

## DanPer Trujillo and Civil Association FríoAéreo, Peru

**Country:** Peru

**ISO member body:** Instituto Nacional de Defensa de la Competencia y de la Protección de la Propiedad Intelectual (National Institute for the protection of competition and intellectual property) (INDECOPI)

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**Duration of the study:** October 2010 – May 2011

## 9.1 Introduction

Asparagus is the star product among non-traditional agricultural exports (NTAX's) in Peru. The country is one of the leading exporters of asparagus and recognized worldwide for the quality of its products. The privileged position of Peru in international markets for asparagus is the result of private and public efforts to develop competitive advantages in a context characterized by strong international competition, strict sanitary and phytosanitary market access requirements, growing private demand for high-quality and safe products and traceability requirements.

How has this industry managed to achieve such a level of success in an increasingly demanding and competitive global market? And, what are the reasons and change factors that have encouraged the development of a sustainable industry that has a significant impact on the Peruvian economy?

The success of the sector can be explained by a combination of factors among which the implementation of standards has played an important role by facilitating the adoption and transfer of knowledge and technology at intra-company as well as at inter-company levels. The asparagus industry has made significant progress in the implementation of good manufacturing practices and management systems for safety and quality – starting with the HACCP (Hazard Analysis Critical Control Point) system, which was followed by the implementation of other management systems, focused on supporting integrated quality assurance.

To analyze the contribution of standards, INDECOPI<sup>1</sup> and the Standardization and Non-tariff Barriers Surveillance Commission<sup>2</sup> of Peru decided to apply a methodology recently developed by ISO to assess the economic impact of standards.

The methodology focuses on microeconomic analysis of the activities of businesses or industries and provides a useful insight into how to consider the multiple ways in which the adoption of standards can promote the development and growth of companies or sectors. In essence, the approach focuses on the value chain analysis, on the identification of key value drivers that characterize a company or an industry, and on the relationship between the application of standards and the creation of value. The impact of standards is determined by measuring how they affect relevant operational indicators for the various business functions, and then translated in monetary terms.

Considering the Peruvian asparagus value chain, INDECOPI and the Standardization and Non-tariff Barriers Surveillance Commission of Peru decided to analyze two companies to represent the sector. The first is a leading agro-exporter, DanPer Trujillo<sup>3</sup> (located in Trujillo, in the North of Peru) and the second a logistics consortium, Civil Association FríoAéreo (located in Lima), which plays a critical role in the sector's logistics, by handling nearly all the Peruvian fresh asparagus shipments by air.

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1 Instituto Nacional de Defensa de la Competencia y de la Protección de la Propiedad Intelectual (INDECOPI) – the main national institution in charge of standardization, accreditation and metrology in Peru.

2 The Commission is responsible for developing regulatory activities nationwide in its capacity as National Regulatory Agency. It supervises the subsequent control and elimination of non-tariff trade barriers, according to commitments made in the framework of the World Trade Organization, free trade agreements and the corresponding supranational and national regulations. It is also in charge of managing the official electronic signature infrastructure.

3 For further information, please consult: <http://www.danper.com/Web/en/Default.aspx>. Address: Carretera Industrial s/n Sector Barrio Nuevo Moche – Trujillo, Peru.

The idea was that the analysis of these two organizations would allow significant insight into the whole sector – without engaging in a complex sector study which would have required more time and resources.

While the quantitative assessment was only completed for DanPer (as explained in the following sections), the combination of DanPer's quantitative results and the qualitative findings concerning both organizations, allowed us to consider factors and trends applicable to the whole sector.

Finally, it is important to note that the analysis is focused on the assessment of the standards contribution to Danper's **asparagus business**, which represent about 50 % of its revenue.

## 9.2 The selected companies

**DanPer** began operating with great success in February 1994 as an international joint venture with Danish and Peruvian capital (see **Table 1**). The company's agricultural operations cover 5 000 hectares, where asparagus (green and white), artichokes, pepper (*jalapeño* and *piquillo*), string beans, mango and papaya<sup>4</sup> are cultivated.

Around two-thirds of the land under cultivation is owned by DanPer and the remaining one third is owned by external suppliers. It is worth noting that DanPer only started production from its own fields in 2003, although this has expanded substantially since then. However, the quantities from external suppliers are also growing, due to the development of the market and the expansion of DanPer's sales.

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<sup>4</sup> Asparagus represents about 44 % of the land under cultivation, while 47 % is dedicated to artichokes, 8 % to peppers, and the remaining area to fruits.

Name	DanPer
Location	Trujillo and Arequipa, Peru
Established	February, 1994
Production lines	Preserved, fresh and frozen
Products	Asparagus (white and green), artichokes, peppers (jalapeño and piquillo), beans, mango and papaya
Turnover/Sales	USD 88 million (2010)
Asparagus exports	USD 36,5 million (2010)
Key markets	North America (USA) and Europe (France and Spain)

Source : DanPer

**Table 1** DanPer – Key facts and figures

DanPer is one of the largest agro-exporter companies in Peru, with total revenues of USD 88 million in 2010, resulting almost entirely from export. About 45 % of its export is directed to the USA, 30 % to Europe and 25 % to other regions (Asia, Oceania, Africa and Latin America).

DanPer has three process plants for preserves, one packaging line for fresh asparagus, and one frozen process plant (IQF tunnel). Recently, it has extended operations to Arequipa in the South of Peru where it has set up a plant for preserved goods. The company business comprises three major lines: preserved goods (about 77 % of sales), fresh products (21 % of sales) and frozen products (2 % of sales). Frozen and preserved products are delivered by sea, while fresh products are delivered by air (two-thirds of the total) and sea.

DanPer maintains a work force of about 6 thousand people, in two locations (Arequipa and Trujillo). The company has a portfolio of approximately 350 customers and 150 suppliers.

**FrioAéreo**<sup>5</sup>, established in 1998 with the support of the Peruvian Export Promotion Agency (PROMPEX), is an association formed by

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5 For further information, please consult : <http://www.frioaereo.com.pe/>. Address : Av. Avenida Elmer FaucettCdra. 30 #s/n, Callao – Peru.

exporters of perishable products (fruits, vegetables and flowers), primarily serving those companies requiring post-harvest management of their products up to pre-shipment stage.

Thanks to the establishment and growth of FríoAéreo, the airport Jorge Chavez in Lima has today the largest perishable-goods centre in Latin America, with modern equipment and a logistics system that provides optimal conditions to handle and store products. The cold terminal has filled a gap in the exporters' supply chain, since, prior to its establishment, perishable products faced serious risks of deterioration due to a break in the cold chain.

FríoAéreo was established by nine member companies, which represented 40% of the Peruvian agro-export industry. Today, 33 companies are members of FríoAéreo, representing 80-90% of the industry. Around 80% of the total Peruvian exports of perishable products dispatched by air pass through its cold chain management facilities. Since its inception, FríoAéreo has contributed greatly to reducing inefficiency in the perishable products logistic chain, particularly in reducing quality losses and long loading times (from 4 hours in 1998 to 1.5 hours in 2005). The company also provides reliable information to the industry, enabling export companies to improve strategic planning.

### **9.3**     **Attitude of the companies towards standardization**

The success achieved by the Peruvian asparagus industry in international markets depends on its ability to supply trustworthy, safe products of high quality.

In 1998, the private and public sector, with the support of INDECOPI, promoted the creation of the Asparagus National Technical Com-

mittee of Standardization (ANTCS) as a way to develop standards that would strengthen safety and other product and process quality attributes, responding effectively to the requirements of importers and national regulatory authorities of importing countries. To achieve this, the national standards for asparagus published by ANTCS were harmonized with Codex Alimentarius<sup>6</sup> standards.

Private certification schemes have also become increasingly important requirements demanded by international markets, to which Peruvian exporters have responded proactively.

Standards implementation and certification has considerably influenced the evolution of the Peruvian agro-export sector in terms of product quality, environmental sustainability of the production systems, and better social welfare conditions.

### 9.3.1 Standards context

The role of these companies within the industry value chain is important and has an influence on the use of standards by suppliers and logistics operators.

For DanPer, products and services provided by suppliers (farmers) and logistic operators are key to meeting the requirements of foreign markets. In this sense, the use of quality and safety standards by DanPer influences the improvement of suppliers' operations and their deliverables (upstream) – as a large buyer of supplies it can push the use of certain standards by its suppliers.

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6 The Codex Alimentarius Commission was created in 1963 by FAO (Food and Agriculture Organization of the United Nations) and WHO (World Health Organization) to develop food standards, guidelines and related texts such as codes of practice under the Joint FAO/WHO Food Standards Programme. More information on: [http://www.codexalimentarius.net/web/index\\_en.jsp#](http://www.codexalimentarius.net/web/index_en.jsp#)

For FríoAéreo, as a downstream service provider of storage (cold chain management facilities), the use of standards is critical to reducing the risks of inadequate handling of products. Given its position in the market, it can influence the implementation of process, safety and quality standards by its customers, to optimize the quality of exported products.

### 9.3.2 Standards capability

DanPer Trujillo has an important history in dealing with standards and, since its establishment, has maintained a strategic and very proactive attitude toward standards<sup>7</sup>. In DanPer's vision, adapting to new standards is seen as an opportunity to improve production processes and to open new markets, which is worth the cost (in time and in money) incurred.

In a decade, FríoAéreo has successfully adopted standards for all its processes, and promoted the implementation of standards such as NTP 011.109:2008, *ASPARAGUS – Asparagus fresh – Requirements*, which have played a key role in promoting the use of standards throughout the industry. Its experience with the implementation of standards has allowed FríoAéreo to develop indicators and control systems for quality attributes that allow asparagus producers to monitor their quality performance, and introduce corrective measures as required.

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<sup>7</sup> DanPer Trujillo is part of ANTCS, the consortium of firms that have created IPEH and FríoAéreo.



## 9.4 Analysis of the value chain

### 9.4.1 Industry value chain

Two chains have been outlined in this section. The first (see **Figure 1**) highlights the asparagus production chain, and the second (see **Figure 2**) describes the main stages for fresh green asparagus<sup>8</sup> export. These chains are useful in understanding the value chain of the Peruvian asparagus<sup>9</sup> industry.

According to FAO (2007), the fresh asparagus supply chain involves several steps from production to export.

“The process begins with selection of varieties, nursery, planting, application of chemical inputs and irrigation, disease control, and harvesting. Timing is fundamental to maintaining a quality product, for example, harvesting is a very coordinated activity, no more than 30 minutes are allowed from harvest to arrival in the packing house in order to avoid deterioration of quality. In the logistics/post-harvest component, fresh asparagus is loaded, weighed, cut, washed, and then sorted, graded, and bunched. Next, the asparagus is packed in specialized cartons (5-12 kg), pre-cooled and loaded onto refrigerated trucks. It then passes through customs clearance, cold storage and airport handling, and is finally shipped by air, and more recently, also by sea.

The marketing component consists of identification of, and negotiation with, buyers, market research information, and ensuring completion of the sale, etc.”(FAO, 2007 : p. 27)

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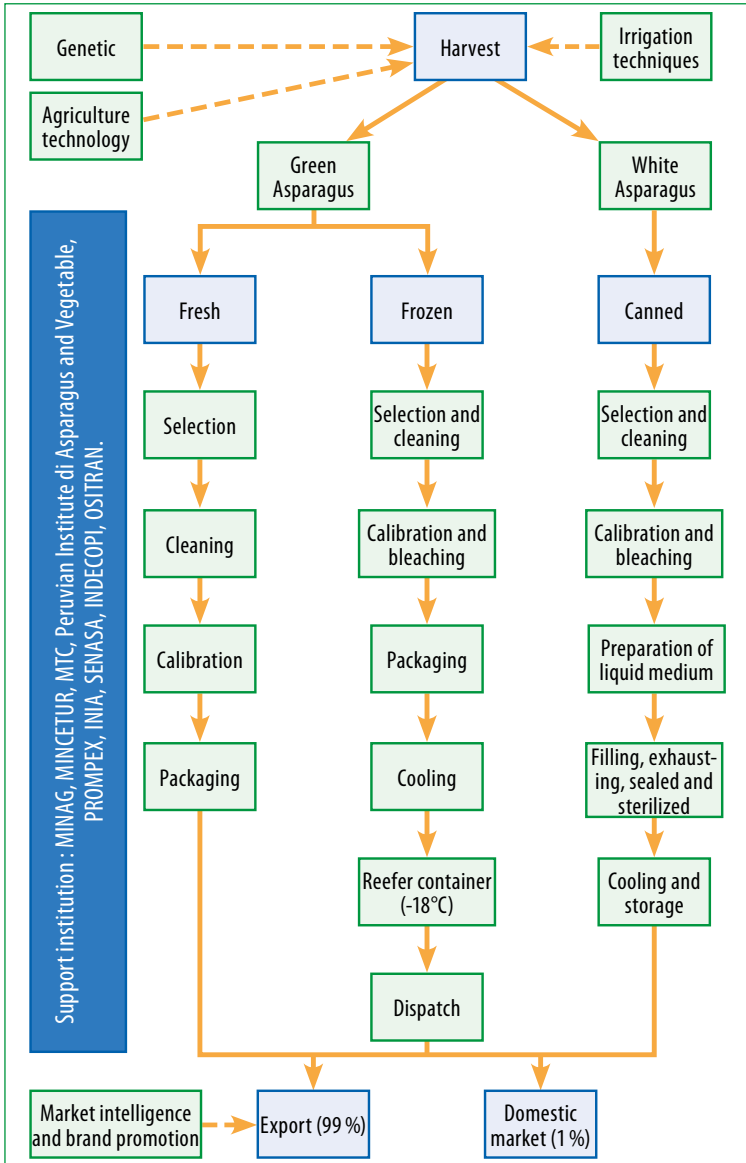
8 Ositran (2009), this document analysed the logistic chain of green asparagus with a key focus on the use of transport infrastructure for export. The goal was to identify the main bottlenecks that could affect business sustainability within this sector

9 Green asparagus is the main variety produced in Peru, representing more than 80% of total production.

In general, processing plants are close to cultivation areas<sup>10</sup>, except when transportation and processing costs are larger in comparison to field costs.

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<sup>10</sup> The main cultivation areas are located in Junín, Trujillo, Lima and Ica.



Source: ACORDE

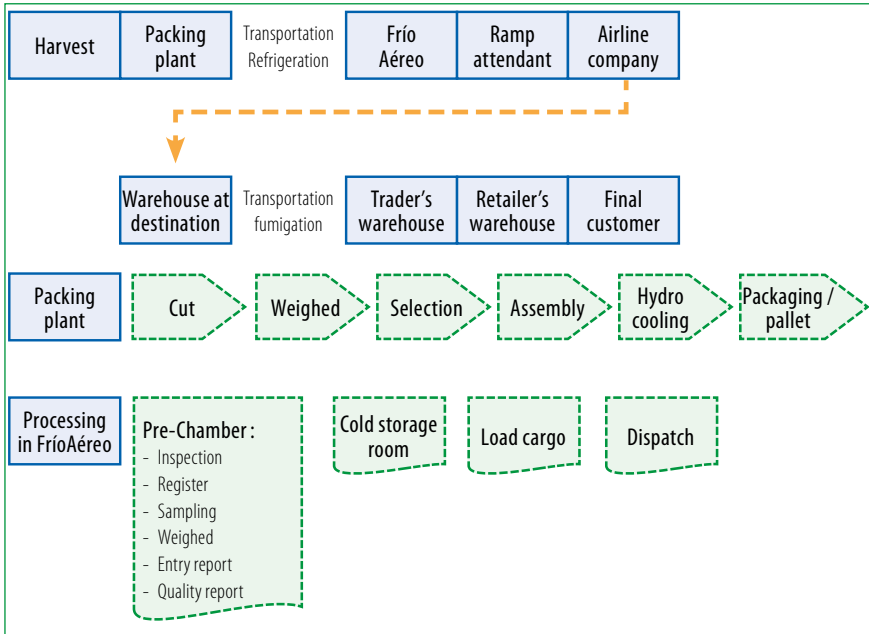
**Figure 1** Asparagus production chain

The processing plant involves different processes (see **Figure 2**), which include cutting, weighing, sorting, wrapping, hydro-cooling and packing pallets for shipping by air (fresh asparagus) or in containers for shipping by sea (asparagus, canned, bottled, etc.).

Once selected, fresh asparagus is transported to Lima Airport for export through FríoAéreo which covers over 95% of export traffic (Talma and Swissport also have a very small share of the market).

FríoAéreo, Swissport or Talma are in charge of storage, refrigeration, palletization and containerization of the pallets, which are in batches containing bundles of asparagus. The containers are then moved to cargo or passenger aircraft ready for take off.

The storage company requires a ramp operator like Talma, Swissport or Globeground to ship the asparagus to its destination. After landing, the asparagus container is stored in the airline warehouse for onward transfer to the trader.



**Figure 2** Main export stages for fresh green asparagus

### 9.4.2 Company value chain

DanPer, Trujillo and FríoAéreo operate at different stages of the industry value chain and their operations are complementary, particularly in the case of fresh asparagus. DanPer is involved at every stage of the chain from field production to export, while FríoAéreo is positioned in the final stage providing logistical support to exporters.

According to **Figure 3**, production planning is the business function in charge of planning the crop for the year on the basis of information provided by the customer requirement and marketing and sales functions. The latter also identifies all the inputs required by the company to achieve the production goals.

The harvesting/collecting function implements the requirements of the production planning function in the field. This stage is critical because harvesting/collecting supplies the production process, including that provided by third parties. In the production/packing function, the asparagus is then processed and packed according to customer requirements. It is important to mention that at this stage DanPer operates three asparagus production lines: fresh, frozen and preserved<sup>11</sup>.

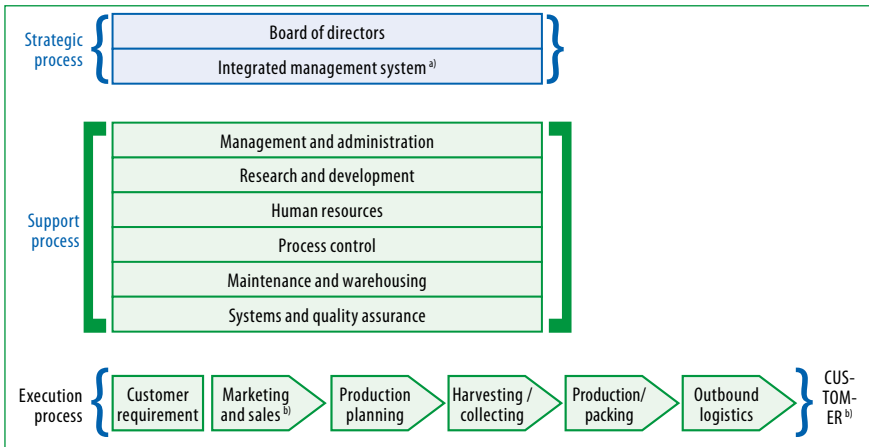
Outbound logistics is another stage critical to the export process, mainly for fresh asparagus. At this stage proper handling of the fresh product from factory to port or FríoAéreo warehouse must be ensured, along with temperature control.

The support and strategic processes complement the activities of the execution process. Within these secondary activities, the key functions are research and development (R&D), process control, systems and quality assurance, and human resources. R&D is responsible for developing new products or upgrading existing ones, as well as for improving the production process. Process control and systems and quality assurance are in charge of product sampling and testing product compliance with specified requirements.

Finally, human resources has become a very important function for DanPer. This business is highly labour intensive and the implementation of programmes to improve labour conditions is essential. Employee involvement and individual contributions to the company's continual improvement philosophy, have been key factors in the rapid growth of DanPer.

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<sup>11</sup> Fresh asparagus represents around 20% of sales, whilst preserved asparagus accounts for 70 %, and frozen for 10 %.



a) Involves the strategic planning and direction revision.

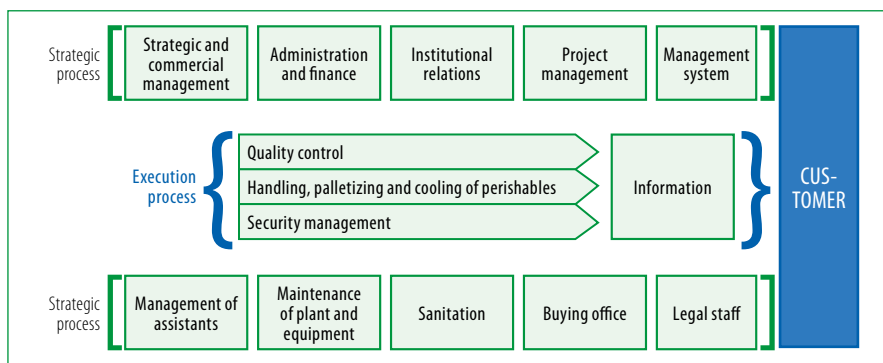
b) Customer (satisfaction) includes some activities of sales (post-sales).

Source : DanPer Trujillo

**Figure 3** The DanPer Trujillo value chain

**Figure 4** outlines the FríoAéreo value chain. Satisfying customer requirements by providing storage and cold services is the core business. In the execution stage, storage and cold services are provided, supplemented by quality control and product control. Quality control covers product sampling and analysis of asparagus characteristics, whereas product control is applied to trace temperature and to monitor the humidity of products until they are loaded onto the aircraft. The information gathered through this process is used to develop reports describing product quality and rankings that are then distributed to FríoAéreo’s associates.

The functions belonging to the Support Process provide services to the execution process, including maintenance of facilities and equipment.



Source : FríoAéreo

**Figure 4** The FríoAéreo value chain

### 9.4.3 Key value drivers

The key functions within the DanPer execution process are production planning, production/packing and outbound logistics, while quality assurance, human resources and research and development are the most important support functions.

FríoAéreo acts as an “outbound logistics” service provider and its execution process, as a whole, is critical. In addition, FríoAéreo provides procurement services for selected goods (e.g. pallets), with a view to offering cost reductions for its associates.

For the asparagus industry, *efficient methods to control pests and diseases, quality of production processes and service and client focus* were identified as key value drivers. The highly competitive international markets require strict and efficient control systems for hygiene, handling and product quality. This implies significant investment in R&D for innovation and continual improvement of production processes.

In DanPer’s case, *efficient pest and disease control methods, vertical integration, standardization, client focus and personell recruitment* were



identified as key value drivers. Many are related to the ability to ensure reliable asparagus supply, a key success factor for this industry. DanPer is keen to establish relationships with farmers and suppliers in order to standardize process and quality, and to assure a fast, reliable and flexible service to customers.

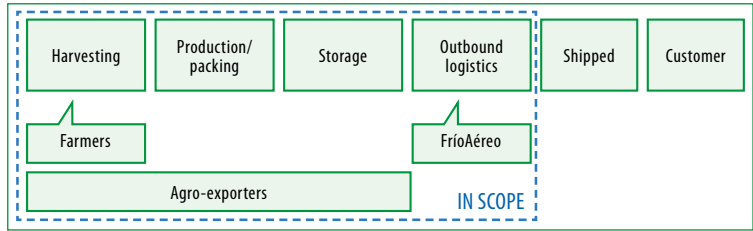
In FríoAéreo's case, *quality service* and *service efficiency* were identified as key value drivers. Performing cold chain management is essential for agro-exporters of fresh products, and the company efforts focus on maintaining outstanding service and process control. To support continual quality improvement, quality reports are regularly delivered to associates and awards assigned.

## 9.5 Scope of the assessment

DanPer Trujillo takes part in almost all stages of the industry value chain, which involve the processes from harvesting to export (product placed on port), whereas FríoAéreo<sup>12</sup> operates as a service provider in the delivery of the product to its final destination, when the product is loaded on the aircraft (see **Figure 5**).

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12 The goal of the service provided by FríoAéreo is to maintain the quality of the product by ensuring the handling and cold chain protection during transit of the product through the airport.



**Figure 5** Fresh asparagus industry value chain

Therefore, the assessment can focus on the functions related to inbound and outbound logistics, production/operations and marketing and sales, which are the main functions of the industry. However, human resources and research and development can be included as complementary functions in the development of the industry. The main reason why only certain business functions were selected is explained by the leading role that standards seem to play in the development of the production process.

## 9.6 Use of standards in the companies value chains

The most important standards and certifications and, separately, regulations, applied by DanPer, are provided in the list below.

### DanPer : Standards and certifications

NTP 011.109 (2008), *ASPARAGUS – Asparagus fresh – Requirements* ;  
 NTP 011.116 (1991), *ASPARAGUS – Refrigerated Transportation Guide* ;  
 NTP 209.401(2001), *ASPARAGUS – Hygienic practices for processing of fresh asparagus* ;  
 21 CFR 110 : NTP 209.402(2003), *ASPARAGUS – Good Agricultural Practices* ;  
 Certifications to ISO 9001:2008, ISO 14001:2004, OHSAS 18001:2007, SA 8000 (Social Accountability International), Globalgap version 03, USGAP Version 08.06, BASC version 03-2008.

## DanPer : Regulations

The Control of Pesticides Regulation 1986, CAC / Vol. III Second Edition 1993. Maximum Limits for Pesticide Residues, UK Statutory MRLs, Regulation EU N° 765/2010, European Biocides Scheme – Biocidal Product Directive 98/8/EC, Directive 79/117/EEC : Active substances prohibited, Certification HACCP according to Codex Alimentarius annex to CAP/RCP 1-1969 (Rev 04 – 2003).

In DanPer's case, most of the standards, certifications and regulations are applied by each operational business function (see **Table 1**). Governments and traders are highly demanding in terms of compliance to health, safety and environmental protection requirements for agricultural products entering their countries.

Inbound logistics and productions/operations make significant use of standards certifications and must comply with the regulations of importing countries, concerning primarily good manufacturing practices, control of pesticides, maximum levels of contaminants or phytosanitary aspects.

It is important to note that **for DanPer it is virtually impossible to separate the impact of voluntary standards and certifications, from that of regulations**. Considering that regulations do not have a dominant role (in terms of number or relative influence) and that all types of requirements are treated in the same way through the company processes, the assessment has been conducted in consideration of the full set of normative documents.

In FríoAéreo's case, quality and environmental management (ISO 9000 and ISO 14000) are the main standards used by the management and administration and production/operations business functions. The production/operations and post-service business functions also use national standards covering fresh asparagus requirements and sam-

pling procedures, which are very important to their activities. Finally, the certification BASC<sup>13</sup> which addresses the problem of concealing contraband in commercial trade is employed in the operations of procurement, production/operations and post-service.

### **FríoAéreo': Standards and certifications**

NTP 011.109 (2008), *ASPARAGUS – Asparagus fresh – Requirements*; NTP-ISO 2859-1:1999, *Sampling procedures for inspection by attributes*; NTP-ISO 9000:2007, *Quality Management Systems – Fundamentals and Vocabulary*; ISO 9001:2008, *Quality Management Systems – Requirements*; ISO 14001:2004, *Environmental Management Systems – Requirements with guidance for use*; ISO 14004:2004, *Environmental Management Systems – General guidelines on principles, systems and supporting techniques*; Certifications: Business Alliance for Secure Commerce (BASC); Directorate General of Civil Aviation (DGAC); GS1: Global Traceability Conformance.

### **The standards impact map used by the companies**

The main impacts of standards on the activities of each business function are summarized in **Tables 1 and 2** (a more comprehensive list of the standards impact map can be found in the full report).

In DanPer's case, the implementation of national and international standards such as NTP 011.109, NTP 209.401, ISO 9001 and ISO 14001, has had a substantial impact on the development of its operations, helping to organize processes in compliance with regulations and to continually improve process efficiency.

However, the most important impact of standards was identified in the marketing and sales department. Conformity to standards

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13 BASC's security standards are designed to significantly improve security practices and in the process deter contraband smugglers and terrorists from using their companies to introduce contraband and implements of terror in legitimate shipments.

and certification against major standards (such as ISO 9001, HACCP, Global GAP, and others) is considered critical because it supports the customers' perception of the company's commitment to quality, safety and good practices, helping to build confidence and access to new markets.

Function	Activities	Impacts	Description
Production / operations	HSE (health, safety and environment)	Easier compliance with regulatory requirements	Influence in standards-setting process and proactive application of standards helps to reduce potential disadvantages from regulations
		Better health/safety/ environmental compliance	HSE management based on standards can be implemented more effectively
Marketing and sales	Marketing activities, client development	Better customer information	Communicating product and service specifications and requirements to potential customers is more effective when referring to standards
	Sales	Higher sales	Sales are higher due to customer confidence in standardized products and services

Source : DanPer Trujillo, ISO Methodology

**Table 1** DanPer's standards impact map

In FríoAéreo's case, the application of standards like NTP 011.109, NTP-ISO 2859-1 and ISO 14001 has had a significant impact on the operations process – the procedures to achieve compliance with customer requirements regarding humidity and temperature of the products stored and handled prior to shipment to their final destination, are now implemented in a more effective way.

The adoption of those standards has also allowed FríoAéreo to exploit the information generated during production, to develop better communication with its clients and help raise the competitiveness of the industry.

Function	Activities	Impacts	Description
Production / operations	Environmental conditions assurance	Better environmental management	Environmental management based on standards can be implemented more effectively in order to maintain the correct temperature and humidity levels
Service	Customer care and technical support	Better customer communication	You can communicate information about products and services to customers more effectively by using standardized specifications

Source : FríoAéreo, ISO Methodology

**Table 2** FríoAéreo's standards impact map

## 9.7 Selection of operational indicators to measure the impact of standards

**Tables 3 and 4** present a list of operational indicators obtained from interviews with each company. The quantification of the impact of standards on them (actually on the subset for which it was possible to gather relevant data) leads to the assessment of the standards value for the company.

Selected business functions (BF)	Related activities	Value drivers	Standards and regulations used	Operational indicators	Definition of the indicators
Field operations	<ul style="list-style-type: none"> <li>i. Planning</li> <li>ii. Irrigation</li> <li>iii. Pest control</li> <li>iv. Operations (from planting to harvesting)</li> <li>v. Personnel management</li> </ul>	<ul style="list-style-type: none"> <li>• Quality and safety of products</li> <li>• Optimal crop yield</li> <li>• Personnel involvement</li> </ul>	<ul style="list-style-type: none"> <li>• HACCP (Codex)</li> <li>• Codex Stan 193-1995</li> <li>• ISO 9001</li> </ul>	<ul style="list-style-type: none"> <li>1. Quality of harvested crops</li> <li>2. Field productivity</li> <li>3. Waste</li> <li>4. Personnel qualification, motivation and satisfaction</li> </ul>	<ul style="list-style-type: none"> <li>1. % of products by category of quality</li> <li>2. Volume of harvested product/cost</li> <li>3. % of waste</li> <li>4. Based on personnel surveys and other (e.g. training)</li> </ul>

Selected business functions (BF)	Related activities	Value drivers	Standards and regulations used	Operational indicators	Definition of the indicators
Procurement (crops)	<ul style="list-style-type: none"> <li>i. Planning</li> <li>ii. Quality control</li> <li>iii. Procurement of crops</li> </ul>	<ul style="list-style-type: none"> <li>• Quality control</li> <li>• Cost effectiveness</li> </ul>	<ul style="list-style-type: none"> <li>• NTP 209.401 : 2001</li> <li>• NTP 209.402 : 2003</li> <li>• Regulation (EC) No 2073/2005</li> <li>• Regulation (EC) No 178/2002</li> <li>• The Control of Pesticides Regulation 1986</li> <li>• HACCP</li> <li>• ISO 9001</li> <li>• ISO 14001</li> <li>• OHSAS 18001</li> <li>• SA 8000</li> <li>• Codex Stan 192-1995</li> </ul>	<ol style="list-style-type: none"> <li>1. The actual kilogram recorded to the total kilogram forecasted ;</li> <li>2. The actual kilogram recorded from own fields over the total kilogram recorded ;</li> <li>3. Number of orders that do not meet the specifications as a percentage of total number of orders</li> </ol>	<ol style="list-style-type: none"> <li>1. Assesses the compliance of raw material supply against plan ;</li> <li>2. Assesses the percentage of inputs from the company's own fields in relation to third-party fields ;</li> <li>3. Measures the level of non-conformity of suppliers</li> </ol>
Logistics/ procurement	<ul style="list-style-type: none"> <li>i. Procurement (all goods except crops)</li> <li>ii. Handling incoming materials and products</li> <li>iii. Transportation</li> </ul>	<ul style="list-style-type: none"> <li>• Quality of supply/ suppliers</li> <li>• Cost effectiveness</li> <li>• Efficiency of transport</li> </ul>	<ul style="list-style-type: none"> <li>• ISO 9001</li> <li>• CAC/RCP 60-2005</li> <li>• Regulation (EC) No 2023/2006</li> </ul>	<ol style="list-style-type: none"> <li>1. Selection of suppliers</li> <li>2. Cost</li> </ol>	<ol style="list-style-type: none"> <li>1. Ratio of suppliers in top quality ranking (category A and B)</li> <li>2. Cost of purchased goods</li> </ol>

Selected business functions (BF)	Related activities	Value drivers	Standards and regulations used	Operational indicators	Definition of the indicators
Production / operations	<ul style="list-style-type: none"> <li>i. All activities</li> <li>ii. Processing – fresh</li> <li>iii. Processing – canned</li> <li>iv. Processing – frozen</li> <li>v. Quality assurance</li> <li>vi. HSE (health, safety and environment)</li> </ul>	<ul style="list-style-type: none"> <li>• Quality and safety of products</li> <li>• Efficiency of processes</li> <li>• Standardization</li> </ul>	<ul style="list-style-type: none"> <li>• NTP 011.109:2008</li> <li>• NTP 209.401:2001</li> <li>• NTP 209.402:2003</li> <li>• 21 CFR 110</li> <li>• Regulation (EC) No 2073/2005</li> <li>• The Food and Environment Protection Act 1985</li> <li>• The Food Safety Act 1990</li> <li>• HACCP</li> <li>• ISO 9001</li> <li>• ISO 14001</li> <li>• OHSAS 18001</li> <li>• SA 8000 &amp; ETI</li> <li>• Codex STAN 1-1985</li> </ul>	<ol style="list-style-type: none"> <li>1. Actual production costs over the planned production cost (labour force, input material)</li> <li>2. The ratio of the top quality (Category I) to total production</li> <li>3. Leftover or discarded rate</li> <li>4. Profitability of each product category</li> <li>5. Production efficiency re asparagus (volume of production per worker)</li> <li>6. Production volume over labour cost or capital cost</li> </ol>	<ol style="list-style-type: none"> <li>1. Measures the efficiency of production (deviation from plan)</li> <li>2. % of high-quality products over the total</li> <li>3. Self-explanatory</li> <li>4. Self-explanatory</li> <li>5. Assesses the productivity of workers</li> <li>6. Assesses the overall productivity</li> </ol>
Research and development	<ul style="list-style-type: none"> <li>i. Investigation of harvest</li> <li>ii. Production process improvement</li> <li>iii. Product development</li> </ul>	<ul style="list-style-type: none"> <li>• Customer orientation</li> <li>• Efficiency of production processes</li> <li>• Standardization</li> </ul>	<ul style="list-style-type: none"> <li>• NTP 209.401:2001</li> <li>• NTP 209.402:2003</li> <li>• 21 CFR 110</li> <li>• The Food Safety Act 1990</li> <li>• HACCP</li> <li>• ISO 9001</li> <li>• ISO 14001</li> <li>• OHSAS 18001</li> </ul>	<ol style="list-style-type: none"> <li>1. Number of new products accepted by customers over the number of products proposed by DanPer</li> <li>2. Complaints re new products</li> <li>3. Number of projects initiated per month</li> <li>4. % of projects completed on time</li> <li>5. Number of new processes deployed divided by the number of new processes developed</li> </ol>	<ol style="list-style-type: none"> <li>1. The first two indicators seek to assess the effectiveness of new product development</li> <li>2. Indicators 3 and 4 concern the efficiency of R&amp;D work</li> <li>3. The fifth indicator assesses the effectiveness of R&amp;D's process improvement activities</li> </ol>



Selected business functions (BF)	Related activities	Value drivers	Standards and regulations used	Operational indicators	Definition of the indicators
Marketing and sales	<ul style="list-style-type: none"> <li>i. All activities</li> <li>ii. Marketing activities, client development</li> <li>iii. Market analysis, research</li> <li>iv. Contracting</li> <li>v. Sales</li> </ul>	<ul style="list-style-type: none"> <li>• Customer focus, customer service</li> <li>• Sales effectiveness</li> <li>• Social responsibility</li> <li>• Innovation effectiveness</li> <li>• Market knowledge</li> </ul>	<ul style="list-style-type: none"> <li>• NTP 011.109:2008</li> <li>• NTP 209.401:2001</li> <li>• Regulation (EC) No 2377/1999</li> <li>• HACCP</li> <li>• ISO 9001</li> <li>• ISO 14001</li> <li>• OHSAS 18001</li> <li>• The Food Safety Act 1990</li> </ul>	<ol style="list-style-type: none"> <li>1. Volume of sales per person</li> <li>2. Average growth in profits</li> <li>3. Actual sales over forecasted sales</li> <li>4. Total DanPer exports over total industry exports</li> <li>5. Number of customer complaints (fresh or preserved products)</li> </ol>	<ol style="list-style-type: none"> <li>1. The first and third indicators assess the productivity of the sales function</li> <li>2. The third indicator assesses the company's profitability</li> <li>3. The fourth indicator assesses Danper's market share</li> <li>4. The fifth indicator assesses the degree of customer dissatisfaction</li> </ol>
Human resources	<ul style="list-style-type: none"> <li>i. Recruitment</li> <li>ii. Salaries</li> <li>iii. Personnel management</li> <li>iv. Training</li> <li>v. Employees and social programmes</li> </ul>	<ul style="list-style-type: none"> <li>• Transparency</li> <li>• Personnel involvement and development</li> </ul>	<ul style="list-style-type: none"> <li>• SA 8000</li> <li>• OHSAS 18001</li> <li>• ISO 9001</li> </ul>	<ol style="list-style-type: none"> <li>1. Personnel enquiries : working environment</li> <li>2. Number of employees or contract workers to the total number of personnel required on time</li> <li>3. Salary increase</li> <li>4. Personnel improvement (training)</li> <li>5. Retention of employees</li> </ol>	<ol style="list-style-type: none"> <li>1. Measures personnel satisfaction</li> <li>2. Measures the efficiency of sourcing</li> <li>3. Self-explanatory</li> <li>4. Measures investment in personnel improvement</li> <li>5. Indirect measure of personnel satisfaction</li> </ol>

Source : DanPer, ISO Methodology

**Table 3** DanPer's operational indicators

Selected business functions (BF)	Related activities	Value drivers	Standards and regulations used	Operational indicators	Definition of the indicators
Production / operations	<ul style="list-style-type: none"> <li>i. All activities</li> <li>ii. Quality assurance</li> <li>iii. Environmental conditions assurance</li> <li>iv. HSE (health, safety and environment)</li> </ul>	<ul style="list-style-type: none"> <li>• Client focus</li> <li>• Quality of production processes</li> <li>• Quality of service</li> <li>• Service efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• NTP 011.109:2008</li> <li>• NTP-ISO 2859-1:1999</li> <li>• NTP ISO 9000:2007</li> <li>• ISO 9001:2008</li> <li>• ISO 14001:2004</li> <li>• ISO 14004:2004</li> <li>• GS1 : Global Traceability Conformance</li> <li>• BASC</li> <li>• DGAC</li> </ul>	<ol style="list-style-type: none"> <li>1. Average rating of quality Inspectors</li> <li>2. Microbiological contamination control in a controlled environment</li> <li>3. Consumption of refrigerant</li> <li>4. Percentage of deviations* from cargo handling</li> <li>5. Percentage of damaged products received</li> </ol>	<ol style="list-style-type: none"> <li>1. Assesses fresh green asparagus products according to the categorization of NTP 011.109:2008</li> <li>2. Monitors the refrigeration chambers to ensure that they remain within the set limits of microbiological contamination</li> <li>3. Self-explanatory</li> <li>4. Monitors the handling of cargos at FrioAéreo's facilities</li> <li>5. Monitors the % of products arrived in unsuitable conditions</li> </ol>
Post-service	<ul style="list-style-type: none"> <li>i. All activities</li> <li>ii. Processing</li> <li>iii. Quality assurance</li> <li>iv. HSE (health, safety and environment)</li> </ul>	<ul style="list-style-type: none"> <li>• Quality of production processes</li> <li>• Standardization</li> </ul>	<ul style="list-style-type: none"> <li>• NTP 011.109:2008</li> <li>• NTP-ISO 2859-1.1999</li> <li>• BASC</li> <li>• DGAC</li> </ul>	<ol style="list-style-type: none"> <li>1. Percentage of cargo with temperature monitoring in platform or ramp</li> <li>2. Percentage of complaints addressed</li> </ol>	<ol style="list-style-type: none"> <li>1. % of cargo with plotted (temperature) – when the cargo has left FrioAéreo's warehouse, until it is uploaded onto the aircraft</li> <li>2. Assesses customer satisfaction.</li> </ol>

Note : (\*) Anything that harms the customer's property caused by improper handling of the product in the storehouse.

Source : FrioAéreo, FAO, O'Brien & Diaz, ISO Methodology.

**Table 4** FrioAéreo's operational indicators

## 9.8 Calculation of the economic benefits of standards

The quantitative analysis was performed only for DanPer Trujillo. Considering the focus of this study, the analysis was **restricted** to the **asparagus business**. FríoAéreo is an important service provider but a rather small company and the available data did not allow us to quantify the impact of standards on its operational indicators. In this case, it is also important to note that the standards adopted and promoted by the company have a significant impact **at the overall industry level** – but this analysis was beyond the scope of the study. Seven DanPer business functions were analyzed, and the quantitative assessment was performed on those for which the impact of standards is most significant: field operations, production/operations, marketing and sales and research and development. **Table 5** presents the main results for the four business functions analyzed.

Selected business functions (BF)	Operational indicators	Financial impact for the operational indicator
Field operations	1. Field productivity	1. USD 321,9 thousand (*)
Production/operations	1. The actual production costs over the planned production cost 2. Asparagus production efficiency	1. USD 71,4 thousand (**) 2. USD 16,6 thousand (*)
Marketing and sales	1. Average growth in profits	1. USD 536,8 thousand
Research and development	1. Number of new products accepted by customers over the number of products offered by DanPer	1. USD 39,9 thousand (**)

Note: (\*) To avoid double counting, this contribution is considered embedded in the average profit growth considered for the marketing and sales function. (\*\*) These have been considered as specific “correcting factors” to the average growth in profits and summed-up.

Source: DanPer Trujillo

**Table 5** Economic benefits of standards for DanPer, based on average annual gross profits 2007-2010

To support the quantitative analysis, and in particular the translation of the operational indicators in financial metrics, the following assumptions were made:

1. Sales and gross profit figures are always related to the total business of the company<sup>14</sup>. As a consequence, when the analysis focuses on indicators referring to specific product categories (e.g. fresh or preserved asparagus), the estimated economic values presented in **Table 5**, calculated as the % of the total business derived from the selected categories, should be considered as a close approximation of the actual economic benefits of standards.
2. The annual average gross profit for the period 2007-2010, 23,6%, was estimated on the basis of the average gross profits of competitors comparable in size to DanPer<sup>15</sup> (such as Agroindustrias AIB<sup>16</sup> and Camposol<sup>17</sup>). It was also assumed that the total gross profits was an average constant over the three years, corresponding to USD 2 147,3 thousand per year.

The details of the assessment for the four selected business functions are given below.

### Field operations

Four key operational indicators (KOI) are considered for this business function, but only one, *field productivity*, could be assessed (information on other KOI's was unavailable or not relevant).

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14 The total turnover includes figures of sales data of asparagus, artichokes, peppers, and the other products detailed by DanPer.

15 DanPer could not provide its average gross profits over the period in the time required.

16 The information was gathered from the financial accounts published on Conasev (Business and Securities National Supervisory Commission of Peru). [http://www.conasev.gob.pe/eeff/eeff\\_x\\_empresa.asp](http://www.conasev.gob.pe/eeff/eeff_x_empresa.asp)

17 Camposol Holding Plc (2011) Fourth Quarter and Preliminary Full Year 2010 Results. <http://hugin.info/138464/R/1492669/428469.pdf>

To avoid double counting, the contribution of increased *field productivity* is considered embedded in the average growth of profits calculated for the marketing and sales function. However, it is useful to present the logical steps taken to perform the quantitative assessment of *field productivity*:

1. The volume of asparagus harvested and ranked as top quality (this is the only crop used for fresh products) increased from 1,2 MT in 2007 to 4,4 MT in 2010. A difference of 3,2 MT.
2. Taking into account that the utilization rate of raw material in fresh products is about 70 %, the volume of products exported amounted to 816,4 thousand kilograms in 2007 and 3 099,3 thousand kilograms in 2010.
3. The sale price and product cost for fresh asparagus (exported) was approximately USD 2,36 and USD 1,25 per kilogram in 2007 and USD 2,72 and USD 1,25 per kilogram in 2010.
4. Therefore, the income generated by the exports of those quantities in 2007 and 2010 were USD 1 929 thousand (USD 2,36 X 816,4 thousand kg.) and USD 8 420 thousand (USD 2,72 X 3 099,3 thousand kg.), respectively. At the same time, the costs were USD 1 458 thousand (USD 1,25 X 1,2 MT) in 2007 and USD 5 534 thousand in 2010 (USD 1,25 X 4,4 MT).
5. This represents a gross profit increase of USD 2 415 thousand for the 2007-2010 period or, assuming, for simplicity, a linear growth over the three years, an annual gross profit of USD 805 thousand.
6. According to DanPer managers, the use of standards in field operations (notably NTP 209.402, NTP 011.109, HACCP, OHSAS 18001, SA 8000, and others) has been an important catalyst in the improvement of the selected products harvested from company fields. Throughout the assessment process, it was estimated that the use of standards contributed about 40% to the results

indicated under step 5 : i.e. an average contribution of USD 321,9 thousand to the company's annual gross profits.

### **Production/operations**

Six KOIs were considered for this business function, but the quantitative assessment was limited to two : *the actual production costs over the planned production cost* and *asparagus production efficiency* (data re: other KOI's were unavailable or not relevant).

The quantitative assessment of *actual production costs versus planned production cost* was conducted as follows :

1. The assessment covers the labour cost incurred in producing white preserved asparagus for export. Planned and actual labour cost for 2007 and 2010 are compared and reductions in the difference between planned vs. actual are accounted as cost savings.
2. In 2007, the *planned* labour cost per worker was USD 0,32 per kilogram with a resulting *actual* cost of USD 0,40 per kilogram. In 2010, the planned and actual labour costs were USD 0,46 and USD 0,53 per kilogram respectively.
3. The quantity of preserved asparagus exported in the analysis period (2007 and 2010) was 21,5 MT and 17,1 MT.
4. Therefore, the actual labour cost exceeded the planned cost by 1 720 thousand USD in 2007 and by 1 197 thousand USD in 2010 (respectively, 25 % and 15,2% of the planned costs). This represents improved cost planning, with a decrease of the labour cost delta of 523 thousand USD (2010 vs. 2007), or 174,3 thousand USD per year. This figure is assumed as labour cost savings.
5. The use of standards (in particular ISO 9001 supporting a thorough implementation of the continual improvement philosophy) has significantly contributed to improve process efficiency. DanPer's management estimated that the implementation of standards

contributed 40% to the results indicated under item 4 – that is, an average annual cost saving of USD 71,4 thousand (40% of 178,4 thousand USD).

The assessment of the KOI *asparagus production efficiency* is considered embedded in the average growth of profits calculated for the marketing and sales function. More details on this assessment can be found in the full report.

## **Marketing and sales**

DanPer exports nearly all of its products (75% of total production is exported to the USA and Europe). These target markets, and the buyers serving them, are very demanding in terms of safety, traceability and quality requirements.

Many customers (notably large department store chains) demand certifications against several standards – in these cases, certification is almost “mandatory” in winning contracts. However, even for those customers who do not directly request certification, commitment to standards and certification strongly support the image of, and confidence in, the company, making it easier to reach contractual agreements.

Five KOIs are considered for this business function, but the quantitative assessment was limited to one: *average growth in profits* (data re other KOIs were unavailable or not relevant). The assessment for this KOI was conducted as follows:

1. The total company sales increased from USD 62 340 thousand in 2007 to USD 89 610 thousand in 2010. This represents a USD 27 270 thousand difference.
2. Assuming a linear growth over the three years, this represents an average annual sales increase of USD 9 090 thousand. Considering the average gross profits for the period (23,6%), this gives an

annual gross profit average of USD 2 147,3 thousand per year. Asparagus exports account for approximately 50 % of that amount, i.e. USD 1 073,7 thousand.

As noted above, *compliance with regulations* (relevant to export markets), and *certifications and extensive use of standards* (e.g. ISO 9001, OHSAS 18001, HACCP, Global GAP, Regulation (EC) No 2377/1999, Ethical Trading Initiative – ETI, etc.) are considered a critical factor in DanPer's sales growth. DanPer's management estimated that certifications and implementation of standards contributed to increased sales in about 50 % of cases. This translates to a contribution to average annual gross profit of USD 536,8 thousand (50 % of USD 1 073,7 thousand).

### **Research and development**

The use of standards by this business function has had a seminal impact, supporting the conception of new ways to improve production processes or to create new product lines. In addition, using standards has made it easier to design new products according to international requirements and/or to adapt products to customer requirements in a shorter time.

Of the five KOs identified for this business function, only one could be assessed, *number of new products accepted by customers over the number of products offered by DanPer*. The assessment was conducted as indicated below :

1. The overall sales value of new products in 2007 was only USD 17 035, but reached USD 1 031,5 thousand in 2010. An increase of USD 1 014,5 thousand or, assuming a linear growth, an annual increase of USD 338,2 thousand.
2. Based on the average gross profit margin (23,6 %) this represents an annual contribution of USD 79,9 thousand to the total company gross-profit.



3. The asparagus business represent 50% of the total, therefore the annual contribution to gross profits derived from asparagus can be estimated at USD 39,9 thousand.

**Table 6** summarizes the financial impact of the use of standards for the selected business functions. The total economic impact of standards was estimated as contributing 648 158 USD to the company’s annual gross profit. This represents about 30% of the gross profit or about 1,7% of the total company turnover derived from asparagus in 2010.

Selected business functions (BF)	Financial impact of standards on total BFs
Field operations	USD 321,9 thousand(*)
Production/operations	USD 71,4 thousand (**)
Marketing and sales	USD 536,8 thousand
Research and development	USD 39,9 thousand
<b>Total impact of standards</b>	<b>USD 648,2 thousand</b>

Source : DanPer Trujillo

Note: (\*) To avoid double counting, this contribution is considered embedded in the average growth in profits calculated for the marketing and sales function. (\*\*) This amount does not take into account the estimated value for the KOI: asparagus production efficiency (USD 16,6 thousand), in order to avoid double counting.

**Table 6** The economic benefits of standards for DanPer, based on average annual gross profits 2007-2010

## 9.9 Qualitative and semi-quantitative considerations

As previously noted, the quantitative assessment was completed for four business functions from the seven identified. **Human resources**, however, deserves further investigation in order to complement the analysis conducted so far.

DanPer's awareness of, and commitment to, social responsibility is an important factor contributing to its success. This highlights its influence on employee performance, and an attitude that is considered very positively by buyers (in support of their own supply chain accountability, and as further proof of the company's seriousness and qualification). Considering DanPer's attitude on standards, and its use of standards in the social responsibility area (e.g. OHSAS 18001), an attempt was also made to assess the impact of standards on human resource activities.

Five KOIs were identified (see **Table 3**), however the lack of specific data did not allow us to perform the assessment. For example, in the case of "personnel enquiries" (concerning the working environment), DanPer has recently implemented an employee survey, but there is no reference to historical data to evaluate changes. In the case of "personnel improvement" (training), the use of standards may have a direct impact as a means of facilitating transfer of information and knowledge, but no relevant data were found. No direct correlation between the application of standards and KOIs such as "salary increase" or "retention of employees"<sup>18</sup> was identified.

However, the company management is well aware of the importance of fair personnel practices and social matters. This attitude seems to have contributed significantly to the involvement and motivation of employees in supporting the effective and rapid implementation of standards, the benefits of which are reflected in the company's rapid growth.

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18 The strong agricultural growth in the north of Peru is leading to a demand for more workers. As a result, the hiring process has become complicated for companies in a job market with inadequate qualified labour, especially during the high season.

**Procurement and logistics** is another business function critical to the production process. Although this function does not base its activities directly on standards, it does so indirectly through the specifications provided by other departments that extensively apply standards in their processes. A more extensive application of standards by this business function could improve, for example, its purchase programme to achieve further cost savings and strengthen its partnership with suppliers.

Within the field operation business function, the KOI *quality of the harvested crops* was not assessed, because we were not able to find a way to quantify the extra value derived from top quality products, and avoid double counting with other KOIs in the marketing and sales function. However, DanPer's management indicated that the implementation of standards has also contributed to a significant increase in the percentage of asparagus ranked as "top quality product", from 31,5 % of the total in 2007 to 45,4 % in 2010.

Finally, it is important to emphasise that DanPer has been able to grow faster than the sector. Its share of Peru's asparagus exports increased from 8.5 % in 2007 to 9.5 % in 2010. The company's management believes that standards, and its attitude to standards, have contributed significantly to its success. As a result, it seems reasonable to conclude that the value of standards to DanPer exceeds the figures given in **Table 6**.

However, while the implementation of standards has contributed to DanPer's performance and impressive growth, it is also important to consider that this *has primarily been led by the expansion of global demand and the existence of Free Trade Agreements* – factors that cannot be isolated from the pure impact of the use of standards.

## 9.10 Conclusions

DanPer has been active in the market for nearly 17 years, and has implemented key standards such as NTP 011.109, NTP 011.116, NTP 209.401, ISO 9001, GlobalGAP, USGAP, OHSAS 18001, and HACCP since 2004. Not all its business functions apply standards, but the company intends to further expand their application in future.

The economic value of standards shown in **Table 6** provides an estimate of the company's asparagus business. Extending the analysis to the full range of DanPer's agricultural products (including artichokes, pepper, beans and fruits) would certainly increase the figures in the table. It is also likely that standards have an impact on some of the operational indicators that could not be quantified during the assessment.

According to DanPer's managers, standards play an essential role. They continue to facilitate access to markets and new customers. As analyzed in this study, this contribution generates substantial economic value. In addition, standards have been valuable tools in helping DanPer to improve its production processes and activities in several areas.

Although the methodology was fully applied to only one (leading) company, and in qualitative terms to another key player of the sector, the results enable us to consider the reality that standards create value. In future it would be worthwhile considering application of the methodology to the whole asparagus sector or even to the total Peruvian agro-export industry.

Many small to medium enterprises operate in these industries and follow the steps undertaken by larger companies. In a broad sense, the implementation of standards is contributing to a change in the landscape of the sector, and this is reflected in improved competi-

tiveness, technology transfer, high employment, process improvements, access to markets and the growing interest of new investors and customers.

