	***(%)***
Certification								
Y	10	*90,9%*	18	***94,7%***	4	*80,0%*	32	*91,4%*
N	1	*9,1%*	1	*5,3%*	1	*20,0%*	3	*8,6%*
Total	11	*100,0%*	19	*100,0%*	5	*100,0%*	35	*100,0%*
Certification period (1)								
<5years	3	*30,0%*	5	*27,8%*	4	*100,0%*	12	*37,5%*
>5years	7	*70,0%*	13	***72,2%***	-	-	20	*62,5%*
Total	10	*100,0%*	18	*100,0%*	4	*100,0%*	32	*100,0%*
Certified/total production (1)								
Partial	5	*50,0%*	2	*11,1%*	3	*75,0%*	10	*31,3%*
Total	5	*50,0%*	16	*88,9%*	1	*25,0%*	22	*68,8%*
Total	10	*100,0%*	18	*100,0%*	4	*100,0%*	32	*100,0%*

(1) On the total No. of responses (n=32).

Table 6 illustrates the compliance with private standards by actors typologies. On the total number of respondents, 33 declared to comply with private standards. Cooperatives and producers/exporters are characterized by the highest relative incidence of private standards with respect to exporters.

Up to 66.7% (22 operators) comply with 2 PSs, 4 with more than 2 PSs, 7 with only 1 PS. On the total number of producers/exporters declaring compliance with PSs (n.18), 17 comply with *at least* 2 PSs, of which 13 with GlobalGAP and BRC. On the total number of cooperatives declaring compliance with PSs (n.11), 8 comply with *at least* 2 PSs, of which 7 with GlobalGAP and BRC. On the total number of exporters complying with PSs (n.4), 3 comply with only one PS (GlobalGAP) and only one exporter with more than 2 PSs (GlobalGAP, BRC, IFS, and Tesco). Producers/exporters thus face the highest heterogeneity of PSs with respect to other typologies.

Table 3. Type of actors and typologies of food safety standards: Private Standards

	Cooperative		Producer - Exporter		Exporter		Total (responses)	
	No.	***(%)***	**No.**	***(%)***	**No.**	***(%)***	**No.**	***(%)***
Private standards (PS)								
Y	**11**	***100,0%***	**18**	***94,7%***	**4**	***80,0%***	**33**	***94,3%***
N	-	-	1	*5,3%*	1	*20,0%*	2	*5,7%*
Total	11	*100,0%*	19	*100,0%*	5	*100,0%*	35	*100,0%*
No. of PSs(2)								
1	3	*27,3%*	1	*5,6%*	3	*75,0%*	7	*21,2%*
2	7	*63,6%*	15	***83,3%***	-	-	22	*66,7%*
>2	1	*9,1%*	2	***11,1%***	1	***25,0%***	4	*12,1%*
Total	11	*100,0%*	18	*100,0%*	4	*100,0%*	33	*100,0%*
Typologies of PSs (2)								
GlobalGAP	3	*27,3%*	1	*5,6%*	3	*75,0%*	7	*21,2%*
GlobalGAP and BRC	7	*63,6%*	**13**	***72,2%***	-	-	20	*60,6%*
GlobalGAP, BRC and other	1	*9,1%*	**2**	***11,1%***	1	*25,0%*	4	*12,1%*
GlobalGAP and other (except BRC)	-	*0,0%*	**2**	***11,1%***	-	-	2	*6,1%*
Total	11	*100,0%*	18	*100,0%*	4	*100,0%*	33	*100,0%*
Nature of PS(s) (2)								
Collective	**10**	***90,9%***	**16**	***88,9%***	**3**	***75,0%***	**29**	***87,9%***
Collective and Individual	1	*9,1%*	2	*11,1%*	1	***25,0%***	4	*12,1%*
Total	11	*100,0%*	18	*100,0%*	4	*100,0%*	33	*100,0%*

(2) On the total No. of operators having declared the compliance with PS(s), n=33.

On the total number of respondents, 29 comply with collective PSs (e.g. GlobalGAP, BRC, IFS, ...), while 4 with both collective *and* individual PSs, of which 1 cooperative (Tesco), 2 producers/exporters (Tesco and McDonald's MCDO) and 1 exporter (Tesco).

Cooperatives have the highest relative incidence of HACCP certification (75% against 35% on average) and of PCI/PIAQ certification, while producers/exporters the highest incidence of ISO9001 certification. The highest incidence of ISO22000 is registered for exporters.

Table 4. Type of actors and typologies of food safety standards: HACCP, ISO, and PCI/PIAQ

	Cooperative		Producer - Exporter		Exporter		Total (responses)	
	No.	*(%)*	No.	*(%)*	No.	*(%)*	No.	*(%)*
HACCP (Y/N) (3)								
YES	6	***75,0%***	1	*9,1%*	-	-	7	*35,0%*
NON	2	*25,0%*	10	*90,9%*	1	*100,0%*	13	*65,0%*
Total	8	*100,0%*	11	*100,0%*	1	*100,0%*	20	*100,0%*
ISO9001 (Y/N) (3)								
YES	2	*25,0%*	4	***36,4%***	-	-	6	*30,0%*
NON	6	*75,0%*	7	*63,6%*	1	*100,0%*	14	*70,0%*
Total	8	*100,0%*	11	*100,0%*	1	*100,0%*	20	*100,0%*
ISO22000 (Y/N) (3)								
YES	1	*12,5%*	3	***27,3%***	1	***100,0%***	5	*25,0%*
NON	7	*87,5%*	8	*72,7%*	-	*0,0%*	15	*75,0%*
Total	8	*100,0%*	11	*100,0%*	1	*100,0%*	20	*100,0%*
PCI/PIAQ(*) (Y/N) (3)								
YES	4	***50,0%***	4	*36,4%*	-	-	8	*40,0%*
NON	4	*50,0%*	7	*63,6%*	1	*100,0%*	12	*60,0%*
Total	8	*100,0%*	11	*100,0%*	1	*100,0%*	20	*100,0%*

(3) On the total No. of responses (n=20); (*) Programme de Contrôle Interne/Programme Intégré d'Amélioration de la Qualité

Both the certification and the adoption of private standards are likely to have a positive influence on the export volume dynamics. Similarly, certification and the adoption of PSs seem to positively influence actors' perceptions on export trends both in volume and values (**Erreur ! Source du renvoi introuvable.**).

Table 5. Compliance with food safety standards and export dynamics

Food safety norms and standards		Dynamics of export volumes (Var 2009/06)	Dynamics of export volumes (forecast)		Dynamics of export values (forecast)	
		Increasing trend	Increasing trend	Variable trend	Increasing trend	Variable trend
Type of GAP	International GAP	80,00%	**61,67%**	**20,59%**	**58,82%**	**20,59%**
	Local GAP	80,00%	80,00%	-	80,00%	-
Certification (Y/N)	YES	**84,38%**	**62,50%**	**18,75%**	**59,38%**	**18,75%**
	NO	33,33%	33,33%	33,33%	33,33%	33,33%
PSs	YES	**81,82%**	**60,61%**	**21,21%**	**57,58%**	**21,21%**
	NO	50,00%	50,00%	-	50,00%	-
	GlobalGap	81,82%	**60,61%**	21,21%	**57,58%**	21,21%
	BRC	83,33%	62,50%	20,83%	58,33%	25,00%
	IFS	100,00%	100,00%	-	100,00%	-
	TESCO Nurture	50,00%	**66,67%**	-	**66,67%**	-

N.B. Percentages indicate the relative incidence of the export trend (increasing/variable) on the total no. of responses per row.

6.3 Compliance costs and benefits and types of export supply chain actors

6.3.1 Compliance costs/difficulties by actors' typology

In general, all the actors have declared to face difficulties in the compliance process both in terms of compliance constraints and also in terms of difficulties associated with the heterogeneity of norms and standards at international level. Looking in more details into the distribution of responses by actors' typologies (Table 6), producers-exporters seem to face relatively lower difficulties with respect to the other typologies (notably exporters and cooperatives) both in terms of compliance constrains and compliance difficulties associated with the heterogeneity of norms and standards.

Table 6 - Compliance constraints and difficulties associated with the heterogeneity of norms and standards by actors' typologies.

Actor typology	Compliance constraints			Compliance difficulties associated with the heterogeneity of norms and standards		
	Y	***N***	***Total***	***Y***	***N***	***Total***
Cooperative	63,6%	36,4%	100,0%	63,6%	36,4%	100,0%
Producer-exporter	**42,1%**	**57,9%**	100,0%	**63,2%**	**36,8%**	100,0%
Exporter	100,0%	-	100,0%	100,0%	-	100,0%
Total	**57,1%**	**42,9%**	**100,0%**	**68,6%**	**31,4%**	**100,0%**

N.B. total no. of responses 35.

Looking in more details into compliances costs/difficulties by actors' typologies, to elicit the judgments of respondents regarding the compliance with food safety standards, a list of 5 items was provided. Respondents were asked to score each of these items on a five-point Likert scale from 'very high' (1) to 'very low' (5). Table reports the judgments by ascending mean score ($\hat{x}$) and the standard deviation (σ_x)[36] for each typology of operators.

On average, the most important item in terms of compliance costs/difficulties was judged to be "infrastructures" followed by equipments, technical skills, labour skills, and initial investments.

Table 7. Ordered mean scores of compliance costs/difficulties with food safety norms and standard by operators' typologies.

	Cooperative		**Producer-Exporter**		**Exporter**		**Total**	
	Av	**SD**	**Av**	**SD**	**Av**	**SD**	**Av**	**SD**
Initial investment	2,55	0,93	**2,33**	0,84	2,75	0,96	**2,45**	0,87
Equipments	**1,45**	0,69	1,89	0,81	1,80	0,84	**1,74**	0,78
Infrastructure	**1,36**	0,50	1,74	0,87	1,80	0,84	**1,63**	0,77
Technical skills	2,27	1,35	**1,84**	0,90	2,20	0,84	**2,03**	1,04
Labour skills	2,27	1,27	**2,16**	0,76	2,00	0,71	**2,17**	0,92

N.B. total no. of responses 35.

Interestingly, none of the presented items were rated on the "low" side of the scaling (that is with a mean score above 3, from "medium" to "very low"). All the items were ranked from "medium" to "very high").

[36] The standard deviation is calculated as follows: $\sigma_x = \sqrt{\sum_{i=1}^{N}(x_i - \hat{x})^2 \Big/ N-1}$, (DEV.ST) where $\hat{x} = \frac{1}{N}\sum_{i=1}^{N} x_i$.

Looking in more details into the judgements by actors' typology, cooperatives have reported relatively higher difficulties (with respect to the other typologies of operators) in terms of equipments and infrastructures, while producers/exporters in terms of initial investments, technical and labour skills. Interestingly, exporters are characterized by relatively higher mean scores with respect to the average scores.

6.3.2 Compliance benefits by actors' typology

To elicit the judgments of respondents regarding the benefits of compliance with food safety standards, a list of 5 items was provided. Respondents were asked to score each of these items on a five point Likert scale from 'very high' (1) to 'very low' (5). The Table below reports the judgments by ascending mean score and the standard deviation for each typology of operators.

Table 8. Ordered mean scores of compliance benefits with food safety norms and standard by operators' typologies.

	Cooperative		Producer-Exporter		Exporter		Total	
	Av	**SD**	**Av**	**SD**	**Av**	**SD**	**Av**	**SD**
Price improvement	2,73	1,49	2,63	1,07	**1,80**	0,84	**2,54**	1,2
Volumes improvement	**2,36**	1,12	2,89	1,24	3,20	1,30	**2,77**	1,2
Competitiveness improvement	2,18	1,33	**1,84**	0,83	**1,40**	0,55	**1,89**	1,0
Improvement of relations with current customers	**1,27**	0,47	1,42	0,69	**1,00**	-	**1,31**	0,6
Access to more lucrative markets	1,64	1,21	**1,37**	0,60	**1,00**	-	**1,40**	0,8
Productivity improvement	2,64	1,50	**2,32**	1,00	**1,80**	1,79	**2,34**	1,3

N.B. total no. of responses 35.

The two most important items in terms of compliance benefits were judged to be "improvement of relations with current customers" (1.31) and "access to more lucrative markets" (1.40), followed by competitiveness, then productivity, price and volume improvements. Looking in more details into the judgements by actors' typology, cooperatives reported the highest relative benefits in terms of volume improvements and improvement of relations with current customers, while producers/exporters in terms of competitiveness, access to more lucrative markets, and productivity improvements. Finally, exporters registered the highest relative benefit in all the items, except volumes, especially in terms of price and competitiveness improvements.

6.4 Compliance with food safety standards, typologies of export supply chain actors, and downstream relations

In this section, we illustrate the norms and standards adopted, the compliance costs/difficulties, and the benefits of compliance, according to actors' typologies (cooperatives, producer-exporters, and exporters) and to the incidence of the DMO channel (high-DMO oriented versus low DMO-oriented operators). We denote "*high DMO-oriented*" operator, the operator having an incidence higher than 70% of the DMO channel on total exported volumes in the year 2009. We denote "*low DMO-oriented*" operator, the operator having an incidence lower than 30% of the DMO channel on total exported volumes in the year 2009.[37]

As shown by Table below, substantially all cooperatives (90.9%) and exporters (80%) are "low DMO-oriented", while 47.1% of producers-exporters are "high DMO-oriented" (and 17.6% are "medium DMO-oriented").

Table 9. Relative incidence of the DMO-channel by actors' typology

	Low (<30%)		Medium (30-70%)		High (>70%)		Total
Cooperatives	10	***90,9%***	-	*0,0%*	1	*9,1%*	11
Producer-exporters	6	*35,3%*	3	*17,6%*	8	***47,1%***	17
Exporters	4	***80,0%***	-	*0,0%*	1	***20,0%***	5
Total	**20**	***60,6%***	**3**	***9,1%***	**10**	***30,3%***	**33**

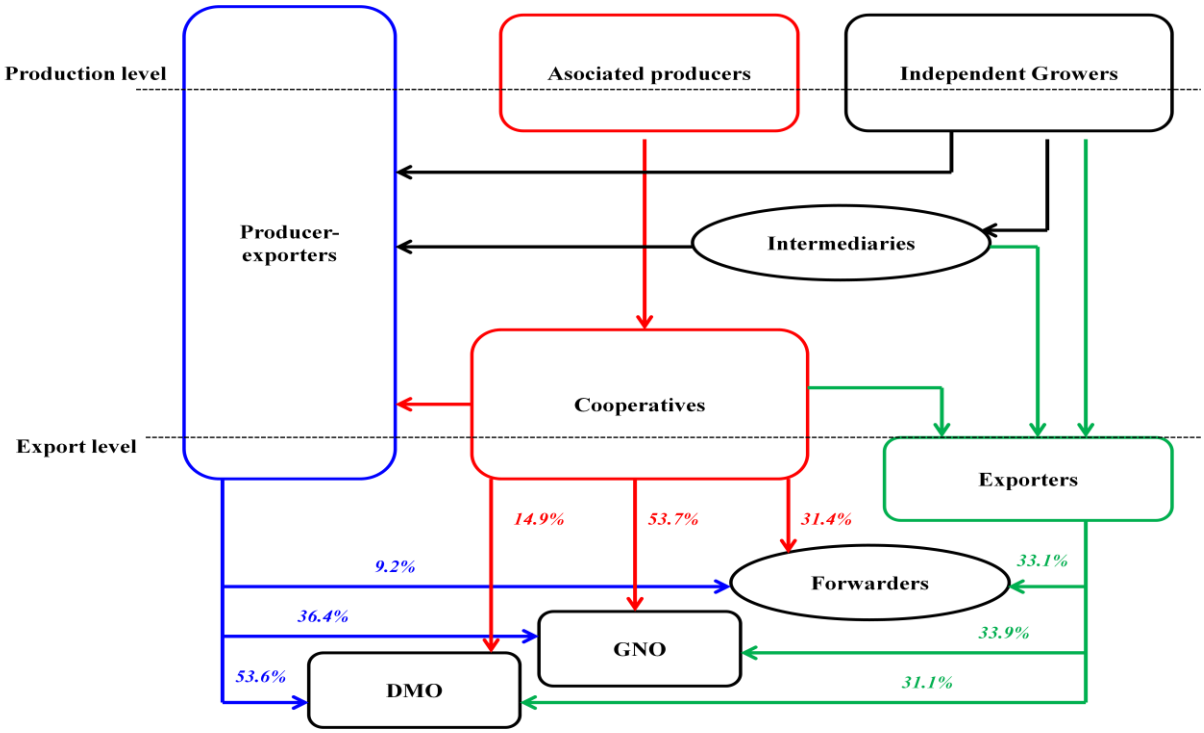
On average, it seems that 60.6% of respondents are *"low DMO-oriented"*, while only 30.3% are *"high DMO-oriented"*. Looking more in details into the distribution of high-DMO oriented operators by actors' typologies, out of the total number of high-DMO oriented operators (10 actors), 80% are producers/exporters.

The figure below shows the distribution of exported volumes by actors' typology and type of downstream distribution channel (DMO channel, GNO channel and forwarders). The volumes exported by producers-exporters on these three market channels in 2009 are as follows: 53.6% on the DMO channel', 36.4% on GNO while only 9.2% is intended to forwarders. Concerning cooperatives, 53.7% of the total traded by this typology goes to GNO and 31.4% toward forwarders, while only 14.9% is traded on the DMO channel. The volumes exported by exporters are as follows: 33.9% toward GNO and 33.1% toward forwarders while

[37] "Medium DMO-oriented" operators are characterized by an incidence higher than 30% and lower than 70% (three operators are located in this class, with incidence of the DMO channel of 40%, 50%, and 60% respectively).

31.1% is intended to DMO. Exporters thus are characterized by a more heterogeneous distribution of volume among the different channels.

Figure 1 - Upstream/downstream relationships and trade flows.



Source: own elaboration

6.4.1 Heterogeneity of norms and standards, typologies of actors and downstream relations

The Table below illustrates the standards adopted (international GAPs, certification, private standards, and other norms, such as HACCP, ISO, and PCI/PIAQ) according to the actors typologies and the relative incidence of the DMO channel.

Table 10. Norms and standards by actors' typologies and relative incidence of the DMO-channel

Actor	DMO ratio	Intern. GAPs	Certif.	Certif. > 5 years	Total prod. certified	Private standards	HACCP	ISO/9001	ISO/22000	PCI/PIAQ
Cooperatives	Low (<30%)	100,0%	90,0%	60,0%	40,0%	100,0%	71,4%	14,3%	14,3%	57,1%
	Medium (30-70%)	-	-	-	-	-	-	-	-	-
	High (>70%)	100,0%	100,0%	100,0%	100,0%	100,0%	*100,0%*	*100,0%*	-	-
	Total	100,0%	90,9%	63,6%	45,5%	100,0%	75,0%	25,0%	12,5%	50,0%
Producer-exporters	Low (<30%)	100,0%	100,0%	83,3%	83,3%	100,0%	-	50,0%	50,0%	-
	Medium (30-70%)	100,0%	100,0%	66,7%	100,0%	100,0%	-	50,0%	50,0%	-
	High (>70%)	100,0%	100,0%	62,5%	87,5%	100,0%	16,7%	33,3%	16,7%	50,0%
	Total	100,0%	100,0%	70,6%	88,2%	100,0%	10,0%	40,0%	30,0%	30,0%
Exporters	Low (<30%)	75,0%	75,0%	-	25,0%	75,0%	-	-	100,0%	-
	Medium (30-70%)	-	-	-	-	-	-	-	-	-
	High (>70%)	100,0%	100,0%	-	-	100,0%	-	-	-	-
	Total	80,0%	80,0%	-	20,0%	80,0%	-	-	100,0%	-
Total (*)	Low (<30%)	95,0%	90,0%	55,0%	50,0%	95,0%	50,0%	20,0%	30,0%	40,0%
	Medium (30-70%)	100,0%	100,0%	66,7%	100,0%	100,0%	-	50,0%	50,0%	0,0%
	High (>70%)	100,0%	100,0%	60,0%	80,0%	100,0%	28,6%	42,9%	14,3%	42,9%
	Total	96,97%	93,94%	57,58%	63,64%	96,97%	36,84%	31,58%	26,32%	36,84%

Percentages represent the frequency of "Yes" respondents to each of the questions
(*) Total number of responses n.33 (except for HACCP, ISO, and PCI/PIAQ n.19)

As shown by Table 10, ***high DMO-oriented operators are characterized by a relatively higher frequency of compliance with both international GAPs and private standards***. With respect to low DMO-oriented actors, they are more likely to be certified. This latter seems to concern more frequently the entire production. Finally, we registered a higher frequency of actors that are certified since more than 5 years. This result is particularly evident for exporters (international GAPs, certification, and private standards), and for cooperatives (certification), while it is less evident for producers-exporters.

6.4.2 Compliance costs/difficulties with food safety norms and standards, actors' typology and downstream relations

Difficulties in the compliance process seem to depend on the type of actor concerned. On average, producers-exporters are likely to face relatively lower difficulties with respect to the other typologies of actors. The most important items were for producers-exporters equipments and infrastructures.

We are now interesting in verifying if the typology of downstream distribution channel is likely to have an influence on actors' perception of the compliance difficulties. We thus analyse compliance costs and difficulties by combining the actors' typology and the relative incidence of the DMO distribution channel on total fruit and vegetable exported volumes in 2009.

As illustrated by Table 11 below, a high incidence of the DMO channel seems to be associated with a lower perception of compliance constraints, for all the typologies of actors. This result seems to indicate that a high incidence of the DMO (highly exigent) channel does not systematically generate higher compliance constraints and difficulties for operators in DCs. This is particularly evident for compliance constraints and less for difficulties associated with the heterogeneity of norms and standards.

Table 11. Compliance constraints and difficulties associated with the heterogeneity of norms and standards by actors' typologies and relative incidence of the DMO-channel.

Actor	Ratio DMO on total exported volumes	Compliance constraints			Compliance difficulties associated with the heterogeneity of norms and standards		
		Y	N	Total	Y	N	Total
Cooperatives	Low (<30%)	70,0%	30,0%	100,0%	70,0%	30,0%	100,0%
	Medium (30-70%)	-	-	-	-	-	-
	High (>70%)	-	100,0%	100,0%	-	100,0%	100,0%
	Total	**63,6%**	**36,4%**	**100,0%**	**63,6%**	**36,4%**	**100,0%**
Producer-exporters	Low (<30%)	66,7%	33,3%	100,0%	66,7%	33,3%	100,0%
	Medium (30-70%)	33,3%	66,7%	100,0%	66,7%	33,3%	100,0%
	High (>70%)	**12,5%**	87,5%	100,0%	**62,5%**	37,5%	100,0%
	Total	**35,3%**	**64,7%**	**100,0%**	**64,7%**	**35,3%**	**100,0%**
Exporters	Low (<30%)	100,0%	0,0%	100,0%	100,0%	0,0%	100,0%
	Medium (30-70%)	-	-	-	-	-	-
	High (>70%)	100,0%	0,0%	100,0%	100,0%	0,0%	100,0%
	Total	100,0%	0,0%	100,0%	100,0%	0,0%	100,0%
Total (n.33)	Low (<30%)	75,0%	25,0%	100,0%	75,0%	25,0%	100,0%
	Medium (30-70%)	33,3%	66,7%	100,0%	66,7%	33,3%	100,0%
	High (>70%)	**20,0%**	80,0%	100,0%	**60,0%**	40,0%	100,0%
	Total	**54,5%**	**45,5%**	**100,0%**	**69,7%**	**30,3%**	**100,0%**

N.B. total no. of responses 33.

We now look in more details at this phenomenon by analysing the mean scores of compliance costs/difficulties with food safety norms and standard by operators' typologies and relative incidence of the DMO channel.

As illustrated by Table 11 below, a high incidence of the DMO (highly exigent) channel corresponds to relatively lower constraints. This is particularly evident for compliance constraints and less for difficulties associated with the heterogeneity of norms and standards.

However, looking in more details into the relations between the ordered mean scores of compliance costs/difficulties and the incidence of the DMO channel, *a relatively high incidence of the DMO channel (high versus low DMO ratio) seems to be associated with relatively higher average scores of compliance costs and difficulties* (i.e. higher difficulties of compliance). This is particularly true for cooperatives (initial investments, equipments and infrastructures) and for producers-exporters (initial investments) and less for exporters (especially for equipments, infrastructures, and technical skills).

Table 12. Ordered mean scores of compliance costs/difficulties with food safety norms and standard by operators' typologies and relative incidence of the DMO-channel

Actor	Ratio DMO on total exported volumes	Initial investment	Equipments	Infrastructure	Technical skills	Labour skills
Cooperatives	Low (<30%)	2,70	1,50	1,40	2,30	2,30
	Medium (30-70%)	-	-	-	-	-
	High (>70%)	1,00	1,00	1,00	2,00	2,00
	Total cooperatives	**2,55**	**1,45**	**1,36**	**2,27**	**2,27**
Producer-exporters	Low (<30%)	2,17	2,33	1,83	2,50	2,50
	Medium (30-70%)	3,00	1,67	1,33	1,00	1,67
	High (>70%)	2,25	1,63	1,75	1,63	2,00
	Total Producer-exporters	**2,33**	**1,89**	**1,74**	**1,84**	**2,16**
Exporters	Low (<30%)	2,67	2,00	2,00	2,00	2,00
	Medium (30-70%)	-	-	-	-	-
	High (>70%)	3,00	1,00	1,00	3,00	2,00
	Total Exporters	**2,75**	**1,80**	**1,80**	**2,20**	**2,00**
Total (n.33)	Low (<30%)	2,40	1,85	1,65	2,30	2,30
	Medium (30-70%)	3,00	1,67	1,33	1,00	1,67
	High (>70%)	**2,33**	**1,56**	**1,67**	**1,78**	**1,89**
	Total	**2,45**	**1,74**	**1,63**	**2,03**	**2,17**

N.B. total no. of responses 33. (1) "Very high"; (5) "very low".

The Table below illustrates the issue of the client contribution to the compliance process according to the type of actor *and* the incidence of the DMO channel on total exported volumes. On average 75% of respondents (no.32) declared to benefit from a contribution by the customer.

Looking in more details at the *type of actor involved*, this percentage is relatively higher for cooperatives (80%) and producers-exporters (82%), while it is lower for exporters (40%).

These results may be put into perspective to analyse the incentive for downstream actors to support the upstream compliance process. The contrasting result obtained for cooperatives and producers-exporters, on the one hand, and for "pure-exporters" on the other hand, seems to suggest that the incentive for downstream customer to support the compliance process may be positively influenced by the *degree of upstream integration* and namely tends to be higher *vis-à-vis* upstream channels that are characterized by a high degree of vertical and/or horizontal coordination (notably cooperatives). In the case of cooperatives, horizontal coordination and the role of the producer group may facilitate transactions, "contractualization", negotiation procedures, control and inspection systems, etc. Cooperatives may also favour producer compliance process and capacity formation (e.g. technical assistance, information ...).

Looking in more details at the influence of the distribution channel on the client contribution (low DMO-oriented versus high DMO-oriented operators) on average high-DMO orientation does not seem to be associated with a higher client contribution with respect to low-DMO orientation. This is particularly true for pure exporters and producers-exporters. As shown by the Table, for pure exporters, targeting high DMO oriented channels does not seem to imply any benefit. As for producers/exporters, 75% of those highly oriented to DMO channels benefits from the client contribution against 100% for those that are low-DMO oriented. The result is sharply different for cooperatives: *high DMO-oriented cooperatives* are likely to benefit relatively more to the client contribution with respect to low-DMO oriented cooperatives. This result seems to suggest the DMO-related customers tend to support the upstream compliance process when cooperatives (and to a lower extent producers/exporters) are concerned, while the do not when pure exporters are concerned. A higher degree of upstream coordination thus positively influence the incentive for DMO-related customers to support the improvement of upstream production practices

Putting results into perspective, we can argue that a higher downstream actor's contribution to upstream compliance process is likely to be associated with higher degree of horizontal and/or vertical coordination among upstream production/export stages. In other words, the higher the upstream integration (between production and export stages or at the production level through the aggregation of producers into cooperatives), the higher the incentive for the client to support the compliance process and the improvement of *production practices.* Moreover, in this case, the incentive may be also associated with the type of downstream channel. High DMO-oriented operators may benefit from the client contribution more than low DMO-oriented operators. This result seems to suggest that a higher degree of downstream coordination (that is likely to characterize DMO-channels with respect to GNO channels), i.e. more or less contractualized and long-lasting relationships (e.g. between importers and downstream retailers) may be associated with a higher incentive for the customer (e.g. importer) to support the upstream compliance process in order to favour products' compliance with customer requirements and *reduce the expected losses associated with non-compliance (notably delisting)*. Hence, *the higher the expected losses for non compliance, the higher the incentive for the client (e.g. importer) to support the improvement of production practices.* This is particularly true when associated with a high degree of upstream horizontal coordination (for cooperatives). Sourcing from cooperatives also enables importers to dispose of relatively higher volumes. The incentive is relatively lower vis-à-vis producer-exporters, partially explained by a lower degree of upstream coordination (potentially lower "control" of the quality of production practices) and lower volumes, with respect to cooperatives.

Table 13. Client contribution to the compliance process by operators' typologies and relative incidence of the DMO-channel

Actor	Ratio DMO on total exported volumes	Client contribution		
		YES	NON	Total
Cooperatives	Low (<30%)	78%	22%	100%
	Medium (30-70%)	-	-	-
	High (>70%)	**100%**	-	100%
	Total	**80%**	20%	100%
Producer-exporters	Low (<30%)	100%	-	100%
	Medium (30-70%)	67%	33%	100%
	High (>70%)	**75%**	25%	100%
	Total	**82%**	18%	**100%**
Exporters	Low (<30%)	50%	50%	100%
	Medium (30-70%)	-	-	-
	High (>70%)	-	100%	100%
	Total	**40%**	60%	**100%**
Total (n.32)	Low (<30%)	**79%**	21%	100%
	Medium (30-70%)	67%	33%	100%
	High (>70%)	**70%**	30%	100%
	Total	**75%**	25%	**100%**

N.B. total no. of responses 32.

6.4.3 Benefits of compliance, actors' typology and downstream relations

Mainly high DMO-oriented operators register a relatively higher benefit in terms of competitiveness improvement, improvement of relations with existing customers, access to more lucrative markets, and improvement of productivity, while price and volumes improvements are relatively higher only for cooperatives (producer-exporters and exporters do not benefit from the insertion in the DMO channel in terms of volume and price).

Table 14. Ordered mean scores of compliance benefits with food safety norms and standard by operators' typologies and relative incidence of the DMO-channel

Actor	Ratio DMO on total exported volumes	Price improvement	Volumes improvement	Competitiveness improvement	Improvement of relations with current customers	Access to more lucrative markets	Productivity improvement
Cooperatives	Low (<30%)	2,90	2,40	2,20	1,20	1,70	2,70
	Medium (30-70%)	-	1,00	2,00	3,00	4,00	5,00
	High (>70%)	1,00	2,00	2,00	2,00	1,00	2,00
	Total	**2,73**	**2,36**	**2,18**	**1,27**	**1,64**	**2,64**
Producer-exporters	Low (<30%)	2,50	2,83	2,17	1,83	1,67	2,17
	Medium (30-70%)	1,67	2,33	2,00	2,00	1,67	2,67
	High (>70%)	3,00	3,25	1,63	1,00	1,13	2,50
	Total	**2,63**	**2,89**	**1,84**	**1,42**	**1,37**	**2,32**
Exporters	Low (<30%)	1,75	3,50	1,25	1,00	1,00	2,00
	Medium (30-70%)	-	-	-	-	-	-
	High (>70%)	2,00	2,00	2,00	1,00	1,00	1,00
	Total	**1,80**	**3,20**	**1,40**	**1,00**	**1,00**	**1,80**
Total (n.33)	Low (<30%)	2,55	2,75	2,00	1,35	1,55	2,40
	Medium (30-70%)	1,67	2,33	2,00	2,00	1,67	2,67
	High (>70%)	2,70	3,00	**1,70**	**1,10**	**1,10**	**2,30**
	Total	**2,54**	**2,77**	**1,89**	**1,31**	**1,40**	**2,34**

N.B. total no. of responses 33. (1) "Very high"; (5) "very low".

6.5 Compliance with food safety standards, typologies of export supply chain actors, and upstream relations

Table below illustrates the distribution of actors according to actors' typologies (cooperatives, producer-exporters, exporters) and the degree of upstream vertical integration this latter measured by the relative incidence of vertical integration (compared to external sourcing from other operators, e.g. producers, cooperatives or intermediaries) on the total production. Cooperatives exclusively source from associated growers. Pure exporters entirely source from producers, cooperatives or intermediaries. Up to 68.4% of producers/exporters declared an incidence of vertical integration higher than 70% on total production.

Table 15 – Distribution of actors according to the degree of vertical integration

	Cooperatives	Producer-exporters	Exporters	Total
Low (<30%)	-	21,1%	100,0%	25,7%
Medium (30-70%)	-	10,5%	-	5,7%
High (>70%)	100,0%	68,4%	-	68,6%
Total	**100,0%**	**100,0%**	**100,0%**	**100,0%**

N.B. total no. of responses 35.

Table 16 below represents mean scores of compliance costs/difficulties with food safety norms and standard by operators' typologies and relative incidence of vertical integration on total production. It is worthy to notice that for producers/exporters, a higher degree of upstream integration is associated with relatively higher mean scores concerning equipments and infrastructures.

Table 5. Mean scores of compliance costs/difficulties and degree of vertical integration

Actor	Vertical Integration on total production	Initial investment	Equipments	Infrastructure	Technical skills	Labour skills
Exporters	External sourcing	2,75	1,80	1,80	2,20	2,00
Producer-exporters	Low (<30%)	3,00	**1,75**	**1,50**	2,75	2,25
	Medium (30-70%)	2,00	3,00	2,50	1,50	2,50
	High (>70%)	2,23	**1,77**	**1,69**	1,62	2,08
	Total	2,33	1,89	1,74	1,84	2,16
Cooperatives	Associated growers	2,55	1,45	1,36	2,27	2,27

N.B. total no. of responses 33.

Table 16 below represents the mean scores of compliance benefits with food safety norms and standard by operators' typologies and relative incidence of vertical integration on total production. A higher degree of upstream vertical integration is likely to be associated with a relatively higher benefit in terms of access to more lucrative markets.

Table 6 – Mean scores of compliance benefits and degree of vertical integration

Actors' typologies	Vertical Integration on total production	Price improvement	Volumes improvement	Competitiveness improvement	Improvement of relations with current customers	Access to more lucrative markets	Productivity improvement
Exporters	External sourcing	**1,80**	**3,20**	**1,40**	**1,00**	**1,00**	**1,80**
Producer-exporters	Low (<30%)	2,00	1,50	1,25	1,00	1,50	1,25
	Medium (30-70%)	2,50	3,00	2,00	2,50	2,00	2,50
	High (>70%)	2,85	3,31	2,00	1,38	1,23	2,62
	Total	**2,63**	**2,89**	**1,84**	**1,42**	**1,37**	**2,32**
Cooperatives	Associated growers	**2,73**	**2,36**	**2,18**	**1,27**	**1,64**	**2,64**

N.B. total no. of responses 33.

Prevailing vertically integrated upstream relations seem to be associated with a relatively higher incidence of international versus local GAPs, certification, and compliance with PSs (particularly GlobalGAP).

Table 7 – Mean scores of compliance benefits and degree of vertical integration

Actors' typologies	Vertical Integration on total production	Certification	Certification since more than 5 years	Total production certified
Exporters	External sourcing	80,0%	-	20,0%
Producer-exporters	**Low (<30%)**	75,0%	50,0%	25,0%
	Medium (30-70%)	100,0%	100,0%	100,0%
	High (>70%)	**100,0%**	**69,2%**	**100,0%**
	Total	94,7%	68,4%	84,2%
Cooperatives	Associated growers	91,0%	63,6%	45,0%
Total		**93,9%**	**57,6%**	**64,0%**

N.B. total no. of responses 33.

As noted in chapter 5, cooperatives exclusively source from associated growers. The vertically integrated channel is thus the dominant mode of governance. On the other hand, "pure exporters" sources exclusively through procurement: either from independent producers, or from cooperatives or from intermediaries. Finally, as for producer-exporters, vertical integration is the more important mode of governance (68% of producer-exporters is vertically integrated). As shown by the Table below, in the case of producers-exporters, the relative

incidence of highly integrated operators is relatively higher highly DMO-oriented channels. *A relationship seems thus to exist between downstream and upstream degree of integration*.

Table 8 - Compliance with food safety standards, DMO-orientation and upstream vertical integration

Actors' typologies	Vertical Integration	DMO oriented			
		Low (<30%)	Medium (30-70%)	High (>70%)	Total
Cooperatives	Low (<30%)	-	-	-	-
	Medium (30-70%)	-	-	-	-
	High (>70%)	100,0%	-	100,0%	100,0%
	Total	100,0%	-	100,0%	100,0%
Producer-exporters	Low (<30%)	**33,3%**	**-**	**12,5%**	17,6%
	Medium (30-70%)	33,3%	-	-	11,8%
	High (>70%)	**33,3%**	**100,0%**	**87,5%**	70,6%
	Total	**100,0%**	**100,0%**	**100,0%**	**100,0%**
Exporters	Low (<30%)	100,0%	-	100,0%	100,0%
	Medium (30-70%)	-	-	-	-
	High (>70%)	-	-	-	-
	Total	100,0%	-	100,0%	100,0%
Total (n.33)	Low (<30%)	30,0%	-	20,0%	24,2%
	Medium (30-70%)	10,0%	-	0,0%	6,1%
	High (>70%)	60,0%	100,0%	80,0%	69,7%
	Total	**100,0%**	**100,0%**	**100,0%**	**100,0%**

6.6 Conclusion

According to the results of this chapter, it seems that the private standards are seen as more relevant than international standards (ISO, HACCP). The emergence of national standards is also relevant with the establishment of the law No. 28-07 relating to food safety and the PCI/PIAQ program.

According to these international standards, cooperatives have the highest relative incidence of HACCP certification and of PCI/PIAQ certification, while producers-exporters of ISO/9001. Hence, both certification (HACCP and PCI/PIAQ) and adoption of private standards are likely to have a positive influence on the export volume and value. Indeed, the results show that producers-exporters tend to be 'high DMO-oriented' than cooperatives and exporters. Furthermore, a relatively high incidence of the DMO channel (high versus low DMO ratio) seems to be associated with relatively higher average scores of compliance costs and

difficulties (i.e. higher difficulties of compliance). This is particularly true for cooperatives (initial investments, equipments and infrastructures) and for producers-exporters (initial investments).

Subsequently, this result seems to suggest that a higher degree of downstream coordination (that is likely to characterize DMO-channels with respect to GNO channels), i.e. more or less contractualized and long-lasting relationships (e.g. between importers and downstream retailers) may be associated with a higher incentive for the customer (e.g. importer) to support the upstream compliance process in order to favour products' compliance with customer requirements and reduce the expected losses associated with non-compliance (notably delisting). Hence, the higher the expected losses for non compliance, the higher the incentive for the client (e.g. importer) to support the improvement of production practices.

Finally, it seems that a higher degree of upstream vertical integration is associated with a relatively higher benefit in terms of access to more lucrative markets. Also, prevailing vertically integrated upstream relations seem to be associated with a relatively higher incidence of international versus local GAPs, certification, and compliance with PSs (particularly GlobalGAP). The analysis also suggests that a higher degree of upstream vertical integration seems to facilitate the insertion in retail-led global value chains.

General conclusions

The agri-food chains in general and fruit and vegetable in particular, are a good example to illustrate a downstream driven chain. Downstream customer imposes on upstream suppliers (whether fresh or processed) preferences (usually these preferences are other than consumer preferences which must be met) and sets minimum requirements which the product must satisfy to market.

The Morocco fruit and vegetable export sector illustrates a good example. The result of survey shows that the level of competitiveness of Moroccan actors is high. It is determined by their positive feedback about the response to the demands of the international market: strong response to quality standards, customer service, strong investment in technical innovation and technological, research and development. For to promote this sector, great efforts have been made either by public authorities (government initiative) in the field of basic infrastructures (highways, Tangier-Med Port, rehabilitation of other ports,..), the ambitious strategy of Green Morocco Plan (especially Pillar I), the establishment of the agricultural development Agency (ADA) as part of the program public-private partnership, and the establishment of the law No. 28-07 relating to food safety by ONSSA. And on the other hand, the initiative of private actors in the framework of the PCI/PIAQ, to engage in the long term in the process of improving their production practices (GAP), optimizing the use of their means of production, especially the side of quality management system through the installation of a self control system.

One of the major constraints hampering these initiatives, especially for small and medium producers, is the ownership status of land and the fragmentation of plots. To raise the challenges, the Green Morocco Plan, among these key successes is the aggregation of producer into groups which will facilitate their access to grants and to obtain certifications with lower costs.

Note that these results should be treated with great caution because they are based on volume and not on the value of exports. They may therefore reflect changes in a way a part of the composition of exports. But anyway they suggest growth allocable.

At the export level, one of the major constraints to export most stressed by the respondents is related to the heterogeneity of standards at the international level. Markets that require different standards set pressure on the players to comply with standards required to ensure market access. This diversity of standards leads additional costs, and therefore is hitting the real actors to technical constraints. This problem relating to the heterogeneity of

norms/standards at the multilateral level is also cited by the EACCE. This fact weighs heavily on the actors performance and affects their competitiveness.

However, a positive development with regard to the cumulative exports of the companies surveyed between 2006 and 2009 explains the willingness of operators to be integrated into the international sector. This commitment is part of a long-term strategy, and is also justified by some companies that have more than one certification of compliance with private voluntary standards (GlobalGAP, BRC, and IFS, Nature's Choice).

Although these actors are successful show, there are many who are weak, because they are not able to meet these different requirements and standards that change frequently. This category excludes the risk of being weakened international networks. Their main objective now is to search for other destination markets are less demanding about the quality standards required. On the other hand, the orientation to other less demanding markets implies a low value in terms of profit. This may affect the social well-being by reducing the incomes of employees involved.

Other factors affecting exports are summarized on the one hand, the expectations of actors in export assistance from the public and private power involved in the industry, and secondly, the difficulties access to international markets with high added value and risk of exclusion of small producers unable to meet the requirements of compliance with standards, especially for private voluntary standards.

Despite these problems, the actors interviewed show a high degree of integration especially for Producers-exporters prevailing DMO channel (producers-exporters).

Subsequently, the results seem to suggest that a higher degree of downstream coordination (that is likely to characterize DMO-channels with respect to GNO channels), i.e. more or less contractualized and long-lasting relationships (e.g. between importers and downstream retailers) may be associated with a higher incentive for the customer (e.g. importer) to support the upstream compliance process in order to favour products' compliance with customer requirements and reduce the expected losses associated with non-compliance (notably delisting). Hence, the higher the expected losses for non compliance, the higher the incentive for the client (e.g. importer) to support the improvement of production practices.

Finally, it seems that a higher degree of upstream vertical integration is associated with a relatively higher benefit in terms of access to more lucrative markets. Also, prevailing vertically integrated upstream relations seem to be associated with a relatively higher incidence of international versus local GAPs, certification, and compliance with PSs (particularly GlobalGAP). The analysis also suggests that a higher degree of upstream vertical integration seems to facilitate the insertion in retail-led global value chains.

References

- **Books**

A. Foglio, **2007**. Il Marketing Agroalimentare: Mercato e Strategie di Commercializzazione, FrancoAngeli;

Abdelhamid Bencherif et al. 1999. Introduction au Management Industriel dans les Economies en Transition : le cas du Maghreb ;

Angel Mariani ed Elena Viaganò, edizione 2002 restampata nel 2004. Il sistema agroalimentare dell'Unione Europea, Carocci;

Anonyme, **1999**. Guides des Bonnes Pratiques Hygiéniques : Fruits et Légumes Frais non Transformés, les Editions des Journaux Officiels ;

Antonio Piccini, **1998**. Gli Agricoltori Europei tra Quote e Mercato, FrancoAngeli;

Elisabetta Croci Angelini, Francesco Farina, 2007, Macroeconomia dell'Unione Europea, Carocci.

Emilio Colombo & Marco Lossani, **2009**. Economia dei Mercati Emergenti. Carocci;

Franscesco Ansaloni, Barbara Ballotta, innovazioni nelle forme e nell'organizzazione del lavoro in agricoltura e nell'industria agroalimentare in Emilia Romagna: Studi di caso, FrancoAngel, 2000.

G.P Cesaretti, R. Green, **2006**. l'Organizzazione della Filiera Ortofrutticola: Esperienze Internazionali a Confronto. FrancoAngeli;

Gianluca Spina, 2008. La Gestione dell'Impresa: Organizatione, Processi Decisionali, Marketing, Acquisti e Supply Chain. Seconda edizione. ETAS.

Guido Cervigni, Massimo D'Antoni, **2001** Monopolio Naturale, Concorrenza, Regolamentazione, Carocci,

J.-J. Lambin, R. Chumpitaz, C. De Moerloose, 2005, Marketing stratégique et opérationnel : du marketing à l'orientation marché 6ème édition Dunod, Paris.

J-F. Soutenain et P. Farcet, Organisation et gestion de l'entreprise. Epreuve n° 3, DECF/MSTCF 2005/2006. Edition FOUCHER, Vanves, 2004.

Joseph E. Stiglitz, 1999, Principi di Microeconomia- seconda edizione, Bollati Boringhieri.

Lahcen El Ameli, 2005 Les Industries Alimentaires au Maroc : Dynamiques et Perspectives de Développement, Imprimerie El Maârif Al Jadida – Rabat ;

Lahcen El Ameli, Outil d'analyse économique, Clés d'analyse des systèmes productifs : entreprises, branches, secteurs, filières, économie nationales,… Collection économie et gestion.

Imprimerie El Maârif Al Jadida-Rabat/ 2010. Ouvrage publié avec le concours du Crédit Agricole du Maroc.

Louis Malassis, 1973, Economie Agroalimentaire : Économie de la Consommation et de la Production Agroalimentaire, tome I. Cujas ;

Luca Barbarito, L'analisi di settore Metodologia e applicazioni, FrancoAngeli, 1999.

MAPM/EACCE, 2007. Programme Intégré d'Amélioration de la Qualité « PIQA ». référentiel pour la mise en place de l'autocontrôle au niveau des entreprises de production, de transformation et de conditionnement des denrées alimentaires d'origine végétale. Version 01/juin 2007.

Margherita Scoppola, 2000 (1° edizione). Le Multinazionali Agroalimentari: I Mrcati e le Politiche. Carocci;

Michael E. Porter, 1980. Competitive Strategy – Techniques of Analysing Industries and Competitors. By the free Press, A Division of Macmillan Publishing Co., Inc. – New York. (la Strategia Competitiva : Analisi per le Decisioni. Edizione della editrice compositori, 1982).

Michael E. Porter, 1987, Competizione globale, ISVOR-FIAT, ISEDI.

Najib AKESBI et al, 1991. Les enjeux agricoles.

OECE (Agence Européenne de Productivité), 1956. Organisation du Marché des Fruits et Légumes en Europe.

Pankaj Ghemawat, 2007. Strategie aziendali e Contesti Competitivi. Edizione italiana, a cura di Cristina Boari e Vincenza Odorici. Carocci Editore S.P.A., Roma.

Pat Hudson, La rivoluzione industriale, il Mulino, 1992.

R. Fanfani et al., 2001. Il Settore Agroalimentare Italiano e l'Integrazione Europea. FrancoAngeli;

Renata Lizzi, 2002, Le politiche pubbliche in Italia: La Politica agricola, Mulino-Studi e Ricerche.

Riccardo Rccardi, Leonel Cesar Rodrigues, Intelligenza competitiva nelle attività negoziali e nelle organizzazioni, FrancoAngeli, 2003.

Robert M. Grant, 1998 L'analisi strategica per le decisioni aziendali, il Mulino.

Salvatore Paolucci, 2002. L'Internazionalizzazione dell'Impresa Italiana: Finanziamenti e strumenti nel sistema europeo-nazionale. G.Giappichelli Editore - Torino

Thami EL KHAYARI, 1987. Agriculture au Maroc, édition OKAD.

Vincenzo Li Donni, 2000 Governare la Globalizzazione: gli stati moderni di fronnte alla sfida del mercato globale, CEDAM, 2000.

- **Publications, periodic and articles**

Akrout and Kharrat, Impact du degré d'implication dans l'exportation sur les stratégies d'influence dans les relations entre exportateurs et importateurs.

Aksoy et al. (2005), Global Agricultural Trade and Developing Countries, World Bank. World Bank Publications.

Allaya Mahmoud, (1992) Options Méditerranéennes, Sér.A/ n° 19, 1992. Le Secteur des Fruits et Légumes dans les Pays Méditerranéens.

Aloui et Kenny (2005), The cost of compliance with SPS standards for Moroccan Exports: a case study, Agriculture and Rural Development Discussion Paper, the World Bank.

Alpha et al. (2009), Normes de qualité pour les produits agroalimentaires en Afrique de l'Ouest, AFD.

Anderson et Van Win Coop (2003), Trade costs, NBER, 95 pp.

Anonyme, (2005) Capacité Concurrentielle du Maroc en Fruits et Légumes de Primeur : Stratégies des Exportateurs – Juin 2005 ; UBIFRANCE.

Anonyme, Union Européenne. De la Ferme à la Table pour une Alimentation Saine en Europe.

Athukorala, P-C., Jayasuriya, S. (2003), "Food Safety Issues, Trade and WTO Rules: A Developing Country Perspective", the World Economy, vol. 26, Issue 9, pp. 1395-1416.

Azzouzi Es Said et ABIDAR Ali (2005), Agriculture situation report for morocco Medfrol PROJET, Market and Trade Policies for Mediterranean Agriculture: The case of fruit/vegetable and olive oil, Sixth Framework Program Priority 8.1 Policy-oriented research Integrating and Strengthening the European Research Area Call identifier: FP6-2002-SSP-1

Bachta. M.S., Ghersi. G (eds), (2004). Restructuration des Filières et Stratégies de Croissance des Entreprises Agroalimentaires dans les Pays du Sud et de l'Est du Bassin Méditerranéen ; Agriculture et alimentation en Méditerranée, CIHEAM, IRESA, KARTHALA, France, 2004, pp. 111-138.

Barratt. M, (2004). Understanding the meaning of collaboration in the supply chain, Supply Chain Management: An International Journal, Vol. 9, No 1, pp. 30-42.

Behrens et al. (2006), Countries, regions and trade: on the welfare impact of economic integration. European Economic Review, 51(5), 1277-1301.

Benita M. Beamon, (1999) Measuring supply chain performance. International Journal of Operations & Production Management, Vol. 19 No 3, 1999, pp. 275-292.

Briz Julian et al., Quality Control in Mediterranean Fresh Food Export Products. Cahiers Options Méditerranéennes – no 64.

Bulletin d'information agroalimentaire http://bitagro.imist.ma/spip.php?article161

Bulletin Officiel n° 3024 du 14 Septembre 1970

Bulletin Officiel n° 3777 du 1985, pp. 152-158

Bulletin Officiel n° 4223 du 6 Septembre 1993

Bulletin Officiel n° 4312 du 2 Juin 1995

Bulletin Officiel n° 5714 du 5 Mars 2009

Bulletin Officiel n° 5822 du 18 Mars 2010, pp 214-219

Bulletin Officiel n°5862 du 5 Août 2010, p 1547

Carmen Bain, Governing the Global Value Chain: GlobalGap and the Chilean Fresh Fruit Industry. Int. Jrnl. of Soc. of Agr.& Food, Vol. 17, No. 1, pp 1-23.

Chemnitz (2007), The Compliance process of food quality standards on primary producer level: a case study of the EUROGAP standards in the Moroccan Tomato Sector.

Chemnitz, C., Künkel, N. (2007) "Standards, a catalyst for the winners - a barrier for the losers? An empirical analysis of the impact of higher SPS measures on the trade performance of developing countries" http://ageconsearch.umn.edu/bitstream/10039/1/sp07ch02.pdf

Chohin-Kuper et al, (2006) L'agriculture irriguée du Maghreb face aux évolutions des marchés agroalimentaires : enseignement de la filière pomme au Maroc, 2006.

Chouaouta M.H, **(2004)** Impacts Environnementaux des Accords de libre Echange sur l'industrie Agroalimentaire : Note d'orientation.

El Alaoui Mohammed, Cahiers Options Méditerranéennes, vol.2, n° 4. L'Expérience Marocaine de Vulgarisation-Modernisation-Développement en Agriculture et Problématique de la Participation Paysanne.

El Khyari Thami, Options Méditerranéennes, Sér. B/ n° 8, 1994. La Crise de l'Agriculture Marocaine à Contre-courant des Idées Reçues.

Emlinger, C., Jacquet, F., Chevassus Lozza, E. (2008), « Tariffs and other trade costs: assessing obstacles to Mediterranean countries' access to EU-15 fruit and vegetable markets », European Review of Agricultural Economics Vol 35 (4), pp. 409–438.

Enquête sur les exportateurs de fruits et légumes en Afrique sub-saharienne : (2009) L'évolution des exigences des acheteurs et leurs impact sur les chaînes d'approvisionnement, PIP- analyse, Mai 2009.

FAO, **(2007),** Guidelines for rapid appraisals of agrifood chain performance in developing countries. Agricultural Management, Matketing and Finance Occasional Paper.

FAO, 2009. Projet «L'amélioration des revenus et de la sécurité alimentaire des petits exploitants en Afrique de l'Ouest et en Afrique Centrale par l'exportation de produits tropicaux biologiques et du commerce équitable» GCP/RAF/404/GER. Evaluation de l'impact du projet

Femise research programme, (2004) Research n°FEM21- 06, Jun 2004. les Effets de la Libéralisation Agricole sur les Economies des Pays Partenaires Méditerranéens, Rapport Exécutif.

Fulponi L (2006), Market access and private standards: case study of the Ghana fruit market (working party on agricultural policies and market).

Fulponi L, Giraud-Héraud E, Hammoudi A , and Valceschini, E. (2006), Sécurité sanitaire et normes collectives de distributeurs: impact sur les filières et l'offre alimentaire", INRA-Sciences Sociales n°5-6.Gereffi, G. (2011). Global Value Chains and international competition. The Antitrust Bulletin, 65(1), 37-56.

Gael Vettori, Economies d'échelle : les Résultats de la Recherche sur le Secteur Bancaire Suisse.

Gereffi (1994), the organization of buyer-driven global commodity chains: how US retailers shape overseas production networks, in Gereffi, G. Korzeniewicz, M. (ed.), Commodity chains and Global Capitalism, Praeger, Westport.

Gereffi (2003), The Global Apparel Value Chain: What Prospects for Upgrading by Developing Countries, UNIDO, Strategic Research and Economics Branch, sectoral studies series, Vienna 2003.

Gereffi et al. (2005), The governance of global value chains, Review of International Political Economy, pp. 78-104.

Gereffi et al. (2009), A Global Value Chain Approach to Food Safety and Quality Standards, paper prepared for the Global Health Diplomacy for Chronic Disease Prevention, Working Paper Series.Gereffi, G., Humphrey, J., Sturgeon, T. (2005). The governance of global value chains. *Review of International Political Economy*, vol. 12, 1.

Giovanni.B, Andrea.M, le Nuove Tendenze dei Consumi Alimentari.

Giraud et al (2010), Hétérogénéité des normes de sécurité sanitaires, stratégie des importateurs et exclusion des producteurs dans les pays en voie de développement, Cahier ALISS, 2010-01, 44 pp.

Giraud-Héraud E, Grazia C, Hammoudi A, (2010), "Hétérogénéité des normes de production et stratégies des importateurs: effets sur les performances des filières des pays en développement", *Cahier ALISS, Alimentation et Sciences Sociales (INRA, Parigi), pp. 42*.

Giraud-Héraud, E, Grazia, C., Hammoudi, A. (2012), "Explaining the Emergence of Private Standards in Food Supply Chains", Cahier Polytechnique 2012-30, Ecole Polytechnique, Département d'Economie, http://hal.archives-ouvertes.fr/hal-00749345.

Grazia C, Hammoudi A, (2012), "The food safety issue: public or private governance?", *Business and Management Revie*w (BMR), Vol 2, n°1, Janvier-Février-Mars 2012, ISSN 2047-0398, pp.102-119.

Grazia C, Hammoudi A, Malorgio G. (2010), "Regolamentazione della qualità sanitaria degli alimenti e accesso dei Paesi della riva Sud del Mediterraneo ai mercati europei: un'analisi empirica", in Boccaletti, S. (a cura di) "Cambiamenti nel sistema alimentare: nuovi problemi, strategie, politiche", XLVI Convegno di Studi SIDEA, Piacenza, 16-19 settembre 2009, pp. 403-422. ISBN. 978-88-568-3107-8.

Hamid Nahla D, **(2003-2004)**. Marketing Mix (Opérationnel).

Hammoudi A et al. (2010) Normes sanitaires et phytosanitaires : accès des pays de l'Afrique de l'Ouest au marché européen, Une étude empirique, AFD Document de travail n° 100, juillet 2010, Agence Française de Développement.

Hammoudi A et al. (2010). Hétérogénéité internationale des standards de sécurité sanitaire des aliments : Quelles stratégies pour les filières d'exportation des PED ? AFD Document de travail n° 101. Octobre 2010 , Agence Française de Développement

Hammoudi A., Hoffmann, R., and Surry, Y. (2009), Food safety standards and agri-food supply chains: An introductory overview", European Review of Agricultural Economics, 36(4), 469–478.

Hammoudi et al. 2010, Hétérogénéité internationale des standards de sécurité sanitaire des aliments : quelles stratégies pour les filières des PEV ? Document de travail, Octobre 2010/101, Agence Française pour le Développement.

Hazel R. Barrett et al. (1999) Globalization and the changing Networks of Food Supply: The Importation of Fresh Horticultural Produce from Kenya into the UK. Source: Transactions of the Institute of British Geographers, New Series, Vol. 24, No 2, 1999, pp. 159-174.

Henson and Humphrey (2009), The Impact of private food safety standards on the food chain and public standard-setting processes (paper prepared for FAO/WHO).

Henson and Humphrey (2010), Understanding the complexities of private standards in global agri-food chains as they impact developing countries (Journal of Development Studies).

Henson et al. (2000), Food Safety Requirements and Food Exports from Developing Countries: The case of Fish Exports from Kenya to the European Union. American Journal of Agricultural Economics 82(5), 1159-1169.

Henson et loader (2001), Barriers to agricultural exports from developing countries: the role of sanitary and Phytosanitary requirements. World Development, 29(1), 85-102

Horton (1998), Food from Developing Countries: Steps to Improve Compliance, Food and Drug Law Journal, vol. 53, 1.

Humphrey and Hubert Schmitz, (2008) Inter-firm relationships in global value chains: trends in chain governance and their policy implications, Int. J. Technological Learning, Innovation and Development, Vol. 1, No. 3, 2008.

Humphrey et Schmitz (2001), Governance in Global Value Chains, IDS, Bulletin 32.3, 2001, Institute of Development Studies.

Humphrey, (2005) Shaping Value Chains for Development: Global Value Chains in Agribusiness, Trade Programme: Div. 41 Economic Development and Employment, Div. 45 Agriculture, Fisheries and Food. Eschborn 2005

ISMEA, Outlook (2008) L'Andamento delle Principali Filiere Agroalimentari.

ITC (2011), The Impacts of Private Standards on Global Value Chains, Literature Review Series on the impacts of private standards – part I

Jaffee (2003), From Challenge to Opportunity. Transforming Kenya's Fresh Vegetable Trade in the Context of Emerging Food Safety and Other Standards in Europe, ARD Discussion Paper n° 31010, Banque mondiale, Washington.

Jaffee et Henson (2004), "Standards and Agro-food Exports from Developing Countries: Rebalancing the Debate", World Bank Policy Research Paper No. 3348. World Bank.

Jaffee et Henson (2005), Agro-Food Export from Developing Countries : the Challenge Posed by Standards, in Aksoy, M.A. et J.C. Beghin, Global Agricultural Trade and Developing Countries, Banque mondiale, Washington.

Jaffee S. and S. Henson (2004), « Standards and Agro-Food Exports from Developing Countries: Rebalancing the Debate », World Bank Policy Research Paper No. 3348. World Bank.

Jaffee Steven, Spencer Henson and Luz Diaz Rios, 2011. Making the Grade: Smallholder Farmers, Emerging Standards, and Development Assistance Programs in Africa. A Research Program Synthesis. The International Bank for Reconstruction and Development / The World Bank.

James A. Sterns & Jean-Marie Cordon, (2001) Why adopt Integrated Corp Production? A Perspective from the French Fruit Sector. AgEconSearch 15 May 2001.

Jean-Christophe. B, Alexandre. G et Vincent Réquillart, (2002) Faut-il et peut-on supprimer les subventions à l'exportation ? Communication à l'Académie d'Agriculture de France 27 Nov. 2002.

Jean-claud M & Alfredo.C et al, (2006) Impact of Agricultural Trade Liberalization between the EU and Mediterranean Countries: the case of the Tomato Processing Industry.

Juthathip Jongwanich, (2009) The impact of food safety standards on processed food exports from developing countries, Food Policy 34 (2009) 447–457.

Kalaitzis, P., van Dik, G. Baourakis, G. (2007). Euro-Mediterranean supply chain developments and trends in trade structures, in the fresh fruit and vegetable sector. Paper prepared for presentation at the 103rd EAAE Seminar, April 23-25, Barcelona.

Lahcen El Ameli, (2005) Gestion de la qualité et compétitivité des exportations agroalimentaires marocaines, Centre International des Hautes Etudes Agronomiques Méditerranéennes, Institut Agronomique Méditerranéen de Bari, 2005.

Laird et Yeats (1990), Trend in non-tariff barriers of developed countries 1966-1986. International Economics Department, World Bank, Policy Research Working Paper, WPS 137.Lee, J., Gereffi, G. Beauvais, J. (2010). Global value chains and agrifood standards: challenges and possibilities for smallholders in developing countries. Proceedings of the National Academy of Sciences (December 13, 2010) (PNAS Early Edition)

MADRPM, (1999) Stratégie 2020 de Développement Rural, Document de Référence 1999 ;

MADRPM, (2005) Documents du Ministère de l'Agriculture, Développement Rural et des Pêches Maritimes;

Maertens et al. (2009), Trade, Standards, and Poverty: evidence from Senegal.

Maertens et Swinnen (2006), Trade, Standards, and Poverty: Evidence from Senegal 'LICOS' Center for transition Economics Discussion Papers 177/2006

Maertens, M., Swinnen, J. (2006), «Trade, Standards, and Poverty: Evidence from Senegal » LICOS Centre for Transition Economics Discussion Papers 177/2006.

MAPM/ADA. Plan Maroc Vert : le partenariat public-privé autour des terres agricoles du domaine privé de l'Etat, 1ère et 2ème tranche.

MAPM/ADA. Plan Maroc Vert : le partenariat public-privé autour des terres agricoles du domaine privé de l'Etat, 3ème tranche.

MAPM/ADA. Plan Maroc Vert.

Marijke Kuiper et al. **(2004)**, Different roads to liberalization Scenarios for a Moroccan case Study of the Euro-Mediterranean Association Agreements, Working paper No. 9 October 2004. Thematic Network on Trade Agreements and European Agriculture, ENARPRI.

Maskus et al. (2005), The cost of compliance with product standards for firms in developing countries: an econometric study. Policy Research Working Paper n° 3590, Banque mondiale, Washington.

Matopoulos A et al. (2007). A concept framework for supply chain collaboration: empirical evidence from the agri-food industry. Supply Chain Management : An International Journal, 12/3 (2007), pp. 177-186

Mbaye (2005), Sanitary and Phytosanitary Requirements and developing country agro-food exports: an Assessment of the Senegalese Groundnut Subsector, ARD Discussion Paper n° 47846, Banque mondiale, Washington.

Mergenthaler. M et al., 2009. Quality assurance programs and access to international markets : the case of horticultural processors in Vietnam. Research paper Supply Chain Management: An international Journal 14/5, pp. 359-368.

Michalek (2005), Comparative analysis of importance of Technical Barriers to Trade (TBT) for Central and Eastern European Countries' and Mediterranean Partner Countries' export to the EU, FEMISE Research no. FEM 22-03

Michel Labonne, Ajustement Structurel au Maroc : le Secteur Agricole en Transition.

Natasha (1996), the supply chains of perishable products in northern Europe. British Food Journal, 1996, pp. 9-15.

NEW MEDIT, (2007). Mediterranean Journal of Economics, Agriculture and Environment. Trimestrale – Vol. VI, n° 3 – Settembre 2007.

Niang (2005), Study of the cost of compliance with export standards in the Senegalese Fisheries Industry. ARD Discussion Paper, The World Bank.

Noelle Terpend, (1997) Guide pratique de l'approche filière. Le cas de l'approvisionnement et de la distribution des produits alimentaires dans les villes. Programme « approvisionnement et distribution alimentaires des villes », collection « aliments dans les villes » DT/18-97 F, 1997.

OCDE (2004), Promouvoir l'entreprenariat et les pme innovantes dans une économie mondiale : vers une mondialisation plus responsable et mieux partagée faciliter l'accès des pme aux marchés internationaux, Istanbul, Turquie 3-5 juin 2004

OCDE (2007), L'accès au marché et les normes privées : étude de cas du marché des fruits et légumes au Ghana. AGR/CA/AMP(2006)22/Final, Directorate for Food, Agriculture and Fisheries, Committee for Agriculture, OCDE, Paris.

OCDE/BAFD, **(2002)**. Perspectives Economique en Afrique : Maroc

Okello et al. (2011), Export Standards, Market institutions and Smallholder farmer exclusion from fresh export vegetable high value added chains: experiences from Ethiopia, Kenya and Zambia.

ONUDI (2005), Les petites et moyennes entreprises alimentaires à l'heure de la qualité. Approche qualité de l'ONUDI dans le secteur agroalimentaire. Expériences et études de cas au Burkina Faso, Vienne.

ONUDI (2011), Diagnostic de la chaine de valeur industrielle : un outil intégré. Organisation des Nations Unies pour le développement industriel (ONUDI). Vienne, Autriche

Opinion, 26-04-2006. L'Agroalimentaire au Maroc : le secteur très sensible ; publié par Kohclok03 sur le site http://www.wladbladi.com

Osservatorio Mediterraneo n°2/ 2001, n°3/2002 et n°1/2004, Bollettino dell'Osservatorio sul Sistema Agroalimentare nei PAESI del Bacino del Mediterraneo.

Otsuki et Sewadeh (2001), Saving Tow in Billion: Qualifying the Trade Effect of European Food Safety Standards on African Exports, Food Policy, 26(5), 495-514

Padilla M, H. Bencharif, **(2001)** Options Méditerranéennes, Sér. B/ n° 32, 2001. Approvisionnement Alimentaire des Villes : Concepts et Méthodes d'Analyse des Filières et Marchés.

PIP (2009), Enquête sur les exportateurs de fruits et légumes en Afrique Sub-saharienne : l'évolution des exigences des acheteurs et leur impact sur les chaînes d'approvisionnement.

Rastoin et al. (2005), Intégrations régionales et stratégies de développement : Les relations Nord-Sud dans l'Euromed, les Amériques et l'Asie. COLLOQUE RINOS (Réseau Intégration Nord Sud), Montréal, 2-3 juin 2005 Organisé en partenariat avec le « Centre Etudes Internationales et Mondialisation » de l'Université du Québec à Montréal

Rastoin et al. (2008), pour une organisation euro-méditerranéenne de la production et des échanges dans la filière fruits et légumes 'OPEFL'

Rastoin J-L et al, (2008) Pour une organisation Euro-méditerranéenne de la production et des échanges dans la filière fruits et légumes OPEFL, IPEMED, Octobre 2008.

Rastoin J-L, (2004) Il settore agroalimentare e l'area euromediterranea di libro scambio (comunicazione al seminario IE.Med – Institut Europeu de la Mediterrània, "l'agriculture et l'association euro-méditerranéenne: défis et opportunités", Bercellona, 28 Maggio 2004.

Rastoin J-L, Nassima Ayadi et Jean-Claude Montigaud, (2005) Vulnérabilité Régionale à l'Ouverture Commerciale Internationale : le cas des Fruits et Légumes dans l'Euro-Méditerranée (Colloque RINOS : Réseau Intégration Nord sud à Montréal 2-3 juin 2005).

Riedel (2009), A Value Chain and Cluster Perspective on the Competitiveness of European Fresh Vegetable Production – Case studies from Germany, Italy And Spain. Working Papers DEIAgra 2009, volume 5.

Riedel B, (2009) A Value Chain and Cluster Perspective on the Competitiveness of European Fresh Vegetable Production – Case studies from Germany, Italy And Spain. Working Papers DEIAgra 2009, volume 5.

Rios et Jaffee (2008), Barrier, catalyst, or Distraction? Standards, Competitiveness, and Africa's Groundnut Export to Europe, Agriculture and Rural Development Discussion Paper 39, the World Bank.

Roberts et Dekremer (1997), Technical barriers to US agricultural exports, Economic Research Service, USDA, Washington DC, 1997.

Rouvière E., Soubeyran R., Bignebat C. (2010). Heterogenous Effort in Voluntary Programmes on Food Safety: Theory and Evidence from the French Import Industry of Fresh Produce. *European Review of Agricultural Economics*, 37(4), pp. 479-499.

Sun et al. (2009), Beyond Typologies of Global Value Chain Governance

Swinnen, J., Vercammen, J., Rozelle, S. (2008), « Standards and Development », LICOS Discussion Paper Series, Discussion Paper 199/2008.

Thomas Reardon, Jean-Marie Cordon and Lawrence Busch et al. Global Change in Agri-food Grades and Standards: Agribusiness Strategic Responses in Developing Countries.

Tozanli (2007), Gouvernance de la chine globale de valeur et coordination des acteurs locaux: la filière d'exportation des tomates fraîches Au Maroc et en Turquie.

Valceschini, E., Saulais, L. and Barrey, S. (2005), Articulation entre réglementation, normalisation et référentiels privés dans les industries agro-alimentaires, Rapport final, Ministère de l'agriculture et de la pêche, Direction des politiques économique et internationale, Paris.

Vogel (1995), Trading up: consumer and environment regulation in a global economy. Cambridge, MA: Harvard University Press

World Bank (2005), « Food Safety and Agricultural Health Standards: Challenges and Opportunities for Developing Country Exports", Poverty Reduction and Economic Management Trade Unit and Agricultural and Rural Development Department, Report No. 31207, Washington D.C: The World Bank.

YiHua Lam & Saadat M. Alhashmi, Simulation of Halal Food Supply Chain with Certification System: A Multi-Agent System Approach.

Web Site

Association Marocaine des Producteurs Exportateurs de Fruits et Légumes (APEFEL) www.apefel.com

Etablissement Autonome de Contrôle et de Coordination des Exportations : www.eacce.org.ma

Fédération des Industries de la Conserve des Produits Agricoles du Maroc (FICOPAM) www.ficopam.ma/

Office nationale de sécurité sanitaire des produits alimentaires « ONSSA » www.onssa.gov.ma

Service de normalisation industrielle marocaine IMANOR (ex-SNIMA) www.snima.ma

The World Trade Organization « WTO » http://www.wto.org/french/tratop_f/sps_f/sps_f.htm