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INVESTIGATING THE IMPACT OF HEALTH
AND ENVIRONMENTAL STANDARDS
ON EXPORTS: THE CASE OF EGYPTIAN
AGRO-FOOD EXPORTS TO THE EU

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Working Paper No. 0707

**INVESTIGATING THE IMPACT OF HEALTH AND
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OF EGYPTIAN AGRO-FOOD EXPORTS TO THE EU**

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Abstract

This study aims at assessing the impact of EU Health and Environment (H&E) standards on Egyptian agro-food exports. Two objectives were addressed, namely: understanding the extent to which agro-food exports to the EU are subject to H&E trade barriers and investigating the impact of H&E standards imposed by the EU on export performance of Egyptian firms in the agro-food sector. The results of the survey were analyzed descriptively and quantitatively. The study showed that a considerable percentage of agro-food exports to the EU are subject to SPS restrictions in terms of the frequency ratio of detentions and the percentage of the value of total agro-food exports to the EU. Nevertheless, the conventional general argument that H&E standards impede trade and are consequently a disguised form of NTBs, can not be simply accepted. The findings of the econometric analysis showed that H&E standards exert a significant positive effect on export performance of firms. Both awareness of firms in terms of complying with H&E standards and costs of compliance as well as importing market restrictions related to H&E standards had a significant positive impact on the export performance of the firms in the sample. Nevertheless, many domestic and external institutional constraints exist that deprive exporters from achieving optimum benefits from compliance.

ملخص

كانت تهدف الدراسة إلى تقييم تأثير معايير الصحة والبيئية للاتحاد الأوروبي على مصدرات الأكلات الزراعية المصرية. وتم تحديد هدفين وهما: فهم إلى أي مدى تتعرض مصدرات الأكلات الزراعية للاتحاد الأوروبي إلى حدود التجارة المتعلقة بالصحة والمعايير البيئية والبحث في تأثير معايير الصحة والبيئة التي يفرضها الاتحاد الأوروبي على أداء التصدير في الشركات المصرية التي تعمل في قطاع الأكلات الزراعية. أوضحت الدراسة بأن نسبة ملحوظة من مصدرات الأكلات الزراعية للاتحاد الأوروبي تتعرض إلى قيود من حيث تردد معدل الحجوزات ونسبة قيمة إجمالي مصدرات الأكلات الزراعية إلى الاتحاد الأوروبي. على الرغم من ذلك، فإن المناقشة العامة والتقليدية بأن معايير الصحة والبيئة تعرقل التجارة وبالتالي تعد شكلا متخفيا و ليست مقبولة. فلقد أوضحت نتائج التحليل القياسي الاقتصادي بأن معايير الصحة والبيئة تحقق تأثيرا إيجابيا وملحوظا في أداء الشركات في التصدير. إن وعي الشركات من حيث الامتثال لمعايير الصحة والبيئة وتكاليف هذا التطبيق بالإضافة إلى استيراد قيود السوق التي تتعلق بمقاييس الصحة والبيئة كان له تأثيرا إيجابيا ملحوظا على أداء التصدير في الشركات. بالرغم من ذلك، توجد قيود مؤسسية خارجية ومحلية تمنع المصدرين من تحقيق أعلي المكاسب من هذا الامتثال

Section One: Introduction

The proliferation and increased stringency of health and environmental (H&E) standards and their impact on trade has received considerable attention from exporters, regulators and trade negotiators. Several reasons were behind the increasing importance of such issues. These included the increasing concern about traditional food safety issues like microbiological contamination and pesticides residues as well as the high frequency of new potential health hazards associated with food consumption like the avian flu, and Bovine Spongiform Encephalopathy (BSE) disease which in turn raised the level of concern among consumers and governments especially in developed countries. This has been complemented by the increasing role played by environmental NGOs and lobbies, and the usage of such measures in some cases as non-tariff barriers (NTBs) replacing tariffs and quotas. The OECD has estimated that up to 80 % of all the world trade is affected by standards (Hufbauer et al, 2001). It has also been estimated that over 60 % of US exports are subject to health and safety standards (Wilson, 2002). Moreover, Fontagne et al (2001) found out that half of the world trade is potentially affected by H&E trade barriers. They further estimated that about 40% of the exports of least developed countries are subject to such barriers. Such wide coverage of standards and their increasing stringency have triggered great amounts of concern among developing countries, which still lack the capability to comply with standards set by developed countries and/or cannot formulate their own.

In view of the above, H&E characteristics of products and production processes became recently an important criterion upon which standards and regulations are based. They are increasingly becoming a factor influencing product quality, international competitiveness and consumers purchasing decisions. Such requirements can be deliberately or unintentionally used as a tool of protectionism. Unlike other technical standards and regulations, H&E requirements are less transparent and have a dynamic nature. They address various stages of the life cycle of a product starting from the products characteristics per se, the process and production method, till post-product stages like packaging and recycling. They are also diverse, in many instances an exporter could be faced by a wide set of those requirements that can be imposed at international, regional and national levels. This special nature of standards puts exporters in developing countries in a challenging situation (Abdel-Latif, 2000). As a result, their impact on market access and competitiveness of developing countries' environmentally sensitive exports has been at the forefront of policy debates.

The growing number of H&E related disputes and counter notifications raised by developing countries under the auspices of the WTO reflect the potentially impeding effect of such measures on their exports. The majority of disputes and counter notifications have been concentrated in food products especially fruits and vegetables. While the US, among developed countries, was the most frequently accused member in H&E related disputes, the EU was the most common member against which trade concerns or counter notifications have been raised. The trade disruptive effect of these measures is also gauged by the rising incidences of border detentions. For example there has been a large increase in the number of detentions for products entering the EU where the number of border rejections registered under the Rapid Alert System for Food and Feed (RASFF) increased more than five fold in 2004 (2588) compared to 2000 (473).

Focusing on the Euro-Mediterranean region, concerns about the effects of H&E policies on exports have been increasing as Partnership Agreements with the European Union (EU) are negotiated and completed. The EU proposed model for regional integration with a large set of developing countries has included some elements of deep integration such as the competition policy and intellectual property rights' laws and regulations to be adopted by their developing partners. Nevertheless, the situation is different as far as standards in general and H&E

standards in specific are concerned. Technical cooperation and capacity building for protecting and preserving the environment and upgrading standards and conformity assessment related institutions are the basic issues that those agreements focused on from this perspective. Moreover, EU-Med agreements include provisions calling for streamlining standards and lowering the heterogeneity of standards and conformity assessment procedures among its members. However, no clear programs or dates exist for implementing such goals. Thus, the EU-Med agreements are rather relatively vague as far as standards setting and adoption are concerned.

The study attempts to assess the impact of foreign H&E standards on trade from a developing country perspective, taking Egyptian agro-food exports to the EU as the main framework of analysis. A relatively limited number of studies tried to assess the impact of H&E standards on Egyptian exports, moreover, none addressed the impact on agro-food exports in spite of the high relevance of the subject to this sector, nor attempted to test the impact quantitatively.

Egypt's main trading partner is the EU, ranked as the first market, accounting for about 45% of total exports and the second market importing agro-food products accounting for 30%, and 22% of agricultural and processed food exports respectively in 2004 (MOFTI, 2005). The EU is a good example of a developed country/entity which imposes relatively strict H&E standards that can be either legitimate or act as a non-tariff barrier. The increasing strictness of the EU from this perspective can be attributed to the on-going process of harmonization of H&E regulations within the Community which has often resulted in the adoption of highly stringent standards compared to international guidelines. This is augmented by the fact that the EU has more frequently applied the 'precautionary principle'¹ when adopting certain standards which initiated a number of debates over the scientific basis for these measures (Jaffee and Henson, 2004). All such factors contribute to the choice of Egypt in its trade relations with the EU as a proxy for the developing- developed countries trade relations and the potential frictions likely to arise when H&E are brought into the scene.

The objective of the study is twofold. *First*, to understand the extent to which agro-food exports to the EU are subject to H&E trade barriers. *Second*, to investigate the impact that H&E standards imposed by the EU could exert on the export performance of Egyptian firms in the agro-food sector.

To address the first objective, an inventory approach is adopted to measure the degree to which agro-food exports to the EU are subject to trade disruptive sanitary and phytosanitary (SPS) standards. This is undertaken by measuring the frequency and trade coverage ratios expressing the percentage of the number of agro-food products and the value of agro-food exports affected by EU notifications and/or detentions respectively. The second objective is tackled by analyzing the results of a firm-level survey in the agro-food sector. The survey is confined to exporters of fresh and processed fruits and vegetables knowing that these products account for 77% of Egyptian agro-food exports. To understand the impact of EU H&E standards on firms' export performance, the results of the survey are analyzed descriptively and quantitatively. Due to data limitations, the first objective addressed SPS measures whereas the field survey covered environmental as well as SPS measures.

The study is divided into five main sections, in addition to the introduction. Section two provides a brief review of the studies existing in the literature that address the impact of standards on trade. Section three outlines the status and challenges facing the agro-food sector in Egypt. The extent to which Egyptian agro-food exports are subject to sanitary and

¹ The EU has integrated the precautionary principle into the new food law which allows for restricting trade whenever a potential health risk exists that is not strongly supported by sound scientific evidence (World Bank, 2005).

phytosanitary trade constraints is measured in section four. The descriptive and quantitative results of the field survey are presented in section five. Section six concludes the study and provides some policy implications.

Section Two: Review of Previous Studies

Standards have a multifaceted nature. The rationale justifying the need for standards involves positive and negative purposes. On the one hand, standards are basically needed to overcome market shortages in the form of production and consumption negative externalities. Standards allow for better provision of public goods like environmental protection, health and safety which markets fail to provide their optimal amounts. In addition, they have many positive spillover effects in the form of technology diffusion, inducing innovation, promoting network industries, enhancing economies of scale, and facilitating transaction. On the other hand, the need for standards could be driven by political economy incentives. According to this view, the regulatory process is regarded to be captured by interest of domestic groups who seek a higher degree of protection and limit foreign competition. Such groups could successfully lobby for the imposition of specific standards and regulations that are not necessarily based on legitimate reasons. Advocates of this stream of thought suggest that domestic regulations, among which are H&E standards, can be used as a secondary means of protection especially when the country lacks the ability to affect trade through traditional trade policy measures (Ederington and Minier, 2003).

Economic literature has been inconclusive regarding the impact of standards in general and of H&E standards in specific on trade. Within the theoretical literature, a number of arguments were raised that viewed standards to be a source of competitive advantage for the complying firm or country, or a source of a competitive disadvantage either for domestic producers due to the relatively high cost they have to bear or for foreign firms if standards encompassed a degree of “regulatory capture” to protect domestic industries from foreign competition (Swann and Shurmer, 1996). For each of those arguments the empirical literature is neither supportive nor dismissive. In general, the impact of H&E measures in importing countries on imports and exports ranged from being significantly negative, significantly positive to non significant at all. The impact differed significantly according to the methodology adopted, the means by which the stringency of the standard was measured, the sector and the product under study.

In general, methodologies that have been used to assess the impact of standards on trade, from macro and micro perspectives, can be classified into six categories: inventory approach, partial equilibrium models, general equilibrium models, surveys, case studies and econometric methods. Econometric methods, in turn, could employ international trade or gravity models to assess the impact on trade flows and econometric estimation of the cost function to assess the impact on cost of production.

Studies employing the inventory approach, like Fontagne et al. (2003) and Ghoneim et al (2005) revealed that significant percentages of exports are subject to H&E standards which showed the importance of standards as trade barriers. Studies which employed partial equilibrium analysis, focused on estimating tariff rate equivalents for standards (Krissoff et al., 1997 and Hooker and Caswell, 1999), analyzing the impact of standards on welfare (Thilmany and Barret, 1997) and on trade flows (Larson et al., 2002). Although partial equilibrium models illustrated that standards are trade restricting factors in many cases, they revealed an ambiguous impact on welfare, where they have a positive effect in the form of reducing the negative production externality and enhancing consumers’ confidence in products’ quality and at the same time they have a negative side effect as a result of their trade restricting effect (Iacovone, 2005). Some studies (Larson et al., 2002; HIID, 2002) showed that the impact of environmental standards on trade is contingent on several factors.

In particular, the impact of environmental policy changes on production and exports would be relatively considerable; the larger the share of regulated inputs in total costs, the larger the input cost change as a result of regulatory change, the higher the supply response and domestic and export demand elasticities, and the lower the possibility of efficiency improvements.

Trade models were mostly concerned with examining the impact of domestic environmental measures on competitiveness of exports (competitive disadvantage argument). Two main studies were found under this type of econometric models, namely Tobey (1990) and Wilson et al. (2002). Both reached contradicting results. Tobey (1990) found no relation between strictness of environmental measures and export competitiveness, whereas Wilson et al. (2002) indicated a significantly negative impact of environmental standards on exports supporting the competitive disadvantage argument.

Gravity models tested mainly two hypotheses, the negative impact of domestic environmental standards on exports representing the competitive disadvantage argument, and the negative impact of environmental standards on imports representing the non-tariff barrier argument. Studies have reached divergent results ranging from a significantly negative impact on exports to a totally insignificant type of relation. The outcomes were shown to be highly sensitive to model specification and definition of environmental standard stringency variable. The results did not only vary across sectors, but also within single sectors across various types of product (Van Beers and Van den Bergh, 1997; Van Beers and Van den Bergh, 2003; Moenius, 1999).

Regarding micro-level studies, most of the surveys did not arrive at common concrete conclusions concerning the impact of standards and regulations on trade. This is partially due to different scopes of each survey and probably due to the subjective nature of responses which could differ from a sector to the other and even among firms within the same sector. However, some general conclusions could be grasped. For example, conformity assessment procedures entailing unnecessary and discriminatory testing and certification were identified as the most impeding factor related to trade as far as standards are concerned (Maskus et al., 2001; OECD, 2000). Moreover, environmental standards, in a strict sense, were perceived in most cases to have a minimal impeding effect on trade (Roberts et al., 1999; Maskus et al., 2005; Verbruggen et al., 1998).

As far as the Egyptian case is concerned, it appears that the surveys undertaken to study the impact of H&E standards on trade are relatively scarce when compared to the increasing importance of the issue. Abdel-Latif and Nugent (1999), Abdel-Latif (2000), and HIID (2002) have addressed the issue by interviewing firms in the industries under study. None of these surveys addressed the impact of foreign standards on food sector exports in spite of the high relevance of the subject to this sector. Moreover, the reviewed studies adopted only a descriptive analysis of the results and none of them attempted to test the impact quantitatively. Two of the reviewed studies showed that foreign environmental regulations did not have a serious negative impact on Egyptian leather and textile exports, though they did not ignore the potential threat. Some of the reviewed studies also revealed that the low enforcement of domestic standards and the low efficiency of standard institutions in Egypt act as a serious impediment to exports.

Most of the case studies underpinned the negative impact of standards on trade. They illustrated the major restrictions and constraints that firms and industries face and the relatively substantial cost that they have to entail in order to meet such standards. Case studies aimed at estimating cost of meeting SPS standards imposed by developed countries. In most of the studies cost of compliance covered the cost of upgrading production facilities and laboratories and the cost of acquiring the measure. Some of the studies extended the

analysis to estimate the loss in exports due to non-compliance with SPS standards (Henson et al., 2000; Herath, 2001). Both cost of complying with SPS standards and the loss in exports due to non-compliance were found to be significant in most of the studies.

Hence, it is suffice to say that theoretical and empirical literature has not reached a clear cut conclusion regarding the impact of standards on trade. Many variables play a significant role in reaching results including the methodologies applied, the scope of the study and measurement of the standard stringency variable.

Section Three: Agro-Food Sector: An Overview

The agro-food sector can be regarded as a sector that encompasses two sub-sectors: agricultural products and processed food. The importance of each is discussed in turn. The agricultural sector accounts for 16% of Egypt's GDP², 29%³ of the workforce and contributes an average of 21% of non-oil exports⁴. The sector witnessed several reforms which resulted in a significant increase in the cultivated area (UNDP, 2005).

Problems with respect to H&E standards may occur due to employing outdated land preparation, planting, irrigation, insect control, and harvesting techniques (UNDP, 2005). Moreover, the number of large managed farms is very limited. They are estimated to account, for about 2.5-3% of exported volumes of agricultural products (ECORYS-NEI, 2004). Compared to other countries, like Morocco, Tunisia and Turkey, Egypt has a much lower availability of arable land. In addition, it suffers from relatively low labor productivity, measured by the value added per worker, in comparison with other competitor (Mediterranean EU non-member countries) countries. Availability of water and the steadily increasing population are other challenging factors constraining agricultural development in Egypt.

Agriculture suffers also from the extensive use of chemical fertilizers. The usage of chemical fertilizers increased significantly after the foundation of the high dam which deprived the soil from natural fertilizers. It is worth mentioning that there is a significant discrepancy between the rates of fertilizers application in Egypt compared to developed countries. For example in 1995, the rate of fertilizer usage in Spain and Italy reached 1330.509 and 2199.686 grams per hectare respectively, compared to 3998.58 in Egypt (World Bank, 2003). This reveals significant divergence between agricultural practices in Egypt and the EU. Regarding pesticides, there are a number of regulations governing their registration, application and trading. Most of the pesticides maximum residue limits (MRLs) are based on those recommended by the CODEX guidelines. Nevertheless, agriculture in Egypt still suffers from negative practices regarding application and trading of pesticides. This is exacerbated by the weak inspection and monitoring from the relevant authorities. This covers testing for MRLs in products directed to domestic market, regulating their trading, and checking if producers abide to safety periods (period between applying the pesticide and harvesting) before products are released in the market. Unaware practices and illiteracy among small producers lead to excessive usage which could reach spraying each crop up to ten times. Moreover, in many cases spraying is done in an unscientific way (Elzemeity, 1995). It has been documented in the study of Elzemeity (1995) that about 55% of the used pesticide affects the surrounding environment and does not reach the targeted crop.

² The figure applies for the year 2002/03 (CAPMAS, 2004)

³ The figure applies to the year 1998 (World Bank, 2003)

⁴ The figure applies to the period 2000-2004 (Ministry of Foreign Trade and Industry (MOFTI), 2005).

Nevertheless, official data shows significant decrease in the importation of pesticides by an annual average rate of -2% during 1996 till 2004 as well as decrease in their consumption where it was 24 thousand tons in 1982 and reached 4 thousand tons in 2004 (FAOSTAT, 2005; UNDP, 2005). Parallel to the ongoing move of forming large managed farms, the H&E awareness of firms working in this field has been increasing. As registered by an NGO for horticultural producers in Egypt, about 145 farms of its 420 members are applying H&E standards that have been recently demanded in the EU⁵ on a voluntary basis, however they are essential for EU market access.

Although Egypt is a net food importer, the food processing sector is a vital sector in the economy. The food sector is classified as a dynamic one as it experienced the highest average annual growth rate of value added compared to other industrial sectors reaching 7% during 1992-2002. This figure also exceeds the average growth rate in the Middle East region (ECORYS-NEI, 2004). Total output of the sector experienced the highest annual growth rate in the year 2000. The average annual growth rate of its output from 1995/96 to 2002/03 was one of the highest among manufacturing industries exceeding the average growth rate of the manufacturing sector production. Moreover, the share of processed food in total manufacturing remained the highest among all manufacturing industries during 1995/96 till 2002/03 (CAPMAS, 2004). In 1990 and 1997, the food processing industry ranked second after textiles in employment levels (18.9%, 18.2% of total manufacturing employment respectively). Nevertheless, Egypt suffers from a huge food deficit compared to its main competitors in the region like Turkey, Tunisia and Morocco.

An Association Agreement was signed with the EU in 2001 and entered into force in 2004. Although the Agreement carried a new view of the EU-Egyptian relationship having a reciprocal nature and covering a wider range of cooperation fields, it did not provide a remarkable change in the market access conditions for the Egyptian products. Forming a free trade area is the basis of the Agreement denoting the removal of all trade barriers over a transitional period of twelve years from the date the agreement enters into force. For industrial products the agreement called for gradual elimination of tariffs (MOFT, 2000).

Agricultural and processed food exports are governed by complex trade laws with the EU. For some products the EU has instituted seasonal windows which allow imports of certain crops at more favorable tariff rates than at other times of the year. Other products are subject to minimum entry prices. Guided by the agricultural policy in the EU, agricultural products under the association agreement will remain governed by the former General Cooperation Agreement facing the same constraints with the exception of expanding quotas for very few products and extending the seasonal window for others⁶ (Nathan Associates, 1999).

For processed food, the EU prepared three lists. The first list includes immediate abolishment of tariffs and with no quantitative restrictions. The second list includes products where its industrial part will be subject to a zero tariff rate, but not its agricultural component. The third list includes products where its industrial part will be subject to a zero tariff rate and its agricultural component will be subject to extra 30% tariff reduction, however under a certain annual quota. Moreover, the EU has currently expanded to include 25 members and there is potential for other coming waves of enlargement. With each enlargement, a side agreement is signed with Egypt to increase the quota allowed for Egypt in the EU market regarding its agricultural and processed agricultural exports (Ghoneim et al., 2006).

⁵ 105 are applying the EUREPGAP and 40 are applying HACCP (interview with HEIA NGO).

⁶ A further complication to the issue is that frozen agricultural products are treated as fresh products and are subject to similar restrictions (Nathan Associates, 1999).

Several factors exist that could represent challenges or opportunities for Egyptian agro-food exports as far as standards are concerned:

- The structure of both sectors being dominated by small scale producers would present a constraint to comply with H&E measures that need high technical and financial facilities that could be beyond their capabilities. Nevertheless, there is a recent trend of organizing agricultural production in large scale managed farms which have high potential to improve control on quality and health conditions compared to smaller producers, and facilitates cooperation between food processors and agricultural producers. Further, this structure would also facilitate complying with traceability requirements.
- Labor in both sectors suffers from relatively low productivity compared to other competitor countries in the region. Nevertheless, wages in those sectors are the lowest compared to other competitor countries in the region. Moreover, the agro-food industry in Egypt is the least among all manufacturing industries which suffers from anti-export bias.
- Negative practices prevail in the agricultural sector that could further constrain the ability to comply with H&E standards. This is evident in the intensive use of chemical fertilizers and pesticides and the very weak monitoring and inspection from relevant government authorities. Nevertheless, consumption and importation rates for both are experiencing a recent decreasing trend.
- The structure of a fresh and processed food exporting sector could facilitate compliance with foreign H&E standards where it is dominated by large exporters having a direct link with importers and having higher technical and financial facilities needed for compliance. If this was accompanied by an efficient vertical integration with small scale agro-food producers who are also willing to improve their production methods, this would significantly help in upgrading their quality and increasing their contribution to exports.
- In terms of revealed comparative advantage, share in food exports and export growth rates, Egypt has a high potential in exporting a wide number of food products. Nevertheless, this high potential is not efficiently exploited where Egypt covered its quota to the EU in a very few number of products⁷.
- Signing the EU-Egyptian Association Agreement does not carry a lot of opportunities other than what already exists. The main changes do not exceed limited expansion in quotas for some products and extend seasonal windows for others.

In spite of the weak institutional framework regulating standards in general, several efforts have been undertaken to strengthen it. The Egyptian side is moving towards harmonizing its food standards with international ones, upgrading laboratories and working on the international accreditation of its accreditation body. These are all very crucial steps to facilitate compliance with foreign H&E standards. Nevertheless, exporters are indirectly tied by a complex conformity assessment and border clearance systems. Exporters mainly suffer from inefficient sampling procedures, high testing costs, inaccurate and delayed testing results, red-tape measures, high transportation costs, and cumbersome and time consuming imported inputs clearance procedures. There were slight improvements due to the recent regulatory changes trying to streamline all conformity assessment procedures under one entity. Nevertheless, enforcement of such new decrees needs to be strengthened.

Regarding the EU, recent institutional changes are expected to affect its food imports. These changes covered both governmental regulations as well as private codes of practice. A set of regulations have been proposed aiming at performing major changes in the regulatory framework governing food safety in the EU, the most important of which is the General Food

⁷ Potatoes, dry and fresh onions and to some extent green beans showed positive performance in terms of utilizing the allowed quota where it reached 100% for the first three products and was not less than 85% for the fourth during the years 2001 and 2003 (MOFTI, 2005).

Law. It aims at building a comprehensive integrated system that intensifies food safety throughout the entire food chain. The new law calls for standards based on scientific risk assessment, but still allows for precautionary measures if scientific evidence is uncertain. It involves strengthening border inspections, the strictness of standards, and turns some H&E related codes of practice to an obligatory regulation for domestic producers (like the HACCP). The law also calls for harmonizing standards across EU member countries. In spite of that, there are significant differences in the enforcement of similar regulations. Moreover, a wide increase of private codes of standards have occurred which could be more stringent than governmental regulations. These include health, environmental, social and ethical conditions. Although they are voluntary in nature, they represent de facto standards that exporters are implicitly obliged to comply with to maintain exporting to the EU. This is partly forced on exporters by importers who prefer dealing with complying firms and by the fierce competition from other competitors who complied with such measures. The institutional framework in the EU is getting more complex in terms of entailing several requirements but on the other hand there is a move towards harmonization. Thus, the demanding and dynamic nature of European H&E standards is a major challenge that faces exporters to the EU especially from developing countries (World Bank, 2005).

Section Four: Subjectivity of Agro-Food Exports to SPS Trade Constraints

To understand the extent to which H&E standards constitute trade barriers to Egyptian food exports, an unexplored data base was utilized, namely the Rapid Alert System for Food and Feed (RASFF). The RASFF is a database compiled by the EU covering notifications enclosing information related to the actual and/or potential existence of serious direct or indirect risk to human health through the entrance of food or feed products in the EU market. It was established in 2002 according to the EC Regulation No. 178/2002 with the aim of providing the control authorities with an effective tool for exchange of information on measures taken to ensure food safety. From this database one can obtain information on the number of notifications, the country which notified the system (origin of notification/measure), the countries involved (origin of the product), the products, and the identified risk. Since this database compiles those notifications of measures that restrict access to the market on the grounds of protecting human health, it adopts the same concept like notifications under WTO where members are obliged to notify any measure when it is believed to have an impact on trade.

The inventory approach was employed to identify the extent to which Egyptian food exports are subject to restrictions by SPS measures. The potentially trade restrictive measures imposed by the EU are identified by combining data from weekly reports of RASFF and monthly phytosanitary interceptions as published by the government of the United Kingdom (UK) (Department for Environment, Food and Rural Affairs (DEFRA)). Two reasons justify the use of those two data sources. First, both are fairly transparent and one can get a lot of useful information, specifically about the measures, the country imposing the measures, and most importantly the product affected. Second, measures covered by both databases most probably fall in the set of measures that could be classified as non-tariff barriers as both focus on problematic measures for exporting countries. The main focus is on those measures due to which Egyptian exports faced problems in accessing the EU market.

Weekly reports of the RASFF system were reviewed and cases where Egypt was the country of origin for the product were registered. This was available partly for the year 2003, which was only available since the 22nd week and fully for 2004 and 2005. About 35 and 25 notifications against products originating from Egypt due to sanitary related reasons were found in 2004 and 2005 respectively. According to the database provided by DEFRA, Egypt faced 14 and 17 interceptions due to phytosanitary reasons in 2004 and 2005 respectively.

Figure (1) shows the main categories of products facing restrictions in accessing the EU in 2004. Fruits and vegetables as well as groundnuts had the highest frequency. Figure (2) shows the main reasons for such restrictions, which were mainly confined to mycotoxins in the form of high levels of aflatoxins, followed by phytosanitary deficiencies in the form of brown rot disease or insufficient phytosanitary certificates and chemical contamination in the form of high pesticides residue levels and the use of unauthorized colors (Sudan 1 and Sudan 4). Phytosanitary reasons had a higher weight regarding the refusal of fruits and vegetables followed by chemical contamination.

Frequency measure was calculated for the years 2004 and 2005. It was calculated as the ratio of the number of affected products or the number of detentions to the total number of food products that Egypt exports to the EU. This measure would reflect the incidence of detentions and the extent to which they would affect food exports. Coverage ratio was calculated for the year 2004 as the value of food exports of those products that appeared in the list of products that have been subject to notifications and restrictions as a percentage of total value of Egyptian food exports to the EU. Both measures indicate to what extent health and phytosanitary restrictions can present a problem to Egyptian food exports. Data on detained or restricted products was matched with trade data using harmonized system (HS) classification. Computing the measures for products on a highly aggregated level would include some unaffected products and thus overestimate the percentage of exported products and trade value restricted by detentions. To avoid obtaining biased results, measures were calculated on 4 and 6 digit level. In the same manner like Ghoneim et al. (2005)⁸, a lower limit at HS 4 digit level and upper limit at HS 6 digit level for the measures were computed. The definition of agro-food products adopted in measuring those indicators covered all fresh agricultural and processed food products including spices and beverages. Table (1) shows the compiled data of restricted products, reasons for restriction and the number of times in which those products faced restrictions in accessing the EU market.

The frequency measure ranged from a lower limit of 7% to an upper limit of 10% of total agro-food exports for the year 2004. Since a higher number of products were affected in the year 2005, the frequency measure increased to lie between 7% and 12%. This frequency measure counts for the number of products affected and ignores the number of times by which each product was restricted. Ignoring this would underestimate the potential trade disturbing effect of problematic health and phytosanitary measures. To take into account the number of detentions that each product faced, the frequency of detentions was measured, where the number of detentions or restrictions that products faced during the year was divided by the total number of food products Egypt exports to the EU. According to this measure, the percentage of potentially affected products within agro-food exports increased to a range from 29% at 6-digit level and 54% at 4-digit level in 2004. As evident from Table (2), the measure was higher in 2004 due to the higher number of detentions in this year. Coverage ratio was calculated by dividing the value of affected food exports by the value of total agro-food exports. The measure ranged from 36% to 45%.

As Ghoneim et al. (2005) and OECD (2003) mentioned, inventory measures do not assess the quantitative impact of standards but rather they indicate how much trade is potentially affected by standards due to which Egyptian food products faced problems and restrictions in accessing the EU. Thus, the measures serve as indicators pinpointing the extent of the

⁸ They applied the same methodology using the data about counter-notifications raised against the EU in the WTO.

problem. It must be noted that those calculations do not take into account environmental standards due to the unavailability of a comparable database. They also account only for the actual impact of restrictions imposed by the EU for reasons related to food safety and plant health protection, rather than potential impact. Incorporating the potential impact by capturing the trade counter-notifications rose around problematic standards and the potentially affected products would increase the values of the frequency and trade coverage indicators. Consequently, the measures could still be considered to be downwardly biased.

Section Five: Field Survey

In 2004/2005 a survey was conducted by undertaking structured interviews with fresh and processed fruits and vegetables exporters. The survey aimed at extracting detailed information regarding compliance with H&E standards imposed by importing countries and their impact on the ability to export. The survey results were complemented by interviews with government officials.

The main indicators that were used to assess the impact of H&E standards on firms' export performance were: degree of awareness, cost of compliance, degree of exposure to market access restrictions due to non-compliance with such measures, and the relative weight of the measures within export impediments.

The sample covered 34 firms in the food sector, 13 of which produce and export fresh products, 15 produce and export processed food and 6 are engaged in both types of products. Firms were classified according to the number of employees and workers into small with less than 99, medium with more than 100 and less than 999 and large with more than 1000 workers and employees. According to this classification, 35% of the sample is small, 42.5% medium, and 22.5% large firms.

Regarding the type of sector to which the firms belong, 87.5% (35 firms) of the sample belonged to the private sector, 5% (2 firms) were public companies, 5% (2 firms) joint venture and 2.5% (1 firm) multinational. The sample was biased to represent exporters especially those having one or more of the EU-member countries as their destination. All surveyed firms are exporters, though with different intensities.

As previously mentioned, the exporting market is highly concentrated where a limited number of large exporters account for the majority of exports. The sample replicated this structure. For example, the sample included three main potato exporters in Egypt, two large producers and one large exporting agent. The latter exported 40% of total Egyptian exports of potatoes. From this perspective the sample could be considered to be quite representative. According to the firms database provided by the Federation of Egyptian Industries, the contribution of medium and large exporters in the food sector is about 58% of the total population of food exporters⁹. Thus, the sample structure, having 65% of the sample as medium and large companies, provides a good approximation to the population of fresh and processed fruits and vegetables exporters. Finally, having a sample biased towards EU exporters also replicates reality since on average 49%¹⁰ of Egyptian fruits and vegetables exports is directed to the EU (COMTRADE, 2005).

⁹ No exact figure was available for fresh and processed fruits and vegetables exporting sector.

¹⁰ This figure was calculated as an average of the percentage from total Egyptian fruits and vegetables directed to the EU during the period 1991-2003.

5.1 Descriptive Analysis

Firms' Awareness

Analysis of the survey revealed that food exporters have a relatively high degree of awareness regarding H&E measures. Similar to Abdel-Latif and Nugent (1999) and Abdel-Latif (2000), awareness was tested on a general and technical level, however, by applying different indicators from the ones they used. General level of awareness was gauged by having an entity responsible for following up and controlling issues related to H&E conditions. About 80% of the sample had some form of an entity; either a special department, a consultant or specialist. The acquisition of H&E related certificates was taken as a proxy for the technical level of awareness. This proxy confirmed that firms enjoy a relatively high level of awareness, though to a lower extent compared to the general level, where 57% of the sample acquired some type of H&E related certificate (EUREPGAP, BRC, HACCP, and Nature Choice). Awareness on both levels was positively correlated with size showing that the larger the firm the greater the tendency to have a responsible entity and to acquire H&E related certificates. The main differences were related to public companies which had a negligible level of technical awareness, EU exporters who had a higher level of technical awareness compared to their general awareness and fresh food exporters who had a higher level of technical awareness compared to processed food exporters.

*Cost of Compliance*¹¹

The survey results showed that it is difficult to arise at a clear estimate of the costs of compliance for several reasons. Among such reasons was the inability to detangle costs of compliance from other types of costs, weak bookkeeping systems, and the involvement of many inter-firm departments in the compliance process. Consequently, to overcome these difficulties, the answers were given in ranges of percentage increase in total cost of production. Cost of compliance is confined to the technical part of compliance which refers to costs related to redesigning the product or even redesigning the whole firm to be in line with the adopted measure.

The survey revealed that H&E measures have a minor impact on costs of production where 55% of the sample believed that compliance would result in increasing costs of production by less than 10%. Moreover, 32% of the firms interviewed considered the increase to be ranging from 0-5% with the majority choosing percentage increases near the bottom of this range. In other words, a 5% is considered a higher bound for the costs of compliance as a percentage of total costs of production. Firms who gave higher estimates were mostly private, fresh food, small and EU exporters. Being an EU exporter or not was the only variable which was significantly correlated with cost of compliance. Positive correlation, though very weak, was found between the two variables implying that EU exporters are more likely to face higher costs of compliance with H&E measures.

Most Problematic Issues Regarding Compliance Process

The survey highlighted the most problematic area in compliance with H&E measures. The majority of firms regarded complying with standards per se to be not the real problem but rather conformity assessment. This involved several issues, most important of which are:

- Low sensitivity of testing and analysis equipments which have often resulted in discrepancies between the results of tests performed by importers/border inspection

¹¹ The questionnaire focused on five measures which were frequently raised by firms during the pilot survey, namely; aflatoxin, pesticides MRLs, traceability, EUREPGAP and HACCP.

(especially in EU and US) and those done by the local accredited laboratory. This discrepancy reached a margin of 100% difference for pesticides in some cases of fresh products. This drawback applied also to other microbiological analysis such as salmonella, aflatoxins (especially for herbs and spices), total plate count, enterobacteria, yeast and molds.

- Lack of accredited highly qualified laboratories is perceived by many exporters to be a problem as far as standards are concerned. For food in general, only one accredited laboratory exists in Egypt which is that affiliated to the Ministry of Agriculture and Land Reclamation (MALR), the Central Laboratory for Pesticides Residues and Heavy Metals. The laboratory is accredited by the Finnish National Accreditation Service.

Such difficulties, besides the lack of trust of the importer in the tests done by the exporter himself or by a domestic official agency, drove many exporters to resort to second party conformity assessment. In this case the importer performs all needed testing and analysis. This subjects exporters to higher costs of testing, to higher price deductions and to be more prone to the moral hazard problem, in the form of unjustified claims and price deductions, from the importers' side. Opposing the common belief that information is a highly restrictive factor, the survey showed that it is the least problematic element of compliance.

Domestic versus Foreign H&E Measures

According to the survey, domestic H&E measures were not considered to be constraining exports. Institutional impediments rather than specific H&E standards were regarded to be constraining firms' ability to export to some extent. This involved the weak regulatory system governing the importation of pesticides and seeds, the unclear rationale behind standards and multiplicity of inspection agencies.

Regarding foreign H&E measures related problems, sudden changes of regulations without sufficient time to cope and the associated cost of uncertainty were regarded to be a major problem. During the time of undertaking the interviews many incidences occurred that drove exporters to identify this problem to be the major one. For example, Greece declared in February 2005 that all wooden pallets (where products are packed) must be fumigated and the decree would come into force in March 2005. Such a short period for adaptation created fear among exporters that their products would not be accepted. More importantly, many did not know how to perform this procedure. A small exporter considered the cost of this sudden change to be substantial: covering the cost of transportation, the cost of handling and stevedoring activities, and the costs of warehouse rent in addition to the nature of the product which is a perishable one. In addition to this decree, potato exporters faced other tremendous changes in regulations during the prevailing season (2004/2005). On the other hand, pesticides MRLs, followed by traceability and microbiological requirements were perceived to be the most constraining foreign H&E related measures.

Role of Different Agencies related to Standards

The survey results revealed the important role which NGOs and foreign institutions (aid donors) play in providing firms with technical and financial support to aid them in complying with H&E measures. Meanwhile, firms asserted that the governmental institutions play a negligible role from this perspective. It was also evident that there are endeavors done by exporters per se to overcome some of the related problems like the undergoing trials to establish a sterilization unit to avoid the relatively high cost entailed in sending food products to other foreign countries to be sterilized.

In line with the results of the OECD (1999) study, the survey underpinned that heterogeneous measures, among importing countries and between the importing countries and Egypt, have minimal negative effect on exports:

Among importing countries: As a response to differences in standards across importing countries, some firms mentioned that they follow the strictest measures. Wilson et al. (2000) differentiated between two ways of adjusting to different standards: to establish a costly platform and adopt foreign standards with implementing minimal modifications to suit the specifications of different markets or to initially follow the domestic market standards and entail huge costs to export. According to this classification, most of the surveyed firms opted for the first option. Although the strategy of adopting stringent conditions is costly for some firms, they overcome such high costs by discriminating their prices in different markets where in some markets they sell below cost if competition was fierce and compensates for the loss by charging high prices in other markets. This strategy was adopted by small and large exporters. Only two firms mentioned that such differences affect their ability to export and has driven them to minimize the number of markets that they deal with. At the other extreme, some mentioned that this difference gives them more flexibility in finding the market that suits each producer's ability to comply. None of the respondents mentioned that they have a special line of production satisfying the needs of different markets and thus no impact on economies of scale or on costs was notified.

Between importing countries and the domestic market: there are considerable differences especially in enforcement, however none of the interviewees indicated that this gap has an adverse effect on their ability to export. Exporters indicated that they are basically guided by the importing country or the importers' specifications. This was highly evident for fresh products exporters.

Moreover, the survey revealed the weak existence of anti-export bias. Most of the firms emphasized that exporting is much more preferable for several reasons:

1. *Imported inputs and market structure*: Most of the intermediate inputs are imported and thus firms have to compensate for such high import costs which cannot be achieved only through selling in the domestic market. Another difficulty arises from the existence of fierce competition especially in the informal (grey) sector which dominates the food sector in Egypt. The informal sector produces very low quality products at very low prices. Such problems are confined to processed food sector.
2. *Transaction costs and institutional arrangements*: Most of the firms emphasized that financial problems in the domestic market were a crucial reason for export preference. Financial constraints are evident in the fresh and processed food (frozen and preserved fruits and vegetables) sector where permanent finance is needed to be able to provide the market with various products in all seasons. Payments are not guaranteed in the domestic market where cases of uncovered checks are not unusual. On the other hand, exporting is financed, only in the case of processed food, through initial down payments from the importer (25% of the total payment) in addition to payment guarantees provided by banks which does not prevail in the case of selling in the domestic market. For fresh producers, exporting does not provide such a privilege as they are paid on consignment basis i.e. they only get paid after the importer checks and tests the consignment and in some cases after selling it. Nevertheless, they still regard the domestic market to be more problematic in this regard.
3. *Domestic policies*: one of the incentives for directing output to the world market is taking advantage of the domestic privileges given to exporters. Among the policies mentioned in the survey are:
 - a) Exemption from duties through the duty drawback system, which was evaluated by most firms as being inefficient, however improving, and
 - b) Receiving governmental financial support (8% of total export value)

Regarding market preference, reasons related to standards and regulations existing in the importing market ranked fifth in a list of eight reasons,¹² showing the relatively weak role of standards in affecting firms' decisions in the choice of market. Moreover, it was evident that many exporters of fresh products, even small ones and relatively new entrants, are targeting to export to retail chains imposing relatively stringent H&E standards. Dealing with the wholesale market entails higher risks for exporters where there is no guarantee that the price they received is the real price at which the importer sold the products and that the raised claims are justifiable. From the exporters' perspective, such problems arise from the term of payments they follow with the importer, on consignment basis, which puts a higher weight on the loyalty of the importer who could pay them according to different prices than he actually sold with and no one can also raise claims without good reasons. Thus, dealing with retail chains overcomes all these drawbacks where firms enjoy more transparency, lower moral hazard problem and a higher price premium. This reveals that standards are not at the forefront of factors that would affect exporters' decisions especially when several benefits are perceived by firms even if not related to standards per se. On the other hand, it also reveals that adhering to standards has a spillover effect in terms of better market access, better negotiating position, and the ability to have a larger pool of buyers.

Severity of Standards

Results of the survey showed that 42.5% of the sample regarded H&E measures to have no significant effect on exports whereas 25% considered them to have a constraining effect on exports. This finding is in line with the results of the survey done by OECD (1999) where few of the surveyed firms regarded standards to be of great concern. 32.5% of the sample considered them as a catalyst to exports and regarded the whole issue to be a win-win game. Those in the last category regarded the benefits gained from compliance (tangible and intangible) to highly surpass the associated costs. Those who regarded H&E measures to be constraining were mainly fresh fruits and vegetables exporters, EU exporters and firms of small size. The size of the firm was the only variable which showed significant, though very weak, correlation with perception of the firms for the impact of H&E on exports. The correlation was positive indicating that small firms regard them as constraining and the larger the firm the more it considers them either to have a positive or a negligible impact on exports.

Standards' Impact on Exports' Market Access

The degree of exposure to strictness of foreign H&E measures was measured by the possibility of facing market access restrictions in the form of detentions, price discounts, and/or delays in entry. About 67.5% of the sample confirmed facing problems in accessing importing markets due to H&E measures. Cases where firms faced market access restrictions were related to the existence of high MRLs, microbiological contamination, moulds, packaging, phytosanitary measures (brown rot), aflatoxin in peanuts and sunflower seeds and labeling. The most frequently chosen reason for such restrictions was the discrepancy between the results of the testing and the analysis done in domestic laboratories and those done abroad. This was usually attributed to the insensitivity of testing equipments in the official laboratory. Again firms mostly experiencing such restrictions were fresh food, small, and EU exporters. This measure revealed that Egyptian food exporters are exposed to market access restrictions due to H&E measures. Nevertheless, most of those admitting to face

¹² These were: higher profitability in the market, low enforcement of health and quality standards in the market, the company is established for exporting, less complicated administrative procedures, personal ties and contacts, fierce competition in other markets, unhealthy business environment in domestic market, and the size of the market.

problems assured that this rarely happens. In addition, as confirmed from the econometric analysis, those facing such constraints are the most successful ones in terms of percentage to export and ability to export to the EU. These constraints could be the driving force for exporters to enhance their performance. In general, H&E measures did not represent a severe threat to food exports, where none of the exporters covered in the survey ceased exporting entirely due to an inability to comply with them.

Size was significantly negatively correlated with the probability of facing problems in accessing importing markets (the larger the firm the lower it faces problems). About 93% of small firms affirmed facing problems while 53% and 55% of each of the medium and large companies respectively did. The intensity of exporting was significantly positively correlated with the probability of facing problems (the higher the percentage they export the more likely they will face problems). About 79% of fresh food exporters faced market access problems due to H&E measures whereas 57% of processed food did. Although 73% of EU exporters faced problems in accessing the market for various reasons, being an EU exporter or not and the intensity of dependency on the EU market did not have any significant correlation with the probability of facing problems due to H&E measures.

Rank of Standards within the list of Potential Other Export Impediments

H&E measures had a relatively low weight within a list of domestic and foreign export impediments. 77.5% of the sample regarded domestic related impediments to have a stronger adverse effect on their exports compared to foreign export impediments. Within foreign export impediments complying with H&E measures came as the second restricting factor (out of four factors)¹³. Those dictated by the customer or buyer (non- mandatory measures) were recognized to be more restrictive, dynamic, and more binding than those set by the country regulations.

5.2 Econometric Analysis

This section aims at econometrically investigating if H&E standards exert an impact on export performance of Egyptian firms in the fruits and vegetables sector. The approach adopted here is based upon Ghoneim and Grote (2006). Two steps have been implemented to conduct the analysis. First, factor analysis was utilized to reduce the number of variables within the three groups representing (i) awareness, (ii) cost of compliance and market access restrictions, and (iii) domestic impediments. Consequently, a number of factors are extracted within each dimension. Second, those factors in addition to the firms' characteristics were entered as the independent variables (covariates) in regression analysis.

5.2.1 Factor Analysis

Factor analysis is usually used for two purposes, namely to understand and examine the structure of relationships among a number of variables, and to summarize the information given by those variables (Heir et al., 1998). To fulfill the second objective, a new set of a smaller number of unobserved composite variables, called factors, is generated to represent the original large number of variables. The information given by the original set of variables is retained and reflected in those limited number of variables (factors). Each factor represents a group of variables which are highly correlated but weakly correlated (or totally independent) with variables in a different group (or factor) (Johnson and Wichern, 1982).

¹³ Domestic impediments included: inspection procedures done domestically before exporting, inspection procedures done on imported inputs, problems related to export finance, duty drawback systems, and transport issues. Foreign impediments included: tariffs and quotas, meeting environmental/health regulations imposed by the importing country, meeting importers health and environmental specifications, and border inspections.

Factor analysis was thus suitable to employ in order to reduce the information given by the various variables in the questionnaire into consolidated variables expressing different dimensions. Before applying the factor analysis, variables extracted from the questionnaire were classified into three dimensions, namely: awareness, cost of compliance and market access restrictions and domestic impediments. Original variables that were incorporated under each dimension were as follows:

1. Awareness:

1. Do you have a special health/environmental inspection/control entity in your company? (1=yes, 0=no)
2. Why do you comply with H&E measures? (satisfy the client) (1=yes, 0=no)
3. Why do you comply with H&E measures? (increase competitiveness, sales, profits and/or prices) (1=yes, 0=no)
4. Do you comply with at least two of the mentioned H&E measures? (1=yes, 0=no)
5. Did you acquire any H&E certificate? (1=yes, 0=no)
6. Do you intend to acquire any H&E certificate? (1=yes, 0=no)

2. Cost of Compliance and Market Access Restrictions:

1. By how much did/would complying with H&E increase your total costs or per unit cost? (1=more than 10%, 0=otherwise)
2. Did you face any problems in exporting to any country (accessing a market) because of environmental/health regulations? (1=yes, 0=no)
3. Did you face problems due to the high cost of compliance? (1=yes, 0=no)
4. Did you face problems due to insufficient precautions in production? (1=yes, 0=no)
5. Do you face different H&E measures in different importing countries? (1=yes, 0=no)
6. Do you perceive H&E measures as constraining your exports? (1=yes, 0=no)
7. Do you consider the costs associated with compliance to be more than the benefits? (1=yes, 0=no)

3. Domestic Impediments:

1. Transportation had the first rank within export impediments? (1=yes, 0=no)
2. Domestic inspection had the first rank within export impediments? (1=yes, 0=no)
3. Inspection on imported inputs had the first rank within export impediments? (1=yes, 0=no)
4. Do domestic impediments have more weight in negatively affecting your exporting ability compared to foreign impediments? (1=yes, 0=otherwise)
5. Do you prefer the foreign market (compared to the domestic)? (1=yes, 0=no)
6. Do you consider domestic H&E measures constraining your exports? (1=yes, 0=no)

As a first step in the factor analysis, the appropriateness of using factor analysis was tested by examining the degree of inter-correlation among the variables in each dimension. This was performed by two checks:

1. The Anti-image correlation matrix, which is a matrix containing the so-called measures of sampling adequacy (MSA) on the diagonal and the off-diagonal cells measure the partial correlation coefficients among the variables. The value of the MSA should exceed 0.5 to reveal the suitability of applying factor analysis. This was satisfied for all variables under the three dimensions. Variables with lower values were excluded from the relevant dimension. In addition, the MSA was calculated for the entire matrix¹⁴ and the values exceeded 0.6 in the three cases. For awareness and domestic impediments, the value of

¹⁴ This is called Kaiser-Meyer-Olkin Measure of Sampling Adequacy.

the measure was classified as mediocre (above 0.6) and for costs of compliance and market access restrictions, the measure was classified as middling (above 0.7) (Heir et al., 1998). Individual MSA, as shown on the diagonals of the matrices exceeded 0.8 in some cases which is referred to as meritorious (excellent or marvelous).

2. The Bartlett test of sphericity: this is a statistical test for the presence of correlations among the variables. The value of this variable was highly significant in the three cases, indicating that the correlation matrices had significant correlations among the variables in each dimension. Thus, applying factor analysis was justified.

The second step included extracting the factors. This entailed applying the factor analysis *per se*. Principle component analysis was used as the extraction method¹⁵. This is a factor extraction method used to form uncorrelated linear combinations of the observed variables. The first factor forms the best summary of linear combination of the variables that accounts for the highest amount of variance in the data. Successive factors explain progressively smaller portions of the variance after the effect of the former factors have been removed. All factors are uncorrelated with each other. Identifying the number of factors was based on the latent root criterion where only those factors contributing a value of one or more to the total eigen value (sum of squared loadings for a factor) were considered significant and taken in account.

A vital step in understanding what each factor represents is the rotated component matrix. The matrix contains the factor loadings which measure the correlation between each variable and the corresponding factor. Loading values higher than 0.5 are usually considered to be significant. These reveal that a relatively high percentage of the variable's total variance is attributed to the factor. The higher the loading, the more the variable is suitable to represent the factor (Heir et al., 1998).

As previously discussed, each of the awareness and domestic impediments was believed to be covered by six variables and seven variables represented costs of compliance and market access restrictions. According to the factor analysis, two factors were extracted for each dimension, see Table (7), Table (8), and Table (9), respectively. The factors were named in accordance with the variables having high loadings (higher than 0.5) on the corresponding factor as follows:

- Factor one for awareness (Awareness_FAC1): Technical Awareness (Compliance with various H&E standards)
- Factor two for awareness (Awareness_FAC2): General Awareness and Enhancing Competitiveness.
- Factor one for costs of compliance and market access restrictions (Compliance_FAC1): Cost of Compliance.
- Factor two for costs of compliance and market access restrictions (Compliance_FAC2): Market Access Restrictions and Heterogeneous Standards.
- Factor one for domestic impediments (Domestic Impediments_FAC1): Transportation and Inspection.
- Factor two for domestic impediments (Domestic Impediments_FAC2): Domestic H&E Standards and Market preference.

5.2.2 Logistic Regression

The extracted factors for each dimension were used as the independent variables in the regression analysis. The factors within each dimension were generated using factor scores

¹⁵ For detailed information on the method see (Johnson and Wichern, 1982) and (Heir et al., 1998).

reduction technique¹⁶. Since the dependant variable, measuring export performance, is a dichotomous variable, a binary logistic regression was applied. For the purpose of the analysis, good export performance was assumed to occur when a firm exports 50% or more of its annual sales and directs 30% or more of its exports to the EU. In other words, a firm is considered to be performing well as an exporter when it highly depends on exporting and at the same time depends on the EU as a major importing market. Consequently, the dependant variable takes the value 1 whenever this occurs and the value zero otherwise.

It is assumed that export performance is a function of four groups of variables resulting from the factor analysis; awareness, costs of compliance and market access restrictions, domestic impediments, in addition to firms' characteristics. Regarding the firms' characteristics, the sample revealed many aspects, namely, the size, age since establishment, year when started to export, the sector (public/private) to which the firm belongs, export destinations and the product which the firm produces (fresh/processed). Nevertheless, only one characteristic was taken into consideration, the size of the company as indicated by the number of workers. This was due to the fact that some characteristics were not meaningful enough to include in the analysis like the sector as most of the surveyed firms belonged to the private sector. The age of the firm and the type of product showed high correlation with other independent variables and thus were excluded from the analysis.

$$ExportPerformance_i = f(AW_i, CCMR_i, DI_i, Z_i) + e_i \quad (1)$$

where:

ExportPerformance_i = export performance of firm *i* ,

AW_i = level of H&E awareness of firm *i* ,

CCMR_i = cost of compliance and market access restrictions facing firm *i* ,

DI_i = domestic export impediments as perceived by firm *i* ,

Z_i = characteristics (size) of firm *i* and

e_i = random error term.

If complying with H&E standards positively affects exports, it is expected that export performance would be positively correlated with awareness of such standards. If compliance with H&E standards is a non-tariff barrier, cost and restrictions of compliance is expected to have a negative coefficient. If compliance with H&E standards provides firms with a competitive edge and is not considered to be restricting their ability to export, it is expected to have a positive coefficient. In all cases it is expected that export performance would be negatively correlated with domestic impediments.

Table (10) shows the results of the binary logistic regression illustrating the values of coefficients, standard error, Wald test, and significance of the coefficients. Various measures of goodness of fit revealed that the model, as represented in equation (1), was capable of adequately describing the sample. For example, the Hosmer-Lemeshow¹⁷ statistic having a value higher than 0.05 illustrated that the model provides a good fit for the data. Similarly, the pseudo R squared statistics (Cox & Snell and the Nagelkerke), which are equivalent to the standard R squared statistic for binary response models measuring the variability of the

¹⁶ Factor scores are composite measures of each factor for each dimension which combines the factor loadings of all variables on a factor. There are various methods for generating factors like selecting a surrogate variables (one with highest factor loading) to be representative of the factor or calculating a summated scale which is a composite measure combining only the variables loading highly on the factor (Heir et al., 1998).

¹⁷ This is a robust goodness of fit statistic which is more suitable when many covariates are continuous and the sample size is small.

dependant variable explained by the model, revealed that the model is quite adequate. Another measure for the goodness of fit is the percent correctly predicted. The results showed that the model provided a better fit for the data when the firm performs well (*ExportPerformance*=1) where it correctly predicted 89.5% whereas 63.6% were correctly predicted when it does not (*ExportPerformance*=0). The overall percentage correctly predicted for both cases, when the dependant variable is equal to one and zero, is 80%, which again shows the appropriateness of the model. The overall percentage is a weighted average of the two former percentages with the weights being the fractions of one and zero outcomes of the dependant variable (Wooldridge, 2002).

The results showed that awareness_FAC1, compliance_FAC1 and FAC2 have significant partial effects on the firms' export performance. The sign of the coefficient of each variable was positive denoting that H&E standards in general have a positive impact on the firm's export performance. Awareness_FAC1 showed that the firms technically aware of such measures experience good performance in terms of the percentage of exports and having the EU as the export destination. The odds ratio for this variable shows that a firm is 4 times more likely to perform well as an exporter if it is more aware of H&E measures in terms of compliance.

Unlike the conventional wisdom that H&E measures form a non tariff barrier on exports, costs of compliance and market access restriction variables had a positive significant impact on export performance. Recalling that the first factor under this dimension reflected the cost of compliance, this reveals that the higher the costs a firm incurs in compliance, the better performance it will experience as an exporter. This could reflect that incurring higher costs due to compliance would entail higher benefits for the firm in the form of providing a competitive edge, better reputation and a wider client base especially in the EU. Such benefits could also extend to efficiency improvements in the firm like saving inputs and reducing wastes.

The second compliance factor, market access restrictions and heterogeneity of standards, had also a significant positive impact illustrating that firms perceiving H&E standards to be constraining, facing market access restrictions and different H&E measures across importing countries are those enjoying good export performance. The explanation for this could be that firms facing market restrictions due to reasons related to H&E measures are the ones who reacted to such constraints and tried to overcome such problems. This was consequently reflected by a better performance as an exporter. It could also be that those firms perceiving H&E as constraining are the ones that are more aware. Moreover, continuing to export despite market access restrictions means that exporting is still profitable and that such restrictions are not highly persisting, as mentioned in the descriptive part. Another justification is the positive significant correlation between the probability of facing restrictions and the intensity to export, as shown in the descriptive analysis. The results also support those of the descriptive analysis where it appeared that firms did not regard heterogeneity of H&E measures to be constraining their ability to export and even in some cases they considered that to have a positive impact on their ability to export. The odds ratios for the two compliance factors, shows that a firm is 5 and 3 times more likely to perform well as an exporter if it incurs higher costs of compliance and faces higher market restrictions due to reasons related to H&E standards respectively.

Although the two factors of domestic impediments had negative coefficients in line with the expectations, they were insignificant. For domestic impediments_FAC2, this partly supports the results obtained from the descriptive analysis where firms perceived domestic H&E standards to have a non-impeding effect on their ability to export. Size of the firm did not have a significant effect on the probability of a firm to experience good export performance.

In general, the model revealed that awareness and costs of compliance and market access restrictions exert a significant positive impact on export performance. It is worth mentioning that this result is consistent with the descriptive analysis where 32.5% of the firms regarded H&E to have positive impact on exports.

A technical note: It is worth noting that one of the variables (Do you consider the costs associated with compliance to be more than the benefits?) in the dimension representing compliance contained missing values. The previous regression was implemented by excluding these missing values, yet this resulted in decreasing the number of cases to 30 representing, 75% of the sample. Consequently, the regression exercise was repeated two times: first, with replacing the missing values by the mean; and, second by totally excluding the variable which contains the missing values. In the two cases, the first factor under the compliance dimension represented the *market access restrictions and heterogeneous standards* and the second represented *cost of compliance*. Similar to the previous regression, the measures of goodness of fit revealed that the model was capable of adequately describing the sample. The results of the two regressions were highly similar to each other and to the previous one where again the first factor of awareness (technical awareness) and the first factor for compliance (market access restrictions and heterogeneous standards) were significant (at a significance level 5%) and had positive signs. Yet, the second factor for compliance (cost of compliance) did not have any significant impact on export performance (see Tables (1 and 2) in Appendix). Those regression exercises included 38 cases representing 95% of the sample. Similarity in the results obtained showed that the model is robust.

Nevertheless, some model limitations have to be taken into consideration, such as;

1. Having a relatively small number of observations.
2. Inability to differentiate between the results for fresh and processed food exporters due to the low number of degrees of freedom.
3. Inability to include many of the firms' characteristics like age of the firm and the sector to which the firm belongs.
4. Possibility of presence of the endogeneity problem that was not accounted for. For example, the cause and effect relation between the percentage of exports and awareness is not clear.
5. Focusing only on the supply side of the problem and not capturing the demand side.
6. Lacking differentiation between the trade impact of voluntary standards and obligatory regulations. The last two points represent a drawback for the whole analysis and not only the quantitative part.

Section Six: Conclusion

By employing the inventory approach, it was evident that a considerable percentage of agro-food exports to the EU are subject to SPS restrictions in terms of the frequency ratio of detentions and the percentage of the value of total agro-food exports to the EU. Frequency and import coverage ratios revealed varying results. Frequency of affected products revealed that health and phytosanitary standards do not present a real threat to Egyptian food exports, where only an average of 8.5% and 9.5% of the total number of exported food products in 2004 and 2005 respectively were affected. Nevertheless, this measure is likely to underestimate the effect of detentions as it ignores the number of times by which products faced restrictions in accessing the EU market. Underestimating the significance of the problem is also valid due to the fact that several products were affected, yet they appeared under one product category under the harmonized system and thus were counted only once. Incorporating the number of detentions and restrictions in calculating the frequency measure increased it to reach an average of 41% and 37% in 2004 and 2005 respectively. The import

coverage ratio showed that an average of 40.5% of the value of total food exports to the EU has been affected by such restrictions in 2004.

On the other hand, the firm level survey undertaken with exporters revealed that such standards do not present a serious threat to Egyptian agro-food exports. On the contrary, H&E standards could be a factor contributing to a better export performance. This was confirmed by the descriptive and econometric analyses applied on the survey results. Although the perceptions of firms regarding the impact of standards on their ability to export differed, most firms confirmed that complying with standards is an investment that the exporter has no choice to undertake. Moreover, standards played a trivial role in affecting firms' choice of importing markets. In general, the survey showed that firms have the ability to accommodate with H&E standards and even gain from the benefits of compliance. This was revealed in absolute terms from the explicit perspective of firms to these measures where 42.5% regarded them to have no impact on their ability to export, in cost terms where 32% of the sample believed that the increase in cost would not exceed 0-5%, and in relative terms where it came at the end of a list of all impediments which is dominated by domestic factors. This finding is not in line with the results of other studies like that of Henson et al. (2000) where SPS standards were considered to be the most significant constraints on food exports to the EU compared to transportation costs and traditional trade barriers.

Descriptive results were supported by the econometric analysis which revealed a significant positive impact of such measures on Egyptian food exports. The hypothesis that export performance is affected by variables related to H&E standards is supported by the findings of the factor analysis and logistic regression. Good export performance was gauged by the percentage of exports, being higher than 50% of total sales, and market orientation, having the EU as a main importing market. It has been found that awareness in terms of compliance with H&E standards and acquisition of H&E certificates exert a positive significant effect on export performance. Similarly, cost of complying with H&E standards showed a positive significant effect on export performance. This reveals that the higher the costs a firm incurs in compliance, the better performance it will experience as an exporter. This could reflect that incurring higher costs due to compliance would entail higher benefits for the firm in the form of providing a competitive edge, better reputation and a wider client base especially in the EU. Enforcement of standards in terms of market access restrictions and heterogeneity of standards, had also a significant positive impact illustrating that firms perceiving H&E standards to be constraining, facing market access restrictions and different H&E measures across importing countries are those enjoying good export performance. In other words, those facing such constraints are the most successful ones in terms of percentage to export and ability to export to the EU. These constraints could be the driving force for exporters to enhance their performance.

In general, the study showed that policy makers, exporters, and negotiators should not ignore that a wide range of agro-food exports are and could be affected by H&E trade barriers. Nevertheless, the conventional general argument that H&E standards impede trade and are consequently a disguised form of NTBs, could not be simply accepted. The agro-food sector situation is quite promising where there is an increasing degree of awareness and compliance with foreign H&E standards. Still many domestic and external institutional constraints exist that deprive exporters from achieving the optimum benefits from compliance. Internally, this is especially evident in the weak conformity assessment infrastructure in Egypt and the weak enforcement of decrees and regulations governing and facilitating conformity assessment procedures. Externally, this is represented in sudden and arbitrary changes in regulations and lack of rigorous scientific risk-assessment for most problematic measures.

The study underpinned major areas that if strengthened, the negative impact of H&E standards on trade could be mitigated.

Conformity assessment: As the survey revealed, upgrading of laboratories and conformity assessment related procedures is an essential step needed to ensure compliance with foreign H&E measures and to avoid facing market access restrictions. This includes the accuracy and speed of conducting tests and analyses.

The survey revealed that standards variation across importing countries or between domestic and importing markets do not represent a significant obstacle for exporting. No indication of loss of economies of scale, separate line of production or significant increase in costs (except in minor cases). This draws doubt on the extent to which harmonization can be beneficial. Harmonizing standards do not guarantee smooth market access. Adopting the strictest measure and a flexible price discrimination policy were indicated as the means by which firms accommodate with differences of H&E across importing countries. Thus, instead of giving high priority to harmonizing Egyptian standards with international or EU ones, more attention should be given to upgrading the technical level for laboratories, aiming at accrediting individual laboratories, and achieving international competence for the national accreditation body. Solving the institutional discrepancies existing between the two countries to gain trust in the conformity assessment procedures is a prerequisite to harmonizing standards.

Better Transparency and databases: Establishing databases similar to that of RASFF to trace imported products that were detained from entering the country and exported products that were detained from entering importing countries, and the corresponding reasons is highly needed. For imported products, this would benefit the country by knowing the potential risks of products entering the country and the country of origin. Consequently, this would have positive repercussions on the food-safety level in the country. The country would also have documented information in case any country objected the detention or took the case to dispute settlement in the WTO. For exported products, this database would notify the country about problems that exporters and producers might have been not aware of and would give indications for detecting the weak areas in human, animal and plant health standards. It would also overcome the problem of the RASFF system of not registering negative or rejected notifications, that is, in case the product originating from the country was retested and accepted.

Moreover, enhancement of the RASFF system is needed. If products were listed according to an international code of classification like the HS or SITC, this would have facilitated better and more accurate data analysis. This was evident from the excessive time needed to match products listed under the RASFF with those under the HS or SITC codes. The same comment would also apply on data provided by the SPS and TBT specific trade concerns (counter-notifications) documents published by the WTO secretariat as well as trade disputes. There is also a need for a data base for detentions due to environmental reasons, in their strict sense, similar to that provided by the RASFF.

Better enforcement of rules and regulations: as mentioned above, there have been efforts to improve the conformity assessment procedures in Egypt in the form of issuing decrees and regulations. Strengthening the enforcement of such decrees is essential.

According to the survey results, strengthening the regulatory framework for importing seeds and pesticides is needed. Moreover, the survey indicated that a minimal level of inspection and monitoring exists on agricultural products directed to the domestic market. Such type of inspection needs to be intensified to provide a better domestic level of food safety and to avoid potential problems in exporting.

Intensifying the role of NGOs: The survey revealed the weak role played by governmental institutions in providing firms with technical, informational or financial assistance to facilitate compliance with foreign H&E standards. This is augmented by the lack of confidence in governmental services in general. On the contrary, the role of NGOs has been highly appreciated by the surveyed firms from this perspective. A very limited number of NGOs played this role for horticultural products and played an important role for promoting exports in general. There has been an on going effort for establishing others for processed food. The few number of effective NGOs reflects a high need for a larger number of them. This would enhance competition among them that could allow for better services for lower prices which would benefit food exporters and producers.

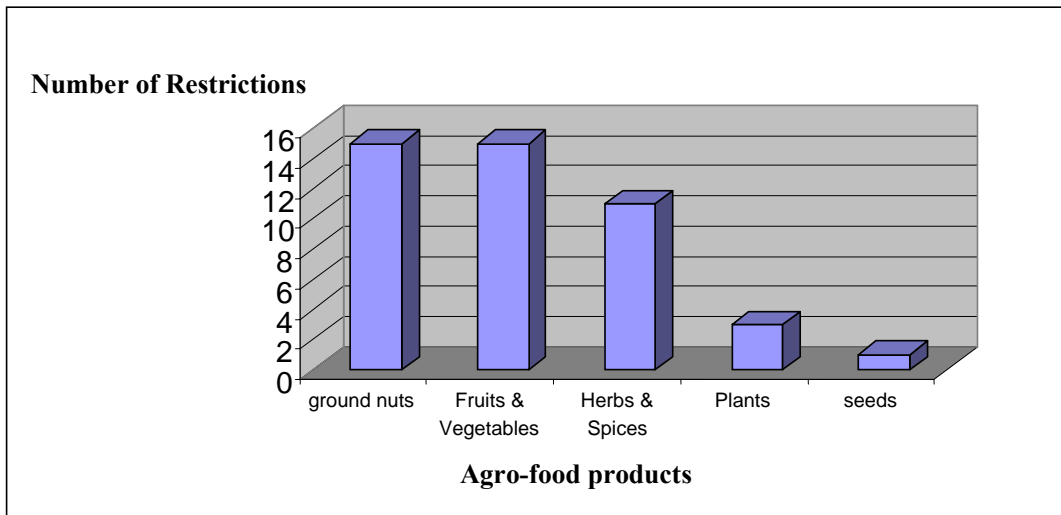
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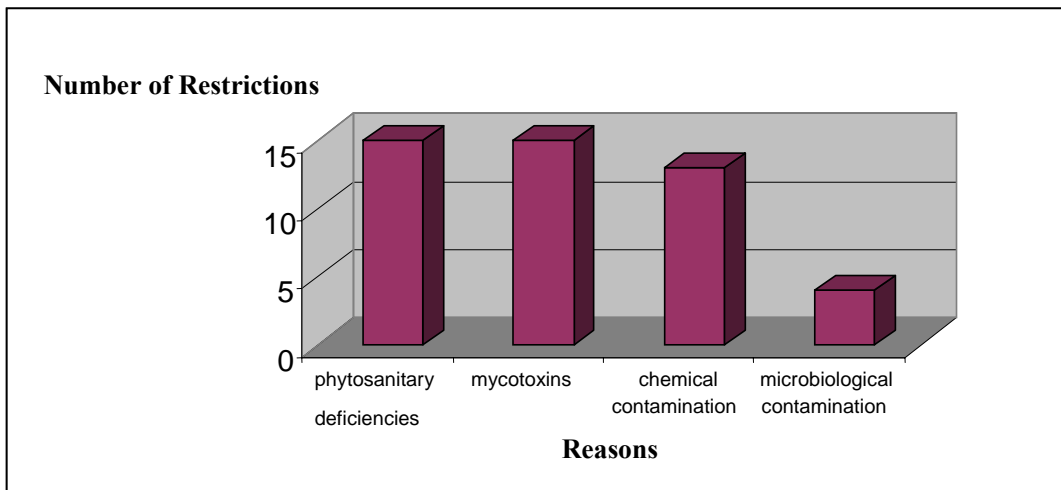
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Figure (1): EU Health and Phytosanitary Restrictions and Detentions of Egyptian Agro-Food Exports in 2004



Source: Based on RASFF Weekly Reports (2004); (<http://www.defra.gov.uk/planth/interc/intercold.htm>)

Figure (2): Reasons for EU Restrictions and Detentions of Egyptian Agro-Food Exports in 2004



Source: Based on RASFF Weekly Reports (2004); (<http://www.defra.gov.uk/planth/interc/intercold.htm>)

Table (1): Notified Products Due to Health and Phytosanitary Reasons¹⁸

2004			2005		
Number of notifications	Product	Reason	Number of notifications	Product ¹⁹	Reason
1	Fresh pepper	Moulds	1	coriander seeds	too high count Enterobacteria
4	Chili	Color Sudan1 and Sudan 4	14	groundnuts (peanuts)	Aflatoxin
15	Groundnut	Aflatoxin	1	dried basil	Moulds
1	Spices (dried flower)	Salmonella	1	sun flower seeds	Aflatoxin
1	Oranges	Dimethoate	1	Marjoram	Clostridium perfringens
1	Grapes	Dimethoate	1	Frozen octopus	Salmonella spp
2	Pepper/s pice	Sudan 1 and Sudan 4	1	Oranges	Dimethoate
3	Spearmint	Dimethoate	1	Crushed senna	Salmonella spp
1	Paprika	Unauthorized additive	1	curry and hot pepper	Sudan 1 and Sudan 4
1	Spice	Sudan 1 and Sudan 4	1	hot pepper powder	Sudan 1 and Sudan 4
2	fennel seeds	too high count of Enterobacteriaceae	1	sesame seeds	Bacillus cereus
11	Potatoes	Brown rot	1	Jam	E 210 – benzoic acid
1	Citrus fruits	Californian red scale Plant disease	15	Potatoes	Brown rot
3	Plants	Plant diseases	4	Citrus	Absent phytosanitary certificate
			1	Plants	Plant diseases
47	Total		42	Total	

Source: Based on Weekly Reports of RASFF (2004, 2005)²⁰; (<http://www.defra.gov.uk/planth/interc/intercold.htm>)

¹⁸ This mostly covers products that were tested and rejected from entering the EU market.

¹⁹ In addition, cut flowers from Egypt were rejected from entering the EU 3 times during 2004 and once in 2005 due to phytosanitary reasons (<http://www.defra.gov.uk/planth/interc/intercold.htm>)

²⁰ Source: http://europa.eu.int/comm/food/food/rapidalert/archive_en.htm

Table (2): Frequency and Import Coverage Ratios (%)

	2004		2005	
	HS_4 digit level	HS_6 digit level	HS_4 digit level	HS_6 digit level
Frequency of affected products	10.3	6.8	11.5	6.8
Frequency of detentions	54.0	29.0	48.3	25.9
Coverage Ratio	44.5	36.4		

Trade data covered HS categories: from 01 to 04, 06 to 15 and from 17 to 23.

Source: Author's calculation based on weekly reports of RASFF (2004, 2005), <http://www.defra.gov.uk/plant/interc/intercold.htm>, and COMTRADE (2005).

Table (3): Constraining Issues Related to Standards in Importing Markets

	Frequency	Percent from all constraining measures
None	13	
EUREPGAP	3	8.6
Other retailers certificates	3	8.6
HACCP	5	14.3
Traceability	6	17.1
Microbiology	4	11.4
Pesticides MRLs	7	20.0
Sudden changes in regulations	7	20.0
Total number of frequency of constraining measures	48	100

Source: Survey Results.

Table (4): Perception of Foreign H&E Measures

	Frequency	Valid Percent
Constraining to a great extent	4	10.0
Constraining to an average extent	6	15.0
No effect	17	42.5
Positive impact on exports	13	32.5
Total	40 ²¹	100.0

Source: Survey Results.

²¹ For the sake of simplifying the analysis and differentiating among exporters of fresh and processed fruits and vegetables, the six firms producing both products were double counted, thus the sample is formed of 40 firms.

Table (5): Cases where Firms Faced Market Access Problems

	Frequency	Valid Percent
Chemical Contamination (MRLs and unauthorized chemicals and preservatives)	15	38.5
Microbiological Contamination (moulds, foreign bodies)	9	23
Phyosanitary measures (brown rot)	3	7.7
Mycotoxins (aflatoxin)	3	7.7
Unaccepted quality and Labeling	2	5
Packaging (non recyclable, tuber moth)	2	5
Incomplete documents (radiation certificate)	2	5
Unrevealed cases	3	7.7

*The frequency does not add up to 40 as not all firms faced such problems.

Source: Survey Results.

Table (6): Reasons for Facing Market Access Problems

Reasons for Problems in Accessing Markets	Frequency
Inefficiency of analysis & testing equipments in Egypt	14
Non compliance due to unawareness of measure	11
Severe (unfair) strictness from the importing market	10
Insufficient precautions in production	9
Problems in transportation and miss-handling	5
Non-compliance due to high cost of compliance	4
Other (Bad weather conditions)	1

Source: Survey Results.

Table (7): Rotated Component Matrix for the Awareness Variables

	Component	
	1	2
Why do you comply with H&E measures? (satisfy the client)	0.731	0.187
Do you comply with at least two of the mentioned H&E measures?	0.673	-0.380
Did you acquire any H&E certificate?	0.906	-0.225
Do you intend to acquire any H&E certificate?	-0.662	0.228
Do you have a special health/environmental inspection/control entity in your company?	0.419	-0.623
Why do you comply with H&E measures? (increase competitiveness, sales, profits and/or prices)	0.26	0.870

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. A Rotation converged in 3 iterations.

Source: Own Calculations.

Table (8): Rotated Component Matrix for the Costs of Compliance and Market Access Restrictions of Compliance Variables

	Component	
	1	2
What was/would be the percentage increase in costs?	0.590	0.182
Did you face problems in accessing importing due to high costs of compliance?	0.650	0.175
Do you consider the costs associated with compliance to be more than the benefits?	0.787	0.16
Do you perceive H&E measures as constraining your exports?	0.745	0.443
Did you face any problems in exporting to any country (accessing a market) because of environmental/health regulations?	0.215	0.709
Did you face problems due to insufficient precautions in production?	0.291	0.684
Do you face different H&E measures in different importing countries?	0.039	0.866

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. A Rotation converged in 3 iterations.

Source: Own Calculations.

Table (9): Rotated Component Matrix for Domestic Impediments Variables

	Component	
	1	2
Transportation ranked one within export impediments?	-0.892	0.105
Domestic inspection ranked one within export impediments?	0.697	0.126
Inspection on imported inputs ranked one within export impediments?	0.836	0.197
Prefer Foreign market	-0.125	-0.717
Do you consider domestic H&E measures constraining?	0.209	0.712
Do domestic impediments have more weight in negatively affecting your exporting ability compared to foreign impediments?	-0.119	0.783

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. A Rotation converged in 3 iterations.

Source: Own Calculations.

Table (10): Results of Binary Logistic Regression

	B	S.E.	Wald	df	Sig.	Exp(B)
Size	.123	1.477	.007	1	.933	1.131
Awareness_FAC1	1.576	.815	3.745	1	.053**	4.837
Awareness_FAC2	-.025	.658	.001	1	.970	.976
Compliance_FAC1	1.726	.963	3.209	1	.073*	5.618
Compliance_FAC2	1.197	.718	2.780	1	.095*	3.310
Domestic Impediments_FAC1	-.237	.728	.106	1	.745	.789
Domestic Impediments_FAC2	-.404	.740	.299	1	.585	.667
Constant	.712	.761	.876	1	.349	2.039

*Significance level 10%, ** significance level 5%

Log Likelihood: 23.895, Cox and Snell R squared: 0.404, Nagelkerke R Squared: 0.553, Significance of Hosmer and Lemeshow test: 0.983.

Source: Own Calculations

Appendix

Table (A.1): Regression Results when Variable with Missing Values are Replaced by Mean

	B	S.E.	Wald	df	Sig.	Exp(B)
Size	-.463	1.641	.080	1	.778	.629
Awareness_FAC1	1.836	.849	4.676	1	.031**	6.269
Awareness_FAC2	.894	.711	1.581	1	.209	2.445
Domestic Impediments_FAC1	.944	.710	1.767	1	.184	2.571
Domestic Impediments_FAC2	-.352	.544	.419	1	.517	.703
Compliance_FAC1	2.247	1.069	4.417	1	.036**	9.463
Compliance_FAC2	1.061	.818	1.684	1	.194	2.890
Constant	1.314	.824	2.542	1	.111	3.722

** Significance level 5%

Log Likelihood: 27.058, Cox and Snell R squared: 0.436, Nagelkerke R Squared: 0.603,
Significance of Hosmer and Lemeshow test: 0.237.

Source: Own Calculations

Table (A.2): Regression Results when Variable with Missing Values is Excluded from the Analysis

	B	S.E.	Wald	df	Sig.	Exp(B)
Size	-.138	1.730	.006	1	.936	.871
Awareness_FAC1	1.665	.759	4.811	1	.028**	5.286
Awareness_FAC2	.975	.709	1.893	1	.169	2.652
Compliance_FAC1	1.992	.942	4.472	1	.034**	7.331
Compliance_FAC2	.330	.615	.288	1	.591	1.391
Domestic Impediments_FAC1	1.103	.708	2.427	1	.119	3.014
Domestic Impediments_FAC2	-.459	.543	.715	1	.398	.632
Constant	1.162	.801	2.103	1	.147	3.195

** Significance level 5%

Log Likelihood: 28.335, Cox and Snell R squared: 0.417, Nagelkerke R Squared: 0.576, Significance of Hosmer and Lemeshow test: 0.716.

Source: Own Calculations