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World Trade Organization
Economic Research and Statistics Division

**AGRICULTURAL TRADE AND DEVELOPMENT:
A VALUE CHAIN PERSPECTIVE**

Miet Maertens and Johan Swinnen

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AGRICULTURAL TRADE AND DEVELOPMENT:

A VALUE CHAIN PERSPECTIVE

Miet Maertens¹ and Johan Swinnen²

April 2014

Abstract

The system of global agricultural and food trade is undergoing rapid processes of change, with important implications for economic development. In this paper we document and discuss these changes; including the rapid growth and structural change in agri-food trade, the increased consolidation in food supply chains, the proliferation of public and private food standards, high and volatile food prices, and increased vertical coordination in the chains. We investigate what the implications are of these changes for developing countries, for their participation in international agricultural trade as well as for economic development, income mobility and poverty reduction in rural areas.

JEL Codes: F13; L14; O19; O24; Q17; Q18

Keywords: global food supply chains; vertical coordination; food standards; food prices; developing countries

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Agricultural Trade and Development:
A Value Chain Perspective

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Background paper prepared for the WTO

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Table of Contents

1. Introduction
2. Growth and structural changes in agri-food trade
 - a. The growth of high-value agri-food exports from developing countries
 - b. Increased consolidation
 - c. Increasing standards
 - d. Vertical coordination in value chains
3. High food prices, economic growth and FDI in agri-food chains in developing countries
4. Development implications
 - a. Integration of developing countries in global agri-food markets
 - b. Standards as barriers or catalyst to trade ?
 - c. Smallholder inclusion in food export chains
 - d. Contract impacts on smallholder income and food security: efficiency premia and spillovers
 - e. Technology transfer through value chains
 - f. Benefits for the poorest through labor market effects of value chains
5. High (and Volatile) Food Prices and Value Chains

1. Introduction

The system of global agricultural and food trade is undergoing rapid processes of change, with important implications for economic development (Mergenthaler et al., 2009; Reardon et al, 2009).

- Global agricultural trade has increased sharply during the past three decades, and has changed considerably in structure with an increased importance of high-value products such as horticultural produce, dairy and meat products (World Bank, 2008).
- During the food price crisis of 2008-2009 world market prices of many agricultural and food products increased sharply, resulting in higher price levels but also in increased volatility in agricultural prices in subsequent years.
- Investment, including foreign direct investment, in food production, processing and retail is expanding rapidly, also in middle- and low-income countries.
- Food standards are spreading rapidly and food production and trade are increasingly regulated through stringent public and private requirements on food quality and safety, and ethical and environmental aspects (Jaffee and Henson, 2005; Henson and Reardon, 2005; Maertens and Swinnen, 2009b).
- These developments in global agri-food markets have resulted in changes in the way global agricultural value chains are organised with increasing levels of vertical coordination, consolidation of the supply base and increased dominance of large multinational food companies (McCullough et al., 2008, Swinnen and Maertens, 2007).

These processes have important implications for developing countries. Understanding these implications is crucial, as agricultural and food exports are a fundamental component of developing countries' growth and entail the potential to increase rural incomes and reduce rural poverty (Jaud and Kukenova, 2011).

In this paper we document and discuss these changes in global agri-food value chains (first part) and investigate what the implications are for developing countries, for their participation in international agricultural trade as well as for economic development, income mobility and poverty reduction in rural areas (second part).

2. Growth and Structural Changes in Agri-Food Trade

World trade in agricultural and food products has in nominal terms more than quadrupled during the past three decades: from US\$230 billion in 1980 to almost US\$ 1,100 billion in 2010 (Figure 1).

Also the structure of world food trade has changed tremendously over the past decades.

a) The growth of high-value agri-food exports from developing countries

Globally the importance of high-value products – which is typically defined as including fruits, vegetables, meat and dairy products, with a relatively high per unit or per weight value – has increased from 32% in 1980 to 41% in 2010 (figure 3). At the same time, the importance of tropical commodities and of cereals and animal feed in total agri-food trade has decreased considerably.

This shift towards high-value exports has been most dramatic in developing regions (figure 2). In South & Southeast Asia and in Latin-America, high-value products are the main component of agri-food exports. Their importance increased from 27% in 1980 to 41% in 2010 in South & Southeast Asia, and from 20% in 1980 to 37% in 2010 in Latin-America (figure 4 and table 1).

The process is similar, but slower, in Africa: high-value exports increased from 2.36 billion USD in 1980 to 11.59 billion USD in 2010 (figure 2), and now constitute 30% of total agri-food exports. Yet, tropical commodities remain the most important export category accounting for 45% of total agri-food exports from the region (figure 4 and table 1).

b) Increased consolidation

Agri-food chains become increasingly concentrated with large food companies and multinational firms dominating the chains. This is most apparent in the food retail sector which is concentrated around a few large super- and hypermarket chains. In EU countries, the five-firm concentration ratio in food retail is particularly high, above 60% in many countries and even reaching 80% in some countries, reflecting the dominance of large retail chains (Henson, 2006).

This consolidation at the retail level in high-income countries affects upstream global food value chains. It leads to further consolidation upstream in domestic and international food chains, as supermarkets increasingly rely on direct trading relations with a limited number of specialised importers, thereby bypassing wholesale markets (Dolan and Humphrey, 2004). Also packing and processing is often assumed by these specialised importers.

The cost of compliance with increasing standards and vertical coordination schemes with preferred suppliers might push smaller food companies to exit the market, leading to consolidation. In the UK for example, the supply of fruits to retailers is largely organised by only four major marketing agents who arrange the supply of domestic as well as imported produce (Grant Thornton, 2005). Consolidation at the import and retail nodes of global food value chains affects overseas exporters and producers who increasingly have to deal with large and powerful multinational companies.

c) Increasing standards

Food standards have increased sharply during the past two decades and now play a dominant role in world agri-food trade (Aksoy and Beghin, 2005). The most important source of food standards are high-income countries, such as the EU and the US. A number of factors contribute to explaining their recent increase (Maertens and Swinnen, 2007).

A series of major food safety hazards in high-income countries has increased consumer and public concern on food-borne health risks and created an increased demand of food safety. In addition, rising income levels and changing dietary habits have increased the demand for high quality food. Consumers are also increasingly (made) aware of ethical and environmental aspects related to food production and trade, which has increased the need for specific standards related to these aspects.

But also the increased trade in fresh food products such as fruits, vegetables, meat and dairy products – which are either prone to food safety risks or subject to specific quality demands by consumers – have increased the need to regulate trade through standards.

In addition, the increased dominance of supermarkets and large multinational food companies in food value chains also contributes to explaining the increased importance of private food standards. Large retail chains put much emphasis on freshness, product quality and food safety as the costs – in terms of reputational damage and loss in market shares – related to selling low-quality or unsafe food might be very high for these companies (Henson and Humphrey, 2008). This results in collective standards that are set by a group or an association of companies, such as GlobalGAP. In addition, large retail chains use private standards as a strategy for product differentiation. This results in company-specific standards set by an individual company, such as Tesco Nature's Choice.

Public standards

At the international level, food safety and quality standards are specified by the Codex Alimentarius, standards regarding plant health by the International Plant Protection Convention (IPPC), and those on animal health by the World Organization for Animal Health (OIE). The WTO Sanitary and Phytosanitary (SPS) and the Technical Barriers to Trade (TBT) agreements regulate the use of standards by WTO member states and use these international standards as a benchmark against which national standards are evaluated.

An illustration of the rapid increase in public standards is in Figure 5 which shows the number of notifications of new SPS measures to the WTO. These have increased exponentially in the last 15 years.

WTO member states have the right to adapt and deviate from these international benchmarks as long as it is in the interest of human, plant and animal health and as long as the need for stricter regulation is based on scientific principles. Several national and regional governments have installed new food laws and regulations that are often much stricter than these international indicative standards. Especially in high-income countries, such as the European Union (EU) and the United States (US), an extensive public food safety and quality control system has been put in place.

Private standards

In addition to these public regulations at the national and international level, many large food companies, supermarket chains and NGOs have specified and adopted private standards. While public standards, set by public authorities, mainly focus on food quality and safety issues, private standards, set by private companies and non-state actors often add other aspects such as ethical or environmental concerns. These private standards are often more stringent than the public ones (Fulponi, 2007; Vandemoortele & Deconinck, 2014).

Conformity assessment and control on compliance is mainly done through third party certification. Over the past 15 years, several hundreds of private food certification and labelling schemes have been set up by private actors (Marx et al., 2012). Adoption of private standards is voluntary but when a large share of buyers in the market is demanding compliance to specific standards, private standards might become de facto mandatory for accessing specific markets (Henson & Humphrey, 2010). Certain private standards, including GlobalGAP, the British Retail Consortium (BRC), Ethical Trading Initiative (ETI), and others are very widespread in certain markets.

An illustration of the spread of private standards is given in Figure 6, which shows the number of producers that are GlobalGAP certified. The figure shows a strong increase in the number of GlobalGAP certified producers. The number increased six-fold over the past decade and a half: from around 20.000 in 1994 to around 120.000 in 2011.

d) Vertical coordination in value chains

There is a move towards tighter vertical coordination in global food chains. This includes a shift from arm's-length market relations and spot-market transactions towards more explicit forms of co-ordination (Gereffi et al., 2005). This move towards tighter coordination is apparent at different nodes of value chains, and can take various forms. First, this can take the form of contracting between different agents in the chain. These contracts can be purely marketing contracts, specifying some form of a price and an outlet ex, or they can be more extensive forms of contracting, including specifications on the production process and the provision of inputs, credit, technical and managerial assistance by contractor firms to their suppliers. Second, increased vertical coordination can take the form of complete ownership integration, or the integration of an activity in the chain within the ownership structure of downstream or upstream companies.

Vertical coordination is importantly driven by the combined effect of increased standards and local market imperfections, preventing local suppliers to invest in technology and quality production processes without support from their buyers (Swinnen and Vandeplas, 2011).

Compliance with increasingly complex and stringent food standards and monitoring of this compliance throughout the supply chain requires tighter vertical coordination at different nodes in the chain. At the buyer end of the chain, retailers, processing companies and importers increasingly procure from a list of preferred suppliers and contract with those suppliers in order to guarantee quality and safety of the produce. Being on this list and attract contract deals with importers or supermarkets becomes increasingly crucial for exporters in developing countries to gain and maintain market access. Dolan and Humphrey (2000)

document how a few large vegetable exporters in Kenya dominate the sector and all have contracts with supermarket chains in the UK and other European countries.

Also upstream the supply chain, vertical coordination is increasing. Agro-industrial food companies and exporters are increasingly changing their procurement system towards more vertical coordination, instead of relying on traditional spot market transactions (Swinnen, 2005, 2007). As a result of increasing food standards and factor market imperfections, the food value chains are moving towards increased vertical coordination where contract-farming and integrated estate farming become increasingly important.

In the most extreme case, primary production is completely vertically integrated in the ownership structure of downstream processing and trading companies. Food processors and traders have sometimes engaged in this extreme form of vertical supply chain coordination and have shifted from smallholder contract-based production to vertically integrated large-scale estate production. Such integrated production facilitates the monitoring of compliance with high standards by reducing transaction costs, even though on the other hand this entails additional production risks and labour supervision costs for the agro-industry.

3. High Food Prices, Economic Growth and FDI in Agri-Food Chains in Developing Countries

Private foreign investments in the agricultural and food sector have been increasing rapidly in developing countries. Worldwide total inflows of foreign direct investment (FDI) has increased from 54 billion USD in 1980 to 1,350 billion USD in 2012 (calculations based on UNCTAD statistics). While there are no representative global data on FDI going to the agri-food sector (these are only available for the countries of Central and Eastern Europe³), ad hoc numbers from specific reports suggest that also in the agri-food sector there have been significant increases. About 6% of total world FDI flows in 2012 were realized in the food processing sector (UNCTAD, 2012). Within the manufacturing sector, the largest increases of FDI flows during the most recent years are observed in the food and beverage sector.

An increasing share of these (growing) FDI flows are going to developing countries. While in 1980 only 13% of total FDI flows were directed to developing and transition countries, this increased to almost 60% in 2012 (UNCTAD, 2013). In Africa, about 20% of FDI inflows in the manufacturing sector – or 6% of total FDI inflows – are in the food and beverage sector. In Latin-America and the Caribbean the food industry represents 30% of FDI in manufacturing or 11% of total FDI inflows (UNCTAD, 2012).

There are several reasons for this increase in FDI.

The first reason is the wave of investment liberalizations in the past 20 years which have made it easier for FDI to flow in. Probably the most extreme case is the opening of the former communist countries in the 1990s, which has contributed to a massive inflow of FDI in these countries, and importantly in the food industry and agribusiness, with important spillover effects on productivity and quality of agricultural production (Dries and Swinnen, 2004, 2010; Gow and Swinnen, 1998).

³ See e.g. Swinnen and Van Herck (2013) and Colen, Maertens and Swinnen (2012b) using sector-specific FDI data on Central and Eastern Europe collected by the WIIW (Vienna Institute for International Economics).

The second reason is strong economic growth in emerging and developing countries, which has triggered increases in demand for higher quality products and, with growing urbanization as part of the economic development process, and increasing demand for retail and processed products in urban areas. The best documented effect on FDI has been the rapid increase of investments in the food retail sector over the past decades, and the associated process of concentration in the retail sector. This led to the so-called 'supermarket revolution' as large retail chains increasingly invested in emerging and developing countries. Supermarkets have spread rapidly in most of Latin America, East and Southeast Asia, and Central and Eastern Europe; and are starting to emerge in Sub-Saharan Africa and South Asia (Dries et al., 2004; Reardon and Swinnen, 2004; Reardon et al., 2003; Reardon et al., 2007). For example, already in the late 1990s, among Latin-American countries, the share of food retailed through supermarkets was estimated to range from 35% to 75% (Reardon and Berdegue, 2002).

Also in Africa supermarkets have started to emerge in more developed countries such as South-Africa and Kenya; and initially a rapid spread throughout Africa was expected (Weatherspoon and Reardon, 2003). However, recent studies show that the supermarket revolution in Africa is much slower than anticipated in earlier studies and that traditional wet markets will remain dominant in domestic food retail in Africa for many years to come (Humphrey, 2006; Minten, 2008; Traill, 2006).

The third factor is high food prices on global markets. This factor has induced, more than the other two factors, an interest in agricultural production itself. While there are many claims on this, data on these developments are scarce. Yet recent reports (such as those by Klaus Deininger and his colleagues at the World Bank) do suggest that the increased global food prices have affected investment interests and that the agricultural sector itself is seen as an increasingly attractive sector for FDI (e.g. Deininger, 2011; Arezki, Deininger and Selod, 2013). However reports also indicate that there is a significant difference between expressed interest in investments and actual investments in farm operations. For example, both Locke and Henley (2013) and Negash, Riera and Swinnen (2013) find that actual investments are only a small fraction (less than 5%) of land that is authorized for biofuels in African countries for that purpose.

Reports by UNCTAD (2013) also show such increased interest. In Africa, a survey among Investment Promotion Agencies identified agriculture as the most promising sector for attracting FDI. Similarly in Asia, agriculture (with forestry and fishing) was the second most promising sector for attracting FDI, behind the food industry, which was the number one ranked among potential FDI interest.

4. Development Implications

Increased demand for high-value products and increasing prices in international food markets create opportunities for developing countries to realize economic growth through expanding and diversifying their agricultural exports. High-value agricultural exports entail an important potential for raising rural incomes and reducing poverty because of the high intrinsic value and labour-intensive production systems (Aksoy and Beghin, 2005; Anderson and Martin, 2005). Many developing countries indeed recognize these opportunities and explicitly mention in their Poverty Reduction Strategy Papers (PRSP) the development of high-value food export sectors (mainly horticultural exports) as an important strategy to foster pro-poor growth.

There are some concerns however.

First, the increased use of standards may imply non-tariff barriers for global trade. In combination with the dominance of large multinational food companies and food retailers in the sector may cause entry in international agricultural markets to be more difficult for developing countries.

Second, increasing levels of vertical coordination in global food value chains may lead to exclusive chains in which smallholder farmers do not share in the benefits, either because they are excluded from contract-farming arrangement or because they are exploited by buyers in the chain.

Third, the tendency towards complete vertical integration in food export value chains is associated with the creation of employment in large agro-industrial farms and firms, and an important question is how this affects rural development, income mobility and poverty reduction.

We discuss the potential costs and benefits of these arguments and summarize empirical evidence.

a) Integration of developing countries in global agri-food markets

As we already documented above (in Section 2) there has been strong growth in high-value exports from developing countries during the past two decades, a period when standards have been tightened substantially;

In Latin-America and the Caribbean, high-value exports increased from 6.4 billion US\$ in 1980 to 56.6 billion US\$ in 2010; in South & Southeast Asia, high-value exports increased from 5.2 billion US\$ to 57.2 billion US\$ over the same time period; and in Africa, from 2.4 billion US\$ to 10.6 billion US\$ (figure 2).

A large number of developing countries have been able to diversify their agricultural exports and to expand their exports of high-value products, most importantly fresh fruits and vegetables. Several countries, including very poor countries such as Burkina Faso, Cameroon, Kenya, Uganda, Senegal and Madagascar, have become important suppliers of fresh fruits and vegetables to the EU market (Maertens et al., 2012).

In figure 6, the top 15 exporters of fruits and vegetables in Sub-Saharan Africa are listed, along with the export values and the share of fruits and vegetables in total agri-food exports. In a number of countries, fruit and vegetables exports have become major components of agri-food exports.

In summary, the increase in high-value exports have coincided with increasing standards and increased consolidation at the buyer end of the value chains.

b) Standards as barriers or catalyst to trade?

However, an important questions that remains is whether the observed export growth has been realized *despite* or *because* of increasing standards. In other words, do food standards act as non-tariff barriers to trade or as catalysts to trade for developing countries (Jaffee and Henson, 2004; Maertens and Swinnen, 2007). This is an ongoing debate.

Issues

There are two main arguments why standards may act as barriers to trade.

First, governments could use public standards to bar agricultural and food imports in order to protect domestic farmers and food companies. Standards could be barriers to trade because they are (mis)used as protectionist tools. The observation that the rapid increase in the use of public standards largely coincides with trade liberalization measures, has led to this argument of 'standards as protection in disguise' (Augier et al. 2005; Brenton and Manchin, 2002; Ferrantino, 2006, Vogel, 1995).

Second, compliance with standards requires one-time investments, e.g. to upgrade production facilities, and recurrent fixed costs, e.g. for certification procedures (Maskus et al., 2005). For exporters and farmers in developing countries these costs may be high relative to their operational size and financial means. By increasing the cost of trade, standards may act as barriers to trade.

These costs are argued to be higher for developing countries as more investments might be needed in those countries to comply with standards that are set and defined in high-income countries and that diverge from implicit norms and on food safety and quality in developing countries. Developing countries generally lack the infrastructure, institutional, technical and scientific capacity for food quality and safety management. Standards could therefore especially limit exports from developing countries.

Private standards may additionally increase the costs of trade. As private standards are often more stringent than public standards, investment costs to comply with private standards might be larger. Also, for private standards, conformity assessment and control is usually done through third party certification and the costs of this are usually borne by the suppliers who adopt the standard; while in the case of public standards the control is done by official authorities and hence paid by the government. So, private standards in particular may create barriers to trade by increasing the costs to trade.

There are also several arguments why standards may act as catalysts to trade.

Standards can solve information asymmetries between trading partners, reduce transaction costs and promote consumer confidence, and thereby act as a catalyst to trade (Jaffee and Masakure, 2005; Hudson and Jones, 2003).

This might be true especially for exports from developing to industrialized countries, as this is where information asymmetries are largest. By providing a bridge between consumer preferences in high-income countries and producers in developing countries, food standards can be thought of as catalysts to developing countries' participation in trade.

Moreover, standards can induce upgrading of the production system and supply chain modernization and allow developing countries to reposition themselves in the global market (Henson & Jaffee, 2008).

Conceptual framework / Theory

Interestingly, the idea that standards (product and process regulations) could be a catalyst to trade has only recently been integrated in trade models. Until quite recently trade models assumed that standards were non-tariff barriers and modeled them as such. Not surprisingly, these models came to the conclusion that standards were hurting trade (and thus development) (e.g. REF).

These assumptions were surprising in the light of other fields of economics which clearly understood that standards and regulations could enhance welfare by solving problems of asymmetric information (e.g. REF), or limit externalities (e.g. REF); or business studies emphasizing the importance of standards for limiting transaction costs and enhancing internal and external business transactions (eg REF).

Recent models which have taken a more nuanced perspective on standards and trade, incorporating the potential welfare enhancing effect of standards by reducing market imperfections (due to e.g. asymmetric information and externalities) include work by John Beghin, Stefan Marette, Frank Vantongeren and colleagues who have focused on the welfare effects of standards (e.g. Beghin et al 2012, 2013), and work by Swinnen & Vandemoortele (2009, 2011) who have modeled the political economy of standard-setting in an international trade framework.

Beghin et al (2012, p 372) argue that *“Efficiency implications of NTMs are much less evident than the welfare losses associated with tariffs and quota. NTMs do not necessarily embody the economic inefficiencies that are associated with classical trade barriers, unless they discriminate between sources of supply. It is therefore not clear a priori that the trade impacts of regulations are inefficient, or that the removal of NTMs that affect trade would achieve efficiency gains that would exceed the losses from weaker regulation.”*

Swinnen and Vandemoortele (2009, 2011) reach similar conclusions, arguing that either producers or consumers may gain or lose from a public standard being imposed, and that standards are therefore not necessarily driven by producer protectionism. Hence, food standards can be, but are not necessarily protectionist.

Empirical evidence

There are several strands of literature that have empirically studied the effect of standards on trade and development. These include gravity models, case studies, survey-based supply chain studies, etc. In general, the models yield mixed evidence, showing that standards may in some cases be protectionist instruments, but can also be trade enhancing, benefiting exporting countries and their local suppliers.

First, some studies have attempted to empirically estimate compliance costs and their estimates vary widely⁴.

⁴ E.g. Aloui & Kenny (2005) and Cato et al. (2005) have estimated the cost of compliance with SPS measure for tomato exports from Morocco and for shrimp exports from Nicaragua respectively, to be only a small fraction, less than 5% of total production costs, while Asfaw et al. (2010) find that investment costs related to GlobalGAP certification represent 30% of

Second, a number of studies analyze the trade effect of standards at the country level – mainly using gravity models. Some find that standards limit trade (e.g., Anders and Caswell, 2009; Jongwanich, 2009; Xiong and Beghin, 2012; Wilson et al., 2003; Wilson and Otsuki, 2003); others that standards have no effect or enhance trade (Blind et al 2013; Mangelsdorf et al 2012).

Complexities in the identification of the effect of standards include the fact that standards do not operate in isolation, but in reality interact with other trade policies, such as QRTs (Felt et al, 2012; Wieck et al 2012); that the standards may be endogenous to trade (Vigani et al 2012); that it is difficult to find good empirical indicators for standards (Chen and Novy, 2012) and that it takes time for countries and companies to adjust to standards – or to reputation effects (Henry de Frahan and Nimenya, 2013; Jouanjean, 2012).

A third set of studies use firm-level analyses and find that standards improve firms' export performance (e.g. Chen et al., 2006, Maskus et al., 2005, Henson et al., 2011) or have no effect (Schuster and Maertens, 2013). These firm-level studies mainly analyse the impact of private standards and do specifically address the effect on developing country exporters. Henson et al. (2011) find that certification to the private standard GlobalGAP increases firms' export revenues for a cross-sectional sample of fresh produce exporting firms from 10 African countries. Colen et al. (2012a) indicate that certification to GlobalGAP increases the length of the export season for vegetable export companies in Senegal (see further box 2). Yet, Schuster and Maertens (2013a and 2013b) find that certification to private standards, including GlobalGAP as well as other standards, does not improve the export performance of asparagus export companies in Peru (see further box 1).

Fourth, some studies have specifically looked at examples of cases where standards are used in a discriminatory and protectionist way and analysed dispute settlement cases related to SPS measures. While there are some examples where standards seem to be used to bar imports and protect domestic producers, Jaffee and Henson (2005) argue that there is no systematic evidence that standards are used as protectionist tools by industrial countries to bar developing country imports. They argue that many of the anecdotal cases involve at least partially legitimate food safety and agricultural health issues.

Finally, the literature has documented several success stories of developing countries that have been successful in complying with standards and ensuring their competitive position in high-value international markets. Examples are Kenya, Thailand, Senegal and Madagascar for horticulture, Thailand and Nicaragua for shrimp (Jaffee, 2003; Maertens and Swinnen, 2009; Minten et al., 2009). Jaffee and Henson (2005) show that the most successful countries and sectors have used high quality and safety standards to (re)position themselves in global markets.

In summary, the evidence is mixed, and it seems that standards may hinder trade from developing countries in certain cases, but may enhance their integration in international food markets in others.

annual crop income for vegetable farmers in Kenya. From own interviews with asparagus exporters in Peru in 2009, we estimate the cost of certification and audits related to a variety of private standards (including GlobalGAP, BRC, HACCP and EFSIS) to be around 4,500 to 7,000 US \$ annually but this cost is small relative to total production costs (less than 1%).

One possible explanation for the mixed evidence is that standards have a larger trade enhancing effect for low income countries, where implicit norms diverge to a large extent from standards set in high-income countries, than for middle income countries where food safety and quality issues are increasingly being addressed in domestic markets as well. Private standards might also have a large effect in terms of facilitating market access in the case of emerging export sectors (such as vegetable export sectors in Africa) but may create little benefits in well-established export sectors (such as the asparagus export sector in Peru).

c) Smallholder inclusion in food export chains

An important way through which rural farm-households in developing countries can benefit from agri-food exports and the increased value in export sectors is through participating in contract-farming with exporters or overseas buyers. But whether or not smallholder farmers do share in the benefits from trade depends on the extent to which they are included in contract-farming arrangement and the impact that participation in contract-farming has on their incomes and well-being.

A shift from vertical coordination towards vertical integration in global food chains implies that smallholder farmers are increasingly excluded from contract-farming schemes and hence from supplying export chains. In addition, contract-farming schemes may be biased towards larger farms because of smaller transaction costs in buying larger quantities from few suppliers (Key and Runsten, 1999). Standards might play an important role in inducing this shift towards vertical integration or sourcing from larger suppliers, and hence in the exclusion of smallholders. Small farms might be unable to comply with stringent requirements due to a lack of technical and financial capacity (Graffham et al., 2009; Maertens and Swinnen, 2007; Reardon et al., 2001), which may induce export firms to reduce (or cease) sourcing from small suppliers. Also, transaction costs for monitoring compliance with standards might be very high in the case of sourcing from smallholders.

On the other hand, standards are themselves instruments for harmonizing product and process attributes over suppliers, and can as such also reduce transaction costs in dealing with a large number of small suppliers. Moreover, well-specified contracts include farm extension and assistance programs that can alleviate the financial and technical constraints small farmers face in meeting stringent standards. In fact, high-standards contract-farming with tight contract-coordination and intensified farm assistance programs could provide a basis for constrained small farmers to participate in high-value export production. In addition, firms might prefer to contract with smaller farms because they might have a cost advantage – especially if it concerns labour intensive production with relatively small economies of scale, such as fresh fruit and vegetable production – or because contract enforcement might be less costly with small suppliers.

Several studies have documented that with increasing standards, a decreasing share of export produce is sourced from small farmers. For example, Maertens and Swinnen (2009) document a recent shift from smallholder contract farming to vertically integrated farming on large-scale plantations in the vegetable export sector in Senegal and attribute this shift to the increased importance of private standards, especially GlobalGAP (see further box 2). Also Schuster and Maertens (2013b) come to the conclusion that the spread of private standards, especially production standards such as GlobalGAP, in the Peruvian asparagus export sector has led to decreased sourcing from smallholders and that certified companies source significantly less from smallholders than non-certified companies (see further box 1). Similar findings on

decreased inclusion of smallholders in food export chains were reported for Kenya (Gibbon, 2003; Jaffee, 2003; Dolan and Humphrey, 2000) and Cote d'Ivoire (Minot and Ngigi, 2004; Unnevehr, 2000). Subervie and Vagneron (2013) describe the rise of large exporter-owned lychee plantations in Madagascar in response to rising private standards. Some export sectors are even completely based on vertically integrated agro-industrial farming, without any inclusion of smallholder suppliers, e.g. the tomato export sector in Senegal (see further box 3).

Yet, other studies show that smallholders are largely included in modern chains. For example, several studies from Eastern Europe document that small farmers were integrated in modern value chains (e.g. Dries and Swinnen, 2004; Dries et al 2009; Noev et al 2011). Also in Africa and Asia smallholders have been successfully integrated in several value chains. Minten and co-authors (2006) find that the vegetable export sector in Madagascar includes 10,000 smallholder farms and is based entirely on an intensive contract-farming systems (see further box 3). Also, export horticulture chains in China are found to be based almost completely on smallholder contract production (Wang et al., 2009). Gulati et al (2007) point out, with evidence from several South and Southeast Asian countries and from several sectors, that there is an overwhelming predominance of smallholder producers in high-value food value chains in Asia based on contract-farming and innovative vertical coordination schemes. Other examples where smallholders are to a large extent included in high-value export chains through contract-farming with buyers and exporters include fruit and vegetable sectors in Zimbabwe (Henson et al., 2005), Chile (Handschuch et al., 2013) and Thailand (Kersting and Wollni, 2012).

A couple of studies have differentiated among smallholders and specifically looked at the selection of poorer versus better-off farm-households in contract-farming in high-value food sectors. For example, Hernandez, Reardon, and Berdegúe (2007) find for the case of tomato chains in Guatemala that smallholders supplying to supermarket chains tend to be more capitalized and belong to the upper-end of the smallholder group. Similarly, Neven, Odera, Reardon and Wang (2009) point out that supermarkets in Kenya are mainly supplied by an emerging middle-class of horticulture farmers who are more capitalized and have a higher degree of education. Also, in the export sector in Senegal – where the introduction of private standards resulted in decreases sourcing from smallholders - the smallholder contract-farmers that remain in the chain are relatively better-off farmers with more land and non-land assets and higher levels of education (see further box 2). Similar findings on contract-farming being biased towards relatively more capitalized and better skilled smallholders, were documented in horticulture export chains in Ghana (Legge et al., 2006), Kenya (McCulloch and Ota, 2002), and Cote d'Ivoire (Minot and Ngigi, 2004).

In summary, the exclusion/inclusion of smallholder producers in export chains through contract-farming schemes varies across sectors and countries. Maertens et al. (2012) provide a review of the literature on smallholder inclusion/exclusion in high-standards horticultural export chains in Africa and also conclude that the evidence is mixed. In some sectors and countries standards have led to increased exclusion of smallholder farms while in other sectors and countries high-standards exports are largely realized by smallholder farmers. Yet, smallholders included as suppliers in high-value export chains through contract-farming with buyers and exporters tend to be relatively better-off households.

To explain these different patterns of smallholder inclusion, Vandemoortele et al. (2012) develop a formal theoretical model of the emergence of the demand for high quality and safe

food and analyse which small producers are most likely to be included. They show that conditional on the initial production structure in the economy, the nature of transaction costs, and the possibility of contracting between producers and processors, certain producers are included in the high quality economy, and others are not. Their model predicts that in a mixed production structure, with both smallholder farms and larger farm enterprises, smallholders are more likely to be excluded. When the farm sector is more homogeneous and dominated by small farms, it is likely that the emergence of high value production will be slower but more inclusive.

These predictions/arguments correspond to the conclusions by Reardon et al. (2009) who, based on the existing empirical studies, find that smallholders are especially excluded if sourcing from large farms is an option. The model also shows that reducing specific transaction costs (for example by investments in infrastructure, producer associations, third party quality control) can enhance the integration of small and less efficient producers in high-value value chains.

d) Contract impacts on smallholder income and food security: efficiency premia and spillovers

How the participation of smallholder farmers in high-standards export production and trade contributes to rural income mobility and poverty reduction depends on whether and how much contracted suppliers effectively benefit from this participation. It has often been argued that the gains from high-standards agricultural trade are captured by foreign investors, large food companies and developing country elites (e.g. Dolan and Humphrey, 2000; Reardon et al., 1999). On the one hand, vertical coordination mechanisms and consolidation at the buyer end of export chains are said to amplify the bargaining power of large agro-industrial firms and food multinationals, displace decision-making authority from the farmers to these downstream companies, and strengthen the capacity of these companies to extract rents from the chain to the disadvantage of contracted smallholder suppliers in the chains (Warning and Key, 2002).

However, several empirical studies find evidence that is in contrast with these predictions. They have found that once farmers are included in contract schemes and high-value export chains, they benefit significantly. In certain export sectors, smallholder farmers even became certified themselves – often with the assistance of contractor companies and/or donors. In the Senegalese horticulture sector it is found that both contract-farming and large farm production leads to important increases in rural households' income – and significant declines in poverty. Interestingly, the poorest households (and women) may benefit more from employment on large estate production since they are more likely to be hired as worker on these farms than to be contracted as farmer (see also below). Minten et al. (2009) find that high-standards vegetable export production in Madagascar is entirely based on small-scale contract farming, including thousands of very poor farmers. By generating higher incomes, and because of technology spillovers on food production, income stability and the food security of participating households improves with participation in the export chains.⁵ For example, Minten et al (2009) also find that the better technology and management practices related to contract-farming spill over to other crops, generating large productivity increases in rice production, and further improving the food security situation of rural households (see box 3).

⁵ Similarly, Negash and Swinnen (2013) find positive effects on food security of smallholder biofuel value chains in Ethiopia because of spillover effects through fertilizer access.

Swinnen and Vandeplas (2011) use a theoretical model to show why buyers may pay suppliers an extra “efficiency premium” in high value chains, even with very unequal bargaining power in the contract relationship. The demand for higher quality products requires buyers to assist farmers in order to improve the quality of production, for example by providing the farmer with inputs on credit. In a context of weak contract enforcement, which is likely in many developing countries, this creates holdup opportunities for the farmer, who can decide to use the inputs but sell the high-value product to another buyer without paying back the credit that the first buyer offered him. In order to prevent this, buyers are forced to offer attractive contract terms in order to secure their returns to investment, for example by offering the farmer a price premium. Hence, poor suppliers can benefit from the introduction of quality standards in a weak contract enforcement context, even if all bargaining power lies with the buyer.

Smallholder certification to private standards is usually found to have additional beneficial effects. Handschuch et al. (2013), Asfaw et al. (2009) and Subervie and Vagneron (2013) find that smallholders' certification to GlobalGAP results in improved quality, increased volumes, higher farm-gate prices and higher net incomes from fruit or vegetable production for respectively Chile, Kenya and Madagascar. Moreover, Asfaw et al. (2010a) finds improved health outcomes among farmers as a result of the use of less toxic pesticides and improved farmers' pesticide management as specified in GlobalGAP requirements.

Based on Chinese data, Xiang et al. (2012) analyse the general equilibrium effects of the growth in high standards food on household welfare. Their simulation results show that an increase in the worldwide or domestic demand for high standard food, leads to an increase in the production of high standard products and to a reduction of poverty and inequality. But the study especially illustrates the importance of taking into account that the growth and equity effects of high standards are determined by a complex set of factors and mechanisms that are often ignored in the empirical literature.

e) Technology transfer through value chains

Successful contract-farming typically involves technology and capital transfers since local suppliers do not have access to the required skills, know-how, technology, management, capital, inputs etc. In many cases to make these value chains functioning, this requires farm assistance programs, which can help to overcome constraints on domestic firms in low-income countries with limited access to capital and technology.

Several empirical studies document these technology transfers and productivity increases: see e.g. Dries and Swinnen (2004, 2010), Gow et al (2000), Maertens and Swinnen (2009), Minten et al. (2009), Negash and Swinnen (2013). These studies find that technology (and management) transfer through value chains generates significant productivity increases both for the product itself and for other production activities at the farm level.

The studies above have analysed value chains involving only/mostly private sector players. There are a number of (relatively recent) examples of technical assistance projects that try to link up local producers to global value chains. ODA in these situations may have multiple roles, including (i) contributing to technology transfer and productivity increased, (ii) establishing the connection between local producers and multinationals and overseas buyers by supporting farmers to comply with specific standards and become certified. For example, the EU-funded *Pesticide Initiative Program* (PIP) in ACP countries and the USAID-funded

Business and Market Expansion (BAMEX) project in Madagascar assist exporters and farmers to comply with private standards from overseas buyers. So far there is little empirical evidence on the impact of these initiatives. One of the only studies is by Jaud and Cadot (2012) and they find that the impact of PIP is not significant.

f) Benefits for the poorest and for women through labor market effects of value chains

An important – and much overlooked – issue in the welfare analyses of agri-food trade is that poor households may benefit through employment effects. High-standards trade creates new employment opportunities in labour-intensive processing and handling of produce, and on vertically integrated estate farms and large contracted farms. A shift from smallholder contract-farming to vertical integrated estate farming – as observed in specific export sectors such as in the vegetable export sector in Senegal and the asparagus export sector in Peru – also entails a shift from production based on family labour to production based on hired labour. Hence, there might be additional benefits from agri-food trade through employment effects.

The empirical evidence on this issue is scarce but some recent empirical studies have documented that the development of high value agro-industrial value chains creates substantial employment, for example in vegetable export sector in Senegal (Maertens and Swinnen, 2009; Maertens, Colen and Swinnen, 2012) and in the cut flower industry in Ethiopia (Mano et al., 2011). In the vegetable export sector in Senegal, it is found that employment in agro-industrial production and exporting companies is well-accessible for the poor and that this employment has a large positive effect on household incomes and on poverty reduction (see box 2 and 4).

Moreover, there seems to be a high demand specifically for female labour in these export sectors. By creating off-farm employment opportunities for women, agri-food export sectors contribute significantly to female empowerment in rural households (Maertens and Swinnen, 2012), which further results in indirect effects such as increased child schooling (Maertens and Verhofstadt, 2013) and investment spillovers (Maertens, 2009).

The increase in standards may also create improved employment conditions for workers. Ethical or fair trade standards may generate positive effects on working conditions. For example, Barrientos et al. (2003) find that labour standards and codes-of-conduct can improve workers' well-being, although not in all cases. Yet, even food quality and safety standards may generate benefits for workers. By increasing the need for companies to invest in training, standards may result in higher wages through an efficiency premium paid to trained workers in order to stimulate them to keep working at that same company. Colen et al. (2012a) find evidence of increased employment periods and higher wages for workers, following companies' certification to private standards in the horticulture export sector in Senegal.

5. High (and Volatile) Food Prices and Value Chains

High food prices have several effects on trade through value chains.

First, and most obvious, they make investing in value chains more attractive and will as such have a positive effect on trade and investment in the value chain. Higher prices implies more

potential profits for all involved in the chain – and more actual profits for at least some involved.

Second, they may also enhance supply chain formation and trade indirectly by reducing capital constraints for companies and farmers to make the necessary investments. Addressing standards and organizing value chains invariably requires investments by all agents in the chain. As farmers (and some of the traders and processing companies) in developing countries are typically credit constrained, increased sales prices may increase profits and reduce their credit constraints and therefore enhance investments and value chain formation.

A third factor is that vertical coordination (interlinked contracting) becomes easier to sustain with high product prices. As Swinnen and Vandeplas (2011) show, vertically coordinated value chains with endogenous technology transfer can only be sustained if product prices are sufficiently high such that the surplus that is created is sufficient to cover efficiency premia for internal contract enforcement. With credit constrained farmers (local suppliers) downstream processors and buyers often need to make additional investments to enhance input and technology transfers to suppliers. To avoid contract breach of the (in)formal interlinked contracts in the value chain, buyers typically have to pay their suppliers a premium above what they would get on the (spot) market price (or the price they could get from an alternative buyer) – what Swinnen and Vandeplas refer to as an “efficiency premium”. This premium may be substantial and can only be paid if the profits for the processors (buyers) are large enough. Hence, there needs to be a minimum price (value) in the chain for this vertical coordination to be feasible.

Swinnen et al (2011) argue that the reason why in the wake of market liberalizations in the 1980s and 1990s throughout the transition and developing world, supply chain formation in Eastern Europe has been easier than in many developing countries, and why some sectors in developing countries have seen economic growth and others decline after the liberalizations is because of the difference in value in the chain. Only if product prices (value) are sufficiently high is it possible to sustain such interlinked contracting system.

Hence, higher prices increases the possibility of extending successful value chain formation to products where this otherwise would not work.

However, one should also note that increased volatility of prices, which seem to characterize current food markets, may undermine contracting since the inherent uncertainty makes it more difficult to design contracts, and to enforce them once they are designed and agreed upon. Unexpectedly large increases or decreases of prices creates incentives for buyers or sellers (depending on the direction of the price changes) for reneging on the contract and exchanging their products with other partners, thus leading to a breach of the contracts and unsustainability of the value chains (Gow and Swinnen, 2001).

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Box 1: Asparagus export sector in Peru

Peru is the largest exporter of fresh asparagus worldwide. The sector currently accounts for about 25% of the country's total agricultural exports. More than 220,000 ton of asparagus are produced yearly. There is no domestic market for asparagus and 99% of the whole production is exported, of which 70% as fresh produce and mainly to the US and the EU. Asparagus exports increased tremendously in the past decades, from 4,590 ton and 6,413 thousand US \$ in 1993 to 134,992 ton and 286,534 thousand US \$ in 2011. The number of firms exporting each year has tripled from around 40 firms at the end of the 1990s to almost 120 firms in 2006, and stabilized at around 100 firms per year since 2006. A variety of private standards, including GlobalAP, HACCP, BRC, BASC, TESCO, LEAF, IFS, GMP, SQF2000 and others, spread in the sector from the early years 2000.

Figure 1: Evolution of fresh asparagus export volumes and values (thousand US\$), 1993 – 2011

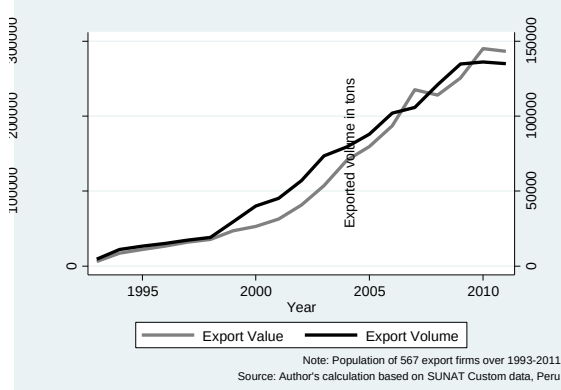
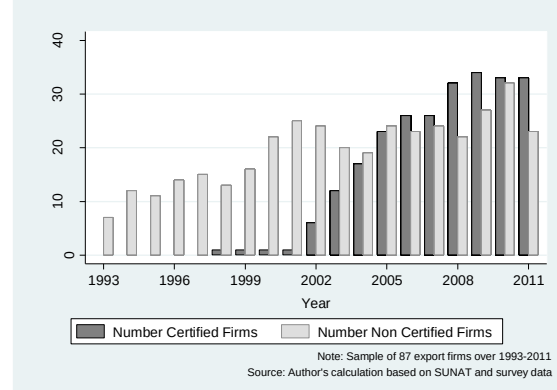


Figure 2: Evolution of the number of certified and non-certified export firms, 1993 – 2011



With the spread of private standards, the export volumes and values continued to increase. However, there is no causal impact of certification on firm's export performance and the observed increase in export volumes would have happened also without the spread of private standards in the sector. Certified firms are observed to export larger volumes and values but they were already doing so before they become certified. It is the best performing companies that seek certification, rather than certification having an impact on the export performance of companies. This is the case for all type of private standards and for the main individual standards in the sector, GlobalGAP and HACCP.

Figure 3: Export volumes of currently certified and non-certified firms

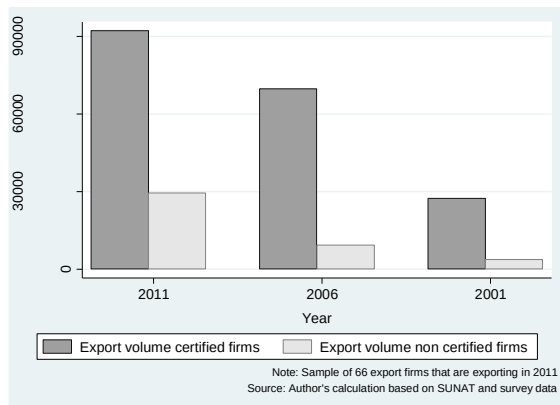
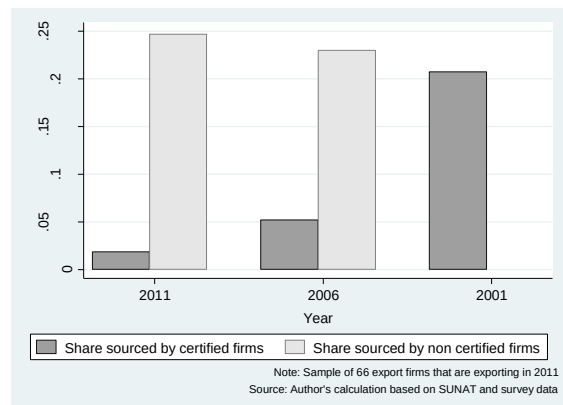


Figure 4: Sourcing from small producers for currently certified and non-certified firms



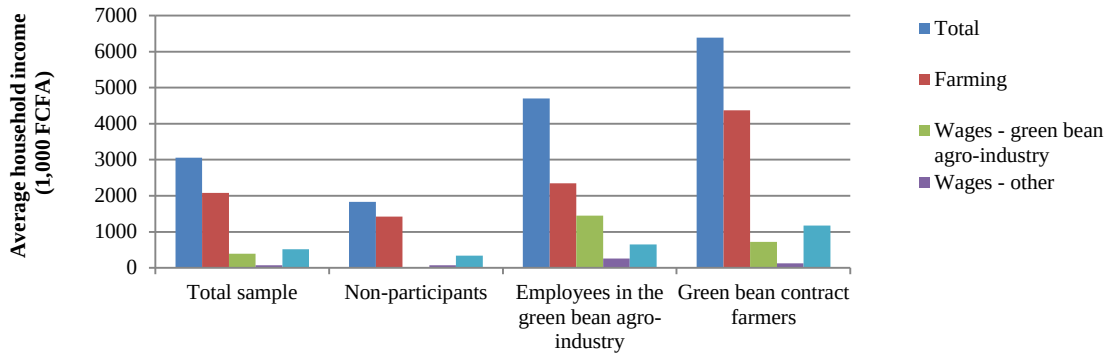
However, certification to private standards did had an effect on the sourcing strategies of export companies. Certified export firms currently source less from smallholder producers (1.5%) than non-certified firms (25%) but before becoming certified, in 2001, these companies were sourcing more from smallholder producers (20%) while companies that did not seek certification were not at all sourcing from smallholders in 2011. A causal impact was found, meaning that certification to private standards, especially production standards such as GlobalGAP, decreases sourcing from smallholder suppliers.

Source: Schuster and Maertens, 2013a and Schuster and Maertens, 2013b

BOX 2: Bean export sector in Senegal

In the Senegalese bean export sector increasing standards have induced a shift from smallholder contract-farming towards vertically integrated estate production by the exporting companies themselves. It is estimated that smallholder procurement under contract decreased from 95% of export produce in 1999 to 52% in 2005. A shift occurred from smallholder contract-farming towards integrated estate farming. This change in supply chain structure has also shifted the way local households benefit: increasingly through agro-industrial employment and labour market effects rather than through contract-farming and product market effects.

Figure 1: Income effects of green bean exports



Both, participation in contract-farming and participation in agro-industrial employment has resulted in significantly higher incomes. It is estimated that contracting with the export sector leads to incomes that are 110% higher than the average income in the region while for employment in the export industry this is 60%. It is important to emphasize that the shift in supply chain structure with increased agro-industrial production has resulted in a stronger poverty-alleviating effect. This is the case because the poorest households, with less land and non-land asset holdings and a lower level of education, mainly benefit through labour market effects and agro-industrial employment.

When comparing employees in certified and non-certified export companies, employees in certified companies are found to be better off. Certification to GlobalGAP is found to increase the length of companies' export season, which results in longer employment periods for workers in certified companies. In addition, workers in certified companies receive slightly higher wages than workers in non-certified companies.

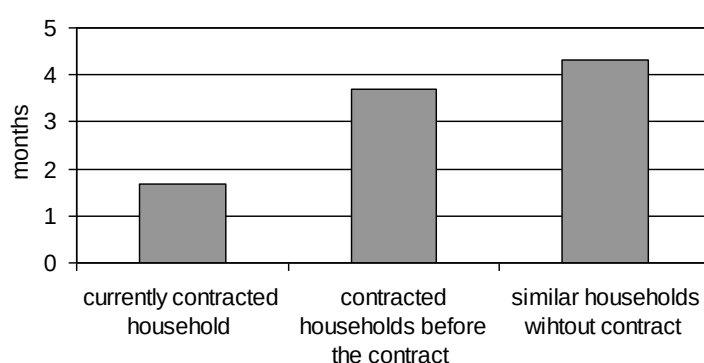
In addition, it is observed that employees in the export sector invest the wage that they earn in the export companies at least partially in their own farms. Access to wages from the export sector has a positive effect on farm intensification and leads to increased use of modern inputs such as mineral fertilizer and improved seeds.

Source: Maertens and Swinnen, 2009; Maertens, 2009; Colen, Maertens and Swinnen (2012a)

BOX 3: Vegetable sector in Madagascar

The vegetable export sector in Madagascar is dominated by one domestic exporting company that relies 100% on smallholder contracting for procurement of primary produce. In response to increasing standards in overseas markets the company has intensified its contract-farming schemes with smallholders. This has led to a vertical coordination scheme including almost 10,000 smallholders, often very small farms with less than one ha, in the hillsides of Madagascar. Rural households benefit substantially from contract-farming with the export industry, as the vegetables produced under contract and destined for export directly account for 47% of total household income. In addition, technological spillover effects from vegetable contract-farming on rice production are observed. Contract farmers were assisted by the extension agents of the export company to use compost on contracted plots, which resulted in an increase in rice productivity with 64%. The overall impact, through direct and indirect effects, is an increase in rural incomes, an increase in the stability of rural incomes and a reduction in poverty. This is reflected in a substantially reduced 'hungry'-season for household engaged in vegetable contract-farming with the export industry.

Figure 1: Impact of vegetable contract-farming on the length of the 'hungry'-season in Madagascar

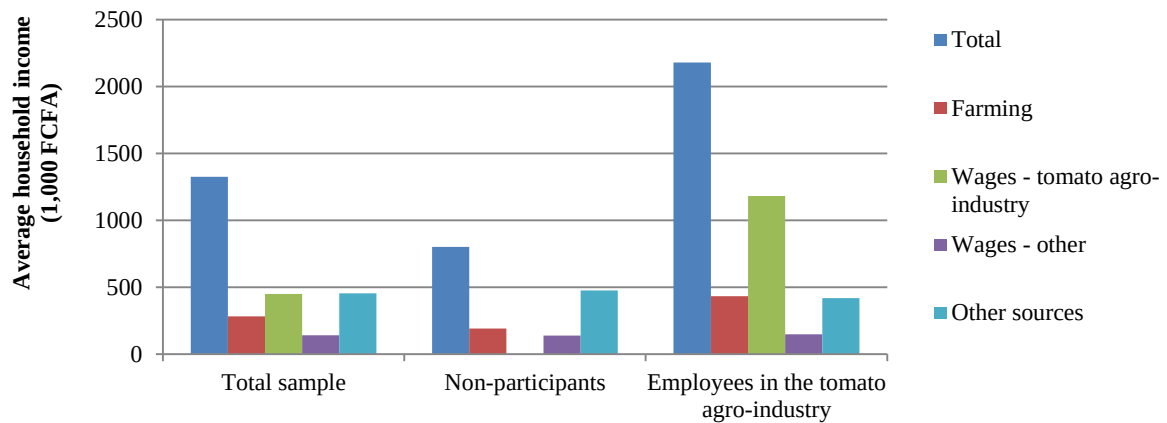


Source: Minten, Randrianarison and Swinnen, 2009

BOX 4: Tomato export sector in Senegal

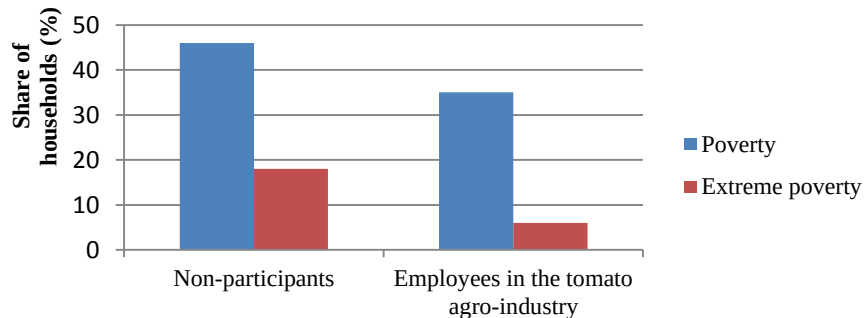
The Senegalese tomato export sector is dominated by one multinational company that was established and started exporting tomatoes from Senegal to the EU in 2003. The tomato export supply chain is completely vertically integrated. Smallholder procurement is 0% and production, processing, trade and distribution is completely integrated within the subsidiaries of the multinational company. This is an extreme case of complete vertical integration. Rural households only benefit through labour market effects as there is no contract-farming and procurement from smallholder farms.

Figure 1: Income effects of tomato exports



This case-study also shows that it is mainly the poorest households who benefit from the creation of employment in tomato export chains. Households employed in the tomato export industry, either on the fields or in the processing units of the export company, have incomes that are more than double the income of other households in the region while they initially, before the multinational company was established in 2003, had lower land and non-land asset holdings. Increased tomato exports have resulted in increased employment, increased incomes and ultimately reduced rates of poverty and extreme poverty.

Figure 2: Poverty effects of tomato exports

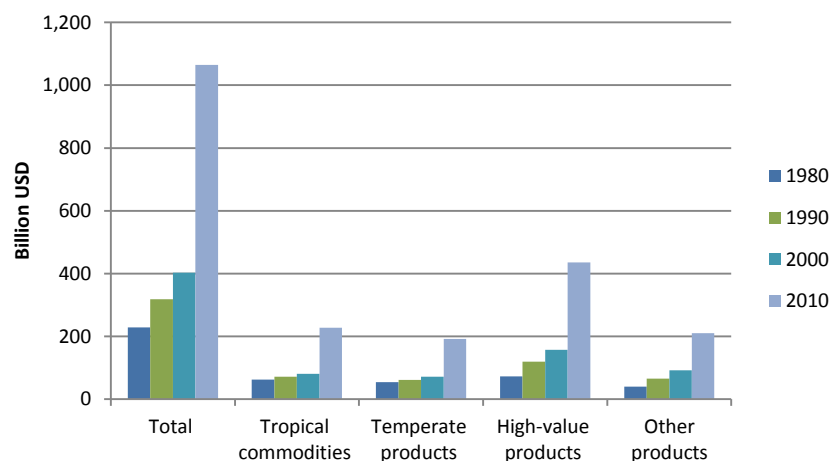


Source: Maertens, Colen and Swinnen (2011)

Table 1: The importance of different product groups in total agri-food exports for the world and for different regions, 1980 and 2010

	World		South & Southeast Asia		Latin America & Caribbean		Africa	
	1980	2010	1980	2010	1980	2010	1980	2010
Tropical commodities	27.2%	21.4%	45.7%	30.0%	39.3%	25.3%	61.4%	44.7%
Temperate products	23.7%	18.0%	19.4%	17.5%	12.9%	17.7%	7.3%	6.5%
High-value products	31.7%	40.9%	27.0%	41.3%	20.4%	36.5%	17.7%	30.5%
Other products	17.3%	19.7%	7.9%	11.2%	27.4%	20.4%	13.6%	18.3%

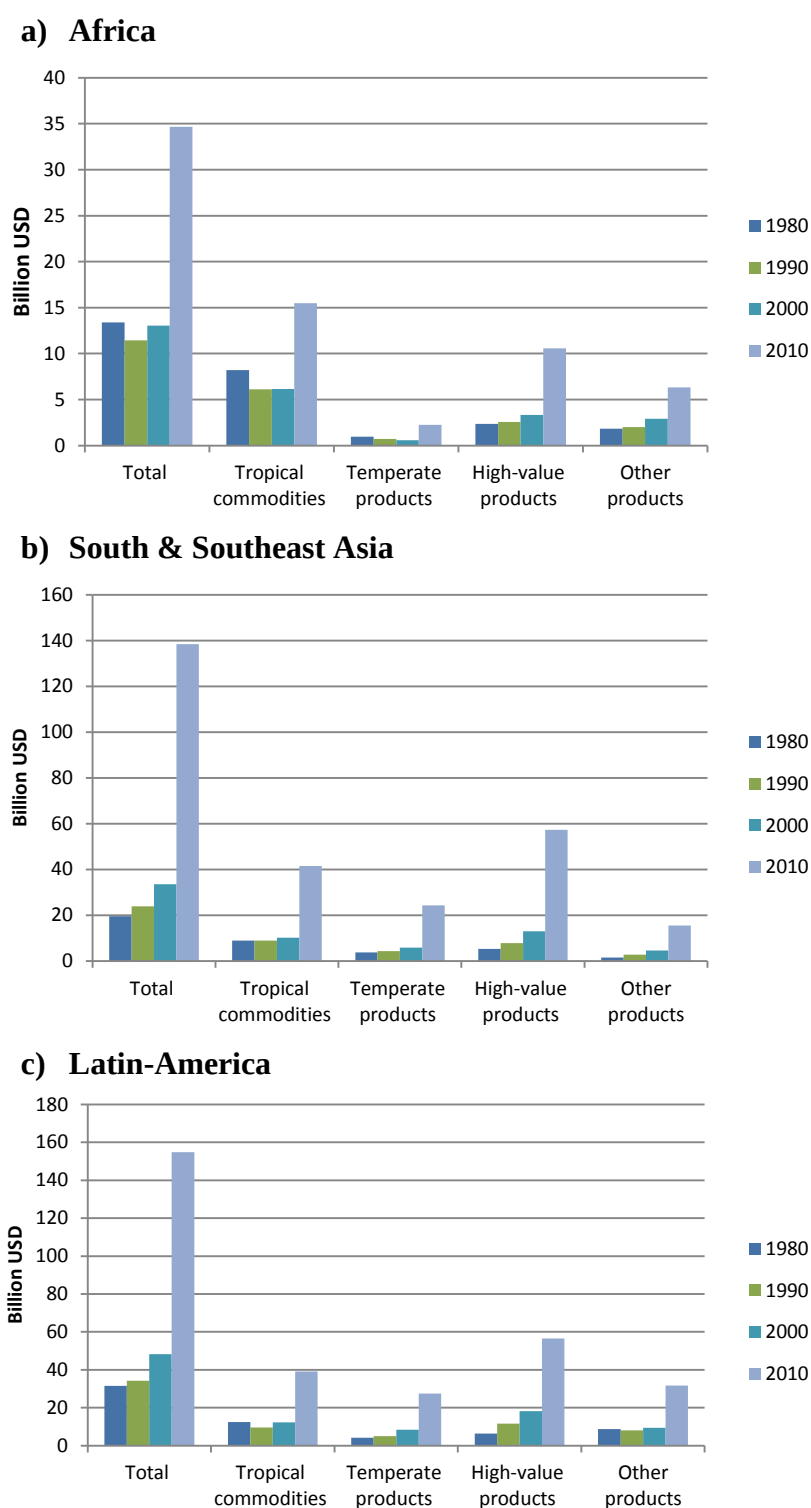
Figure 1: Changes in world food trade, 1980 – 2010



Source: Own calculations based on FAOstat (2013)

Tropical commodities include coffee, cocoa, tea, cotton, soybean, rubber, groundnuts and other raw materials; Temperate products include cereals, fodder and feeding stuff; High-value products include fruits, vegetables, meat and meat products, milk and dairy products; Other products include beverages, tobacco, sugar and other processed food products.

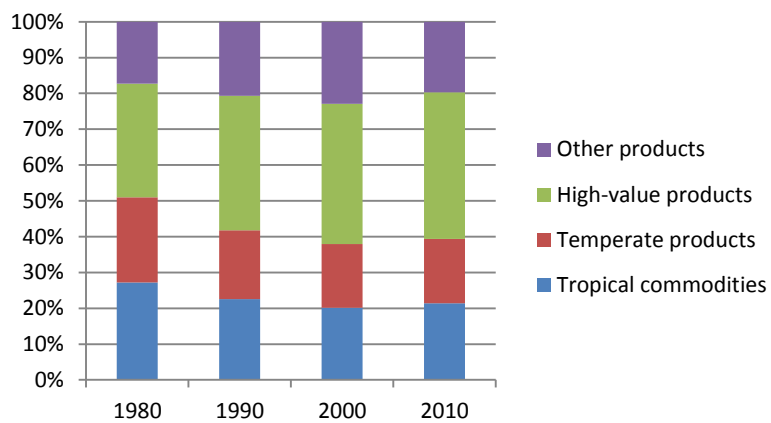
Figure 2: Changes in agri-food trade across regions, 1980 – 2010



Source: Own calculations based on FAOstat (2013)

Tropical commodities include coffee, cocoa, tea, cotton, soybean, rubber, groundnuts and other raw materials; Temperate products include cereals, fodder and feeding stuff; High-value products include fruits, vegetables, meat and meat products, milk and dairy products; Other products include beverages, tobacco, sugar and other processed food products.

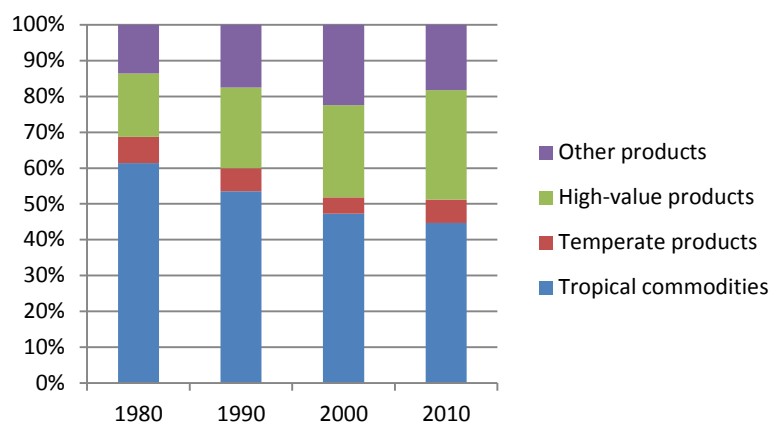
Figure 3: The importance of different product groups in total world agri-food exports, 1980 – 2010



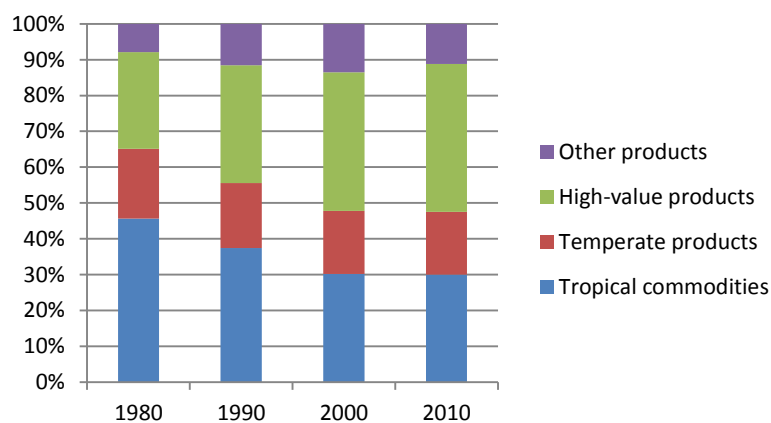
Source: Own calculations based on FAOstat (2013)

Figure 4: The importance of different product groups in total agri-food exports for different regions, 1980 – 2010

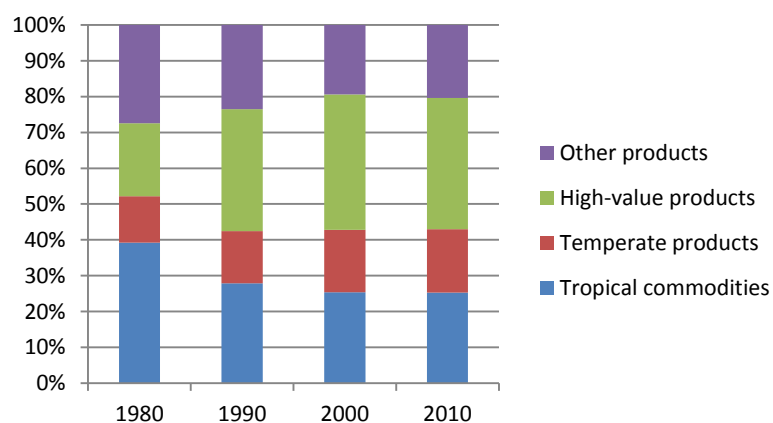
a. Africa



b. South & Southeast Asia



c. Latin America & Caribbean



Source: Own calculations based on FAOstat (2013)

Figure 5: Number of new SPS notifications to the WTO, 1995 -2011

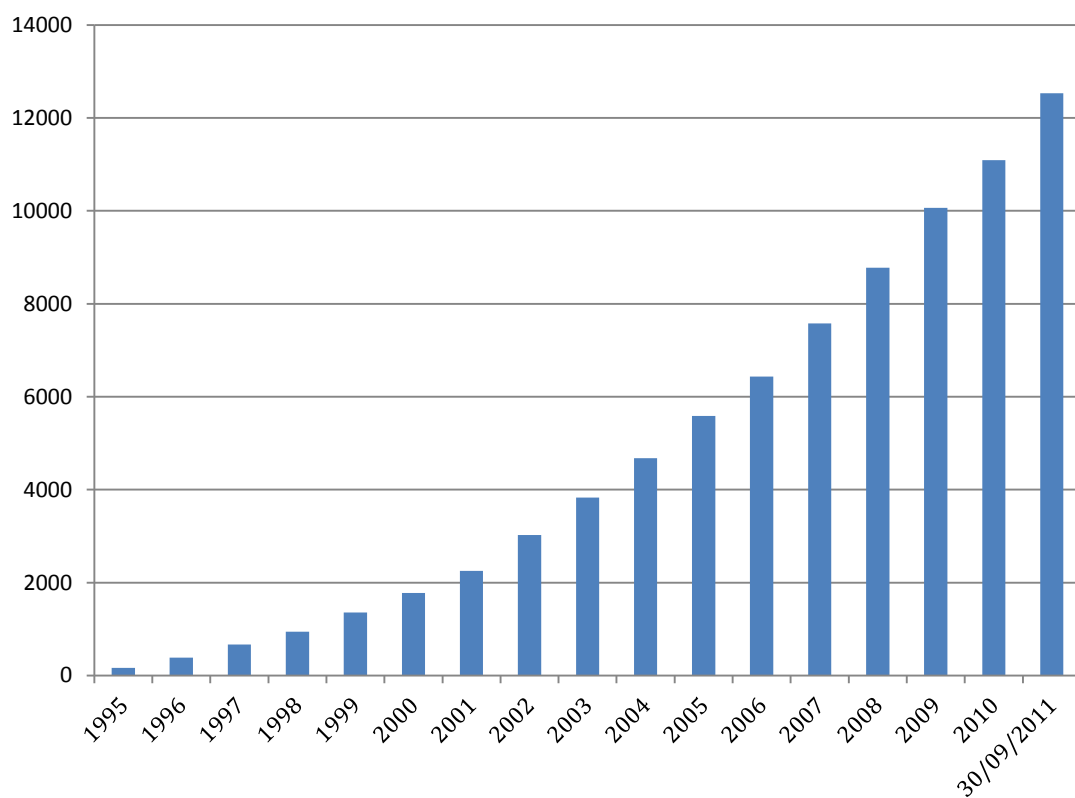
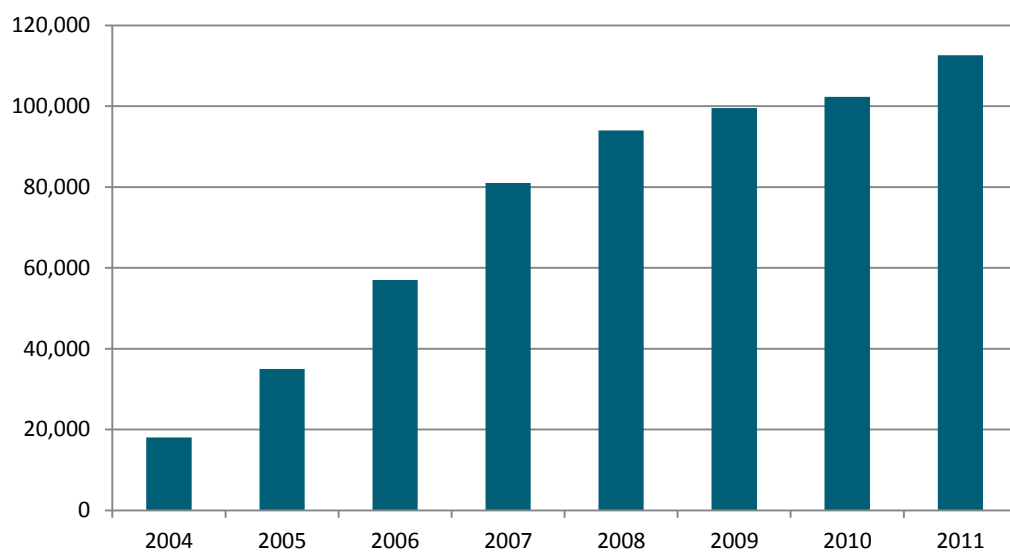
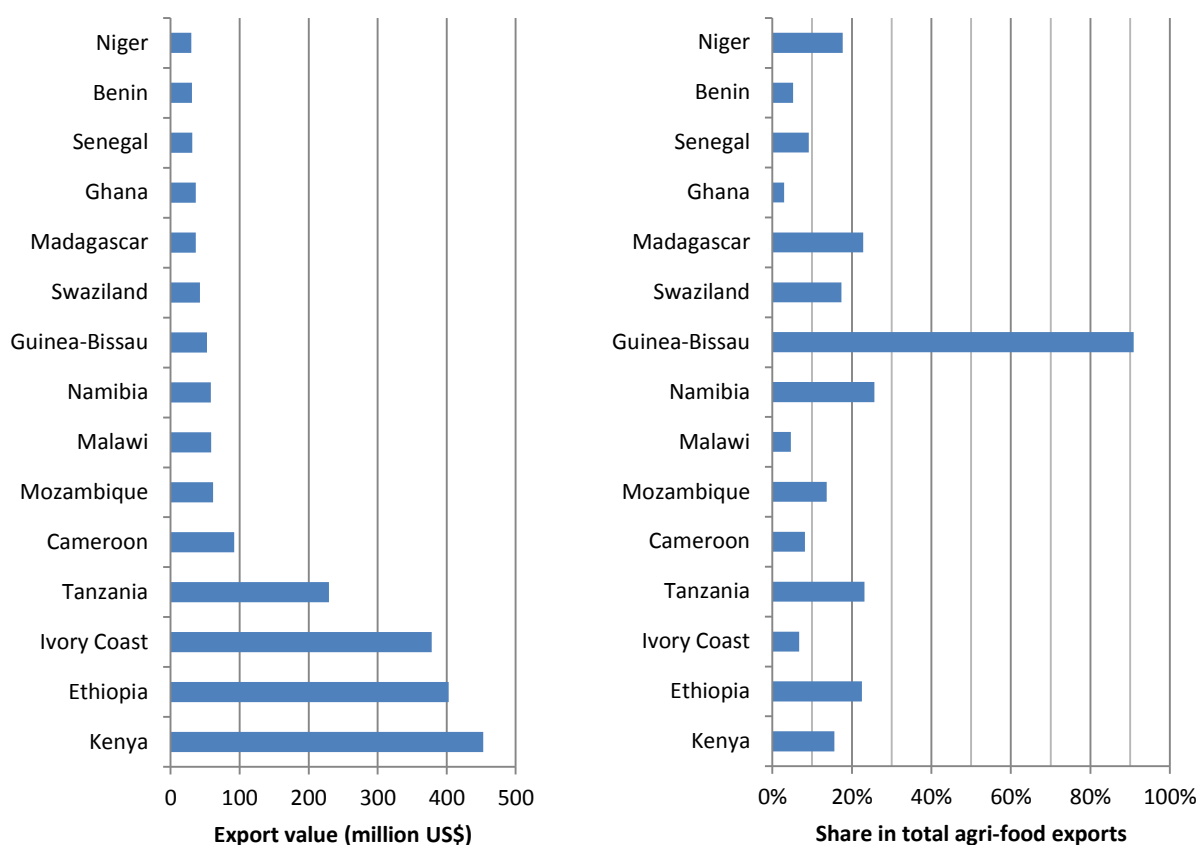


Figure 6: The number of GlobalGAP certified producers, 1994 - 2011



Source: GlobalGAP (2011)

Figure 6: Top 15 exporters of fruits and vegetables from Sub-Saharan Africa (2010)



Source: Own calculations based on FAOstat (2013)