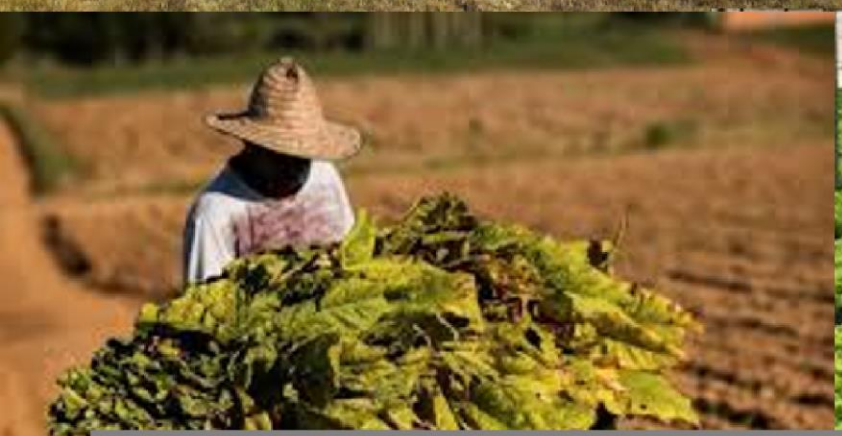


New Agriculture New Generation:

Recharging Greek Youth to Revitalize the Agriculture and Food Sector of the Greek Economy

Sectoral Study on the potential of Agrologisticts in Greece

Summary Report

JUNE 2020

NEW AGRICULTURE NEW GENERATION

ΕΞΑΝΤΑΣ
ΙΝΣΤΙΤΟΥΤΟ ΛΙΜΕΝΙΚΗΣ ΚΑΤΑΡΤΙΣΗΣ

RUTGERS
Center for Advanced Infrastructure and Transportation

CERTH
CENTRE FOR RESEARCH & TECHNOLOGY HELLAS

Πανεπιστήμιο Πειραιώς
University of Piraeus

Founding Donor

ΙΣΝ/SNF ΙΔΡΥΜΑ ΣΤΑΥΡΟΣ ΝΙΑΡΧΟΣ
STAVROS NIARCHOS FOUNDATION

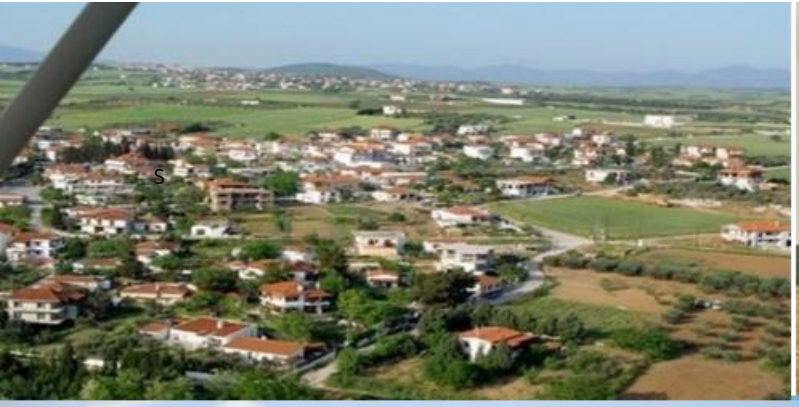
The Sectoral Study on the potential of Agrologistics in Greece has been funded by New Agriculture New Generation, a non profit organization that supports youth career opportunities and entrepreneurship in the Agrifood sector in Greece.

The organization was established under the initiative and with the founding support of the Stavros Niarchos Foundation (SNF), as part of its " Recharching The Youth" program.

NEW AGRICULTURE
NEW GENERATION

Founding Donor

ΙΣΝ/SNF ΙΔΡΥΜΑ ΣΤΑΥΡΟΣ ΝΙΑΡΧΟΣ
STAVROS NIARCHOS FOUNDATION




Sectoral Study on the potential of Agrologisticts in Greece

SUMMARY REPORT

Prepared by: UNIVERSITY OF PIRAEUS, QUANTITATIVE ANALYSIS IN SHIPPING LAB; EXANTAS TRAINING INSTITUTE; CENTER FOR ADVANCED INFRASTRUCTURE AND TRANSPORTATION, RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY; HELLENICINSTITUTE OF TRANSPORT, CENTRE FOR RESEARCH AND TECHNOLOGY HELLAS

Status: Final

Author: Maria Boile, Sotirios Theofanis, Nicholas Rodopoulos, Ali Maher, Afroditi Anagnostopoulou

NEW AGRICULTURE
NEW GENERATION

Summary

The objective of the Sectoral Study on the potential of Agrologisticts in Greece is threefold: (a) examine the level of development of the sector in the country now and in the future; (b) evaluate the potential of developing a network of Agrologistics hubs in the country with a focus on the development of an Agrologistics Center in the region of Thessaloniki; (c) identify skills gaps and shortages in the agribusiness industry, assess the sector's attractiveness to young professionals and produce recommendations for the development of an Agrosynergy training program to enhance the sector's further development.

As a first step, the international state-of-the-art and state-of-practice of the Agrologistics sector is reviewed. Empirical cases that can be successfully adopted by the Greek agricultural sector are analyzed, including emerging technological trends, new policy imperatives and best practices. Subsequently, the relative characteristics and specifics of the Agrologistics sector at national level are considered, and the current status and potential of the sector are assessed. An overview of the activities of the Greek secondary and tertiary sectors of the economy that are related to the Agrologistics is provided with emphasis being given to the processing, packaging as well as the supply chain and logistics activities that heavily impact agribusiness in Greece. Subsequently, the potential of developing Agrologistics hubs networks in Greece is investigated. A comprehensive analysis examined the capacity of several areas that present strong competitive advantage and significant potential for successfully supporting Agrologistics hubs for both national and regional operations exploring also the potential benefits theyprovide for improving the balance between the Greek production and the local demand and exports. The existing distribution networks as well as the necessary characteristics for creating successful hubs and centers of Agrologistics services are identified. The best geographic location for such a hub that can also boost the sector is explored, resulting in the recommendation of developing a relevant center in the region of Central Macedonia and more specifically in Thessaloniki. A prefeasibility study based on criteria such as the hub's accessibility to multiple transport modes and its proximity to critical local and international markets is presented. Future scenarios are developed for assessing the prospective role of the Agrologistics sector in Greece and for enhancing the potential viability of a relevant hub in Thessaloniki.

As a final step, the existing education and training (E&T) curricula in the context of the Agrologistics sector are assessed vis- à-vis the industry needs and requirements for skills and qualifications of their current and future employees, in order to efficiently identify the mismatches between skills supply and demand and the associated gaps. To achieve this, the relevant education and training programs available in Greece are mapped and presented with emphasis being given on the tertiary education and vocational education and training offerings in the context of the existing national accreditation and certification system. In total, 116 E&T programs of different EQF levels are identified. To complement the mapping of E&T offers the youth career aspirations, opportunities and barriers are also determined through a questionnaire survey addressed to young professionals and undergraduates of age between 18 and 40 years old. In total, 64 participants provided insightful information about their interest in being engaged in the Agrologistics sector and the challenges that constrain them from following a relevant career path. The results indicated also the potential capacity of the sector to support its further growth in terms of human resources. The skills needs and qualifications of the Agribusiness are defined through a questionnaire survey addressed to relevant companies that cover multiple activities of the whole value chain of the sector. The industry skills needs and requirements are assessed, in order to identify any skills gaps and imbalance between them and she supply of skills. These findings are utilized so as to provide recommendations on how contemporary education and training programs should be structured towards ensuring a well-qualified and well-trained current and future workforce in the Agrologistics sector, supporting thus the Agrosynergy training programs and contributing in the near future to the further development of the sector.

Περίληψη

Στόχος της παρούσας μελέτης σχετικά με τις δυνατότητες του κλάδου των Agrologistics στην Ελλάδα είναι: (α) να εξετάσει το επίπεδο ανάπτυξης του τομέα στη χώρα τώρα και στο μέλλον β) να αξιολογήσει τις δυνατότητες ανάπτυξης ενός δικτύου κέντρων Agrologistics στη χώρα με έμφαση στην ανάπτυξη ενός τέτοιου κέντρου στην περιοχή της Θεσσαλονίκης (γ) να εντοπίσει κενά δεξιοτήτων και ελλείψεις στο χώρο των αγροτικών επιχειρήσεων, να αξιολογήσει την ελκυστικότητα του τομέα σε νέους επαγγελματίες και να διατυπώσει προτάσεις για την ανάπτυξη ενός προγράμματος κατάρτισης για την ενίσχυση και περαιτέρω ανάπτυξη του τομέα.

Ως πρώτο βήμα εξετάζονται οι διεθνείς βέλτιστες και σύγχρονες πρακτικές στον τομέα των Agrologistics. Αναλύονται εμπειρικές περιπτώσεις που μπορούν να υιοθετηθούν επιτυχώς από τον ελληνικό τομέα των Agrologistics, συμπεριλαμβανομένων των νέων τεχνολογικών τάσεων, πολιτικών επιταγών και βέλτιστων πρακτικών. Στη συνέχεια, λαμβάνονται υπόψη τα σχετικά χαρακτηριστικά και οι ιδιαιτερότητες του τομέα σε εθνικό επίπεδο και αξιολογείται η τρέχουσα κατάσταση και το δυναμικό του. Γίνεται επισκόπηση των δραστηριοτήτων του δευτερογενούς και τριτογενούς τομέα της Ελληνικής οικονομίας με έμφαση στην επεξεργασία, τη συσκευασία, καθώς και την αλυσίδα εφοδιασμού και τις δραστηριότητες εφοδιαστικής που επηρεάζουν σε μεγάλο βαθμό τις επιχειρήσεις στον τομέα της αγροτικής παραγωγής. Στη συνέχεια διερευνάται η δυνατότητα ανάπτυξης δικτύων κόμβων Agrologistics στη χώρα. Αναλύονται τομείς που παρουσιάζουν ισχυρό ανταγωνιστικό πλεονέκτημα και σημαντικές δυνατότητες επιτυχούς υποστήριξης των κόμβων Agrologistics και διερευνάται η πιθανή συνεισφορά τους στη βελτίωση της ισορροπίας μεταξύ της ελληνικής παραγωγής, και της τοπικής ζήτησης και εξαγωγών. Εξετάζονται τα υφιστάμενα δίκτυα διανομής και τα άλλα απαραίτητα στοιχεία για τη δημιουργία επιτυχημένων κέντρων και υπηρεσιών Agrologistics. Εξετάζεται επίσης η βέλτιστη γεωγραφική θέση για ανάπτυξη ενός τέτοιου κόμβου που θα έχει τη δυνατότητα να ενισχύσει τον τομέα, και προτείνεται η ανάπτυξη κέντρου Agrologistics στην περιοχή της Κεντρικής Μακεδονίας και πιο συγκεκριμένα στη Θεσσαλονίκη. Παρουσιάζεται μια προκαταρκτική μελέτη βάσει κριτηρίων όπως η προσβασιμότητα του κόμβου μέσω εναλλακτικών μέσων μεταφοράς και η εγγύτητά του σε κρίσιμες τοπικές και διεθνείς αγορές. Αναπτύσσονται μελλοντικά σενάρια για την αξιολόγηση της συμβολής του τομέα των Agrologistics στην Ελλάδα καθώς και για την ενίσχυση της βιωσιμότητας ενός κόμβου Agrologistics στη Θεσσαλονίκη.

Ως τελικό βήμα, τα υφιστάμενα προγράμματα εκπαίδευσης και κατάρτισης (Ε&Κ) στον τομέα των Agrologistics αξιολογούνται σε σχέση με τις ανάγκες και τις απαιτήσεις της αγοράς ώστε να διερευνηθούν πιθανές αναντιστοιχίες ή κενά μεταξύ προσφοράς και ζήτησης δεξιοτήτων. Για να επιτευχθεί αυτό, χαρτογραφούνται και παρουσιάζονται τα σχετικά προγράμματα εκπαίδευσης και κατάρτισης στην Ελλάδα με έμφαση στην προσφορά τριτοβάθμιας εκπαίδευσης και επαγγελματικής εκπαίδευσης και κατάρτισης στο πλαίσιο του υφιστάμενου εθνικού συστήματος διαπίστευσης και πιστοποίησης. Συνολικά, προσδιορίζονται 116 προγράμματα Ε&Κ διαφορετικών επιπέδων EQF. Για τη συμπλήρωση της χαρτογράφησης των προγραμμάτων Ε&Κ οι προσδοκίες νέων σε σχέση με τη σταδιοδρομία τους καθώς και οι ευκαιρίες και τα εμπόδια που παρουσιάζονται καθορίζονται μέσω μιας έρευνας ερωτηματολογίου που απευθύνεται σε νέους επαγγελματίες και φοιτητές ηλικίας μεταξύ 18 και 40 ετών. Συνολικά 64 συμμετέχοντες παρείχαν πληροφορίες σχετικά με το ενδιαφέρον τους να ασχοληθούν με τον τομέα των Agrologistics και τις προκλήσεις που αντιμετωπίζουν. Τα αποτελέσματα ανέδειξαν τη δυναμική του τομέα για περαιτέρω ανάπτυξη. Μια δεύτερη έρευνα ερωτηματολογίου που απευθύνεται σε εταιρείες του κλάδου, στόχο έχει να αξιολογήσει τις απαιτήσεις και ανάγκες για νέες δεξιότητες και να αναδείξει τα όποια κενά μεταξύ αυτών και της προσφοράς δεξιοτήτων. Τέλος, διατυπώνονται προτάσεις σχετικά με το πώς τα σύγχρονα προγράμματα εκπαίδευσης και κατάρτισης θα πρέπει να δομηθούν ώστε να διασφαλιστεί ένα καλά καταρτισμένο και καλά εκπαιδευμένο εργατικό δυναμικό στον τομέα των Agrologistics.

SCOPE OF THE STUDY

The objective of the SectoralStudy on the potential of Agrologisticts in Greece is threefold. The study aims to: (a) examine the level of development of the sector now and in the future; (b) evaluate the potential of developing a network of Agrologistics hubs in the country with a focus on the developmentof an Agrologistics Center in the region of Thessaloniki; (c) identify skills gaps and shortages in the agribusiness industry, assess the sector's attractiveness for young professionals and produce recommendations for the creation of an Agrosynergy training program to support the sector's further development.

OVERVIEW OF THE AGROLOGISTICS SECTOR

As a first step, the state-of-the-art and state-of-practice of the Agrologistics sector is summarized, to form the background of this study. Empirical cases that can be successfully adopted by the Greek agricultural sector are analyzed, including international examples. These include applications of emerging technological trends, new policy imperatives, lessons learnt and good practices, which aim atimproving the efficient management of agricultural products from farm to fork.

Use of IoT and AI technology in the sector has great potential to improve quality of services and increasefinancial benefits from processing and warehousing. Real time information on the location of products and the conditions prevailing in their transportation, storage and packing is of great importance for wholesalers, exporters and retailers. Such applications, however, are not widespread as of yet, with themajority of them confined in developed economies with advanced agri-business sectors.

Collaboration among stakeholders using shared transport, warehouse and infrastructure, leads to highercost efficiency, increased on-shelf availability, reduced traffic congestion and lower energy consumptionin urban areas. The clustering of activities, creating agribusiness parks where businesses can bundle theiractivities, improve their efficiency and lower their costs seems to be an emerging trend in terms of businesses policy. Companies in the agri-business sector need to reduce the wastage of energy and comply with reprocessing of assets utilizing reverse logistics practices, which also help them meet the goal of an environment friendly supply chain.

Review of international cases shows that key success factors may be derived from private investments in infrastructure and government incentives for collaboration among stakeholders. Post-harvest fresh fruit and vegetable losses are key challenges to be tackled. Agri-business hubs, where several businesses are concentrated creating synergies among them, leading among others to reduced costs of managing temperature-controlled infrastructures and services, present good practices. To remain competitive in the global marketplace, businesses need to comply with the quality standards of developed markets andprovide seamless cold chain facilities for perishable products.

THE AGROLOGISTICS INDUSTRY IN GREECE

Agrologistics related activities of the Greek secondary and tertiary sectors of the economy emphasize on *processing* and *packaging*, as well as *supply chain* and *logistics* activities that heavily impact agribusiness in the country.

Processing

The proper utilization of agricultural production and the creation of products that meet the consumer needs and preferences are the subject of a specific part of the secondary sector, namely processing of agricultural products. The contribution of agriculture to the secondary economic sector remains substantial with processing of agricultural products considered to be one of the main industrial activitiesin the sector. The manufacturing sectors engaging in the processing of agricultural products comprise the following: manufacture of food products and beverages, with an annual (2018) turnover of 15.500,6million euro; manufacture of tobacco products with a turnover of 685 million euro; and manufacture oftextiles with a turnover of 746 million euro. The total manufacturing sector amounts to 58.195,2 million euro. The food and beverage industry is accounting for 27% of the total manufacturing turnover havinga higher contribution compared to the European average (10-20%). The industry employs more than 120 thousand persons, corresponding to 37% of the total workforce in the manufacturing sector. The majority of companies (14,765) that are active in the food and beverage industry are very small, family-owned businesses, employing less than 10 people. They account for 15% of the total industry turnover (€ 2.3 billion). The 325 largest companies of the industry employ more than 50 persons and account forapproximately € 10 billion of turnover or 64% of the total sector's turnover. The remaining 21% of the turnover is attributed to the small and medium-sized companies (10-49 employees) of the industry.

The subsectors of the food and beverage industry include bakery and farinaceous products, which accounts for the highest share (20%) in terms of gross value added, while fruits and vegetables, and beverages are in the second place with 16% each, and dairy products are third with 14% of the industry's total gross value added.

Exports of the Greek processed food and beverage products in 2017 amounted to 3.06 billion euro whileimports amounted to 4.8 billion euro. The main products that recorded a positive balance of trade werethe processed fruits and vegetables, and oils and fats, while all other product categories had more imports than exports.

The food industry in Greece has not taken full advantage of the agricultural production and its wide range of products. The majority of the agricultural products are exported in bulk without a substantial degree of processing, and little added value from manufacturing. A more holistic and focused product export strategy needs to be drafted. With 38.3% of the entire secondary sector clearly showing the potential of the food industry to exploit innovative solutions for strengthening its market position, the domestic industry is expected to improve its competitiveness through adoption of new technologies and

innovative business practices, achieving high levels of product diversification and quality, and expandingits market share.

The changes that are observed today require a fundamental transformation in operational and businesspractices of all actors involved in the agri-food chain along with the drafting of sector related policies and support initiatives to create favorable conditions for the development of innovative efforts that willfacilitate the sector's extroversion and business potential.

Greece has adopted a support programme, under the 2014-2020 rural development programme, to promote agribusiness activities by supporting investments in processing, marketing and development ofagricultural products. Some of the focus areas of the support action encourage, among others, the digitaltransformation in the agrifood sector, construction or improvement of building infrastructure, purchaseand installation of laboratory equipment to the extent that it serves the operational activities as well asequipment for the production of energy from renewable sources and equipment for water saving and waste treatment. The industry focuses on strengthening its collaboration with other economic activities.With the support of relevant government bodies the extroversion of the industry may increase by efficiently promoting the uniqueness and quality of Greek products and choosing the appropriate distribution channels.

Packaging

The production of packaging materials is of great importance for the majority of the agricultural sector and the associated businesses producing food, beverages, tobacco and other agriculturally basedproducts.

According to the structural business statistics (SBS) of Eurostat, more than 600 companies are active in Greece in the manufacture of the 3 major type of packaging products namely the plastic packaging products, corrugated paper and paperboard packages, and containers and light metal packaging. In totalthere are currently 324 active companies manufacturing plastic packing, 210 for paper and 73 for metalpackaging. The total turnover of the plastic packing businesses rose to more than € 883 million in 2017 from € 629 million in 2010 (an increase of 40%), while those of paper and metal packaging reached € 482 million and € 368 million respectively.

Significant changes and rearrangements are expected in the packaging industry as a result of the new Directive (EU) 2018/852 of the European Parliament and of the Council of 30 May 2018 regarding the single use plastics amending the Directive 94/62/EC on packaging and packaging waste.

Supply chain sector

The tertiary sector in Greece accounts for the highest employment rates (73%) and GDP (81%) comparedto the rest economic sectors and It covers a wide range of economic activities related to i) market services sector like commerce, transport, accommodation and food service activities, etc. and ii) non- market services like public administration, health and social work, education, etc. In relation to the agribusiness, all the services that are provided in businesses and consumers across the agricultural

supply chain and add value to the related products, fall under this sector. The Greek supply chain sectoris an ecosystem of economic activities that are a major source of employment with substantial contribution to the country's GDP covering all modes of transport (land, water and air), storage and all the transport related activities. They cover a wide range of activities throughout the agricultural supply chain from raw material procurement, storage and distribution of the final products to consumers.

The presence of an efficient and reliable logistics network covering all the necessary storage, transport and ancillary services is crucial for the availability and effective distribution of goods in a market. In thecase of Greece however, the logistics outsourcing is approximately 20% of the total transport expenditures highlighting the need for improvements in the sector and for adoption of modern-day logistics practices that will help lower the costs and contribute to the sustainability of supply chains.

According to Eurostat (2017), the Greek supply chain sector consists of 60.143 companies of which 58.566 are very small (0 to 9 people) while there are also 1.316 small companies (10 to 49 people), 204medium (50 to 249 people) and 57 large companies (> 250 people).

Logistics services

The majority of logistics service providers in Greece are based in the Attica region in locations such as the Thriassian Field (Aspropyrgos, Magoula, Mandra, Elefsina), Avlona, Oinofyta along with Paiania and Koropi in close proximity to the Athens International Airport where several 3PL companies are also active offering combined sea - air and air - road transport services. Furthermore, many of the businesses that are engaged in freight forwarding activities maintain facilities and warehouses in northern Greece in thegreater Thessaloniki area (Kalochori, Thermi, and Sindos) and other important provincial cities throughout the country. Approximately 40% of these are large sized multinational or domestic companies (that partner with large foreign companies) which cover almost the entire Greek territory offering a full range of services to their clients which mainly consist of large businesses. For covering thesmaller and regional markets, the 3PL providers often form partnerships with local agencies.

The majority of the sector is comprised of small and medium sized companies that maintain smaller facilities and offer a limited range of services due to inability to follow technological developments and modern operational procedures. These companies hold the smaller market share and their customers are also small businesses with limited transportation and storage service requirements.

Regarding the distribution of the third party logistics companies in the main business categories, the services associated with the storage and handling of goods account for approximately 59% of the total value of the provided 3PL services, out of which the 44% corresponds to the storage and handling of third party dry products and the 15% to the storage and handling of third party refrigerated goods. Thedistribution services are following next with the 34% of the market. The remaining is distributed to the unpacking, repackaging and labeling services and other value adding services (e.g. monitoring, softwaresupport, etc.) with 4% and 3% respectively. It is evident that 93% of the total provided logistics servicescorresponds to the storage and distribution sub-sectors.

In relation to the storage and handling of the third-party products, the majority of the 3PL providers (63%) own warehousing facilities with limited storage capacity of less than 10,000 square meters whileonly 14% have facilities larger than 45,000 square meters. The food and beverage industry remains thesector with the largest percentage regarding the outsourcing of logistics procedures per main product category with approximately 23% of the total.

The country's strategic geographical location is an important factor for the growth of the sector as it provides a gateway to the Balkan region and the central Europe as a whole. To this end, the reformation of the domestic supply chain sector is of paramount importance for the Greek Governments highlightingthe necessity of providing efficient, competitive, reliable, fully integrated, sustainable and high-quality supply chain services that meet the needs of businesses and consumers.

The National Supply Chain Action Plan aims to support the sustainable development of the sector by promoting the country's strategic objective to become a leader in the supply chain at regional and European level. The ports of the country are vital for achieving this goal and especially the Ports of Piraeus and Thessaloniki where a significant part of the transit cargo is exported via international routesas Greece is a transit country for goods between Europe, Asia and Africa. Ports and storage infrastructureto the Northeast part of Greece will also play a significant role as they are also linked to the Black Sea region.

POTENTIAL OF AGROLOGISTICS HUB NETWORKS IN GREECE

Key Agricultural products

A survey of the main supply chains of key agricultural products is performed in an attempt to specify their structure and present a summary of their demand and supply. Key agricultural products include cereals for grain, beans/pulses, vegetables, melons/watermelons and potatoes, industrial plants, trees (orange, lemon, etc.), grapes.

Almost all cereal production in the territory comes from Macedonia, Thessaly and Central Greece. An exception is Oats and Maize also concentrated in Western Greece.

Edible pulse production is also mainly concentrated in Macedonia, Thessaly and Central Greece. An exception is beans with a significant level of production in Peloponnese and North Aegean and broad beans with significant production in Crete.

Vegetable production is spread in many different regions, including Macedonia, Thessaly, Central & Western Greece, Peloponnese and Crete.

Melons, watermelons and potatoes are mainly produced in Macedonia, Thessaly, Western and Central Greece and Crete.

Industrial plants have Macedonia, Thessaly and Central Greece as key producing areas.

Tree production is concentrated mainly in Macedonia, Peloponnese, Thessaly and Western Greece.

Distribution and Storage

The previous steps formed a reference basis upon which the potential of developing Agrologistics hubsnetworks in Greece is investigated. Examination of current practices reveals absence of key logistics infrastructure in Agribusiness. Wholesalers are mainly responsible for providing marketing of agriculturalproducts, storage and distribution, as well as packaging, maturation rooms and other added value activities.

Distribution also takes place via (a) the rural producers' means of transport, supporting mainly small production volumes for central markets and street markets; (b) the inland freight forwarders and/or transport operators and service providers; and (c) coastal transportation mainly through Ro-Ro vessel carrying vehicles.

Agrologistics center location selection and functionalities

The process for selecting a proper location for the establishment of a logistics center includes the availability and quality of infrastructure, connectivity to transport networks, border administration, openness to trade and customs barriers, geographic location and land availability, domestic market size,availability and cost of skilled labor, transport and distribution costs including port and airport charges, land price, political stability and regulation transparency, proximity to producers and to consumption markets.

In designing an Agrologistics center special consideration should be given to the provision of aggregation facilities, sorting, grading and packaging facilities, storage, ambient and controlled temperature facilities,as well as on value addition and market intelligence, distribution, collection, cross docking and logistics,and value chains for end to end linkages.

Typical infrastructures may include trading platforms and shops, packhouse-cold chain, packhouse-ambient, fruit pulping plants, general cargo warehouse, cold storage, ripening store, business center, service and administration buildings, R&D knowledge center. Services and infrastructures are to be supported by modern technological means and electronic platforms, providing traceability in all phasesof operations for each product.

Available services should include standardization and packaging services (processing, packaging & labeling, maturation), quality control services (laboratories, quality product characteristics specification,evaluation of products, suppliers and producers), supply chain and logistics services (storage andwarehousing, order collection, reverse logistics, routing and distribution, cross docking, recycle and waste management), international trade services supporting imports and exports.

Agrologistics hub network development

Analysis of data on agricultural production by region produced useful insights on identifying regions of main importance for developing Agrologistics centers. Based on an assessment of agricultural production per year and of the key transportation infrastructure in each region, it turns out that Thessaloniki area in Central Macedonia is an area of high interest. Thessaloniki is the main hub of agri-food consolidation. It incubates the second largest commercial port of Greece, which is the country's largest export port. The port is connected to the railway system and to the main roadway axis of Egnatia(part of the TEN-T). The area also has an airport, which is currently undergoing major expansions. The transport networks provide access to the northern borders, and connection to the eastern Europe and the Balkans. It should be noted that main export partners of Greece are located in the Balkan region.

Another area of high interest is the Oinofyta area in Attica region. Oinofyta is between Central Greece, Attica and Chalkis the broader region of which has a large production of agricultural products. Oinofytais one of the largest open space areas in Greece with significant industrial activity. There is a large amount of available land, a factor that is important, also for environmental reasons. At the same time, Oinofyta is planned to become a Business Park, which would further emphasize the selection of the area.It should be noted, however, that an assessment of the existing facilities indicates that Attica is alreadyover utilized with small / medium logistics installations.

Besides the two areas of national scope, areas of regional scope that should be further examined include (a) Tripolis, which is located in the heart of Peloponnese, has excellent road connection with the capitalcity of Athens, concentrates large agricultural production volumes, and has large available land capacityalong with an existing industrial zone; (b) Heraklion, which is located in the middle of Crete and has goodconnection to major production areas such as the Messaria valley, (c) Agrinio, which has significant landcapacity, (d) Larissa, which is in the middle of one of the largest production areas of Greece, and (e) Alexandroupolis, which has a port with good connection to the Egnatia roadway and railway connectionproviding access to Bulgaria and Romania.

Potential development of an Agrologistics center in Thessaloniki

Central Macedonia concentrates the largest share of production of major export products like cereals and beans, while It also holds a large share of the production of vegetable. Furthermore, there are exportflows of agricultural products from neighboring countries to Asia and the Mediterranean in which an Agrologistics center in Thessaloniki could play an essential role as a hub for the transit of these products. The hub could also accommodate the flow of agricultural products from MENA countries to Eastern andCentral Europe.

According to the key criteria that were presented earlier, the selection of a proper site for the development of an Agrologistics Center in Thessaloniki is mainly based on the following considerations:

- The category of products, such as fresh, animal, cheese, etc. (market demand).

- The volume of products produced in the broader geographical area per category (market sufficiency).
- Connection to main transport routes (road, rail, ports, airports).
- Connection of the planned production model of the geographical area with the products produced and possible future productions.

Two candidate sites in Thessaloniki that meet the key criteria are the following:

- Gonnos Camp
- Ziaka Camp

Both sites are currently vacant, comprising unused land spaces. The Gonos Camp is characterized as National Logistics Hub. However, it has several disadvantages, including a major one, the presence of mines in the site, which will need to be removed. The Ziakas Camp has the advantage of being near theentrance of the city of Thessaloniki, near the port, relatively near the airport, and near the national roadsto West Macedonia and East Macedonia. It is also characterized as a National Logistics Hub. It is bordering the Thessaloniki central fresh produce market. It is adjacent to the national roadway and an abandoned rail line, which may be revitalized, to connect the site to the national railroad network. The site is 124.37 acres, which is adequate for the proposed development.

Development scenarios and prospects

The development of a network of regional and local Agrologistics centers should be considered. In collaboration with local stakeholders, social economies should be strengthened to target the improvement in quality, quantity and control of agricultural production and costs of distribution as compared to the existing systems.

Currently, there is lack of relevant culture with organized groups of producers who will transform their production process to smart agriculture, while at the same time they will increase the quality of their products. Furthermore, digitization and organized distribution networks that are actively managed to reduce the cost of collecting, storing, processing packaging and transporting the products are deemed essential. The main idea is to implement scenarios of integrated networks, to overcome issues related to the small size of productions. A pessimistic scenario includes small clusters with insignificant footprintin the agricultural sector.

Clustering and networking of production and distribution should be considered as part of a national strategic plan, aiming to increase exports and further expand and develop the distribution networks, soas to overcome issues related to the geography and geomorphology of the country, which results in increased costs. Networking and integration with local logistics centers should be considered. Transport,storage and distribution costs should thus be reduced, to increase the profitability of the primary sectorand reduce the cost for the consumer.

It is important to carefully consider the location selection of the Agricultural centers of local and regionalsignificance, their networking and the mapping of flows over these networks. Exclusive goods movement or freight transport oriented multimodal transport and logistics networks should be designed, toefficiently connect production areas to distant markets. Today, for example, products from the Messaravalley in Crete, move through a sequence of road and sea routes, as follows: by truck to Heraklion, fromthere by boat to Piraeus, from Piraeus by truck to Patras, from Patras by boat to Ancona, and from thereby truck to central markets in Belgium and Germany. The possibility of deploying vessels directly from Heraklion to Trieste and from there by rail to the central European markets should be examined. EitherRo-Ro services or Ro-Pax to also support touristic activity could be used.

E&T NEEDS AND DEVELOPMENT PROGRAMS

Technological advancements, digitalization, environmental regulations and circular economy led to innovation-driven business processes that pose significant challenges to the labour market by transforming the traditional forms of work. The skill-sets of the Agrologistics sector employees have been updated and many activities and job contents have been readjusted in order to adapt to automatedwork practices. There is an increasing need for skilled personnel as well as for reskilling and upskilling ofthe existing workforce. This will be achieved through the restructuring of the existing educational curricula and the development of targeted work-based vocational training programs designed in cooperation with the industry in order to effectively cope with these changes.

Examination of the education and training (E&T) needs in the Agrologistics sector is conducted through (a) an assessment of the existing E&T programs in Greece; (b) an investigation of youth career aspirationsand opportunities and barriers for a relevant career path; (c) analysis of the industry skills requirements;and (d) a assessment of the supply (E&T providers) vis-á-vis the demand (industry) for skills in the sector.

Assessment of education and training programs

The education and training programs that are related to Agrologistics and are offered in Greece cover awide range of the sector's value chain from production of agricultural products to their distribution. Onehundred and sixteen such programs have been reviewed. They correspond to EQF levels 4 – 7 and Professional Certificates. The assessment showed that educational paths are generally long with the majority of the programs being at post-graduate level (47%). Vocational Education and Training (V.E.T.) offerings and Professional Certificates account for 16% and 4% respectively, implying inefficient E&T opportunities for blue collar occupations.

The curricula of the reviewed programs cover the entire value chain of the sector with emphasis on theactivities of the primary sector of the economy. More specifically, 27% of the programs provide skills inGeneral agriculture and agronomy (i.e. skills in agricultural science, farming, food businesses in rural, urban and suburban areas), 15% in Food Science and Technology (i.e. agrifood production, processing, quality control, food safety), 10% in Supply Chain management (i.e. transportation of goods,

optimization of inflow, outflow, storage and distribution) and 10% in Animal Production and Aquaculture(i.e. animal husbandry, fish farming, biotechnology applications, genetic improvement and biodiversity management, conventional and integrated animal production systems aligned with environmental protection). The contents of the rest of the programs qualify their attendees in Business management of farming facilities and agricultural businesses, Agronomics and rural development, Marketing and digital marketing practices for communication and promotion activities, Viticulture, Oenology, Forestry,and Dairy products. It should also be highlighted that all of the programs are continuously adapting to global emerging technological trends, environmental regulations and consumer requirements in order to enhance business activities.

Youth aspirations, opportunities and barriers for a career path in Agrologistics

A questionnaire survey produced 64 responses from participants that are somehow involved in the NewAgriculture for a New Generation program. The age of the respondents ranged from 18 to 40 years old.The survey outcomes indicate that the sector is attractive to young adults as a prospective career (70%of the respondents are interested in following a career in Agrologistics). Additionally, those who are already employed in the sector are willing to change their current jobs only for a relevant position in thesector in which they could better use their skills and qualifications, and/or receive better wages and better job security. Respondents also stated that although they are moderately satisfied by their current job, they have no intentions to change their sector of employment.

The main reasons for choosing such a career path include their *personal interest* in the sector and their *personal career aspirations.* The majority of them would prefer to be employed in the private sector, with a preference in entrepreneurship and running their own businesses. The ideal job for the majority of respondents would include a *friendly work environment*, *provision of good healthcare and insurance coverage*, *safety at work*, *continuous training opportunities* and *opportunities for promotion and career advancement*. However, more than half of the survey participants have not yet considered to start or continue their studies in the field of Agrologistics, while about 41% of them already intends to do so. This is encouraging for the sector considering that its current and potential workforce is willing to specialize and expand its knowledge, skills and qualifications in this field.

Career opportunities and barriers: Young adults consider that career opportunities in Agrologistics are moderately available. Their main sources during job seeking are *the internet and the media* (94%) and then *friends and peers*. Most of them are willing to relocate within Greece or even abroad in order to be recruited in the sector. Furthermore, most of them consider as the main barriers for a career path in Agrologistics the *lack of connections* (50%) and the *lack of work experience*, as well as high unemployment rates in Greece. Another barrier that was noted is the *lack of guidance on job seeking and skills matching* (40%), implying a relevant absence of career counseling and mentoring services.

Career counseling and mentoring services: About 33% of the respondents have access to career counseling and have received services such as (a) talks and seminars with industry professionals; (b) placement opportunities in educational programs; and (c) talks and seminars with alumni from educational institutes.

Perceptions on personal qualifications, skills development and market requirements: 78% of the survey participants mentioned that the main soft skills that the Agrologistics industry currently requires include *teamwork*, *creativity* and *initiative*, followed by *organizational and good time management skills* (74%). The market's recruitment criteria include *work experience in similar positions or field* (72%), *years of work experience* (55%) and *technical and hard skills* (53%). About half of the respondents consider themselves as moderately qualified for a job in the sector (51%). However, they are willing to address the skills mismatch by attending a skills development program, although *time constraints* and the *lack of financial resources* may discourage them for doing so. Their main goals for attending such a program are (a) improve their general skills; (b) receive advice on how to improve their skills through appropriate education or training; as well as (c) gain access to opportunities for internships or work experience, in order of preference. The ideal duration of such a program would be up to 4 weeks with both classroom and online instruction. Nevertheless, the vast majority (85%) are not fully aware of the available skills development programs in the sector. For balancing youth aspirations and the industry needs and requirements, they believe that the best methods are (a) on-the-job training; (b) targeted skilling strategies and skills development programs; as well as (c) private investments on new hires.

Industry needs and skills requirements

A targeted survey of private companies involved in the sector was conducted to determine the industryneeds and skills requirements. Participating companies indicated that they assess at least once a year the skills of their employees and they offer training opportunities, aiming at their reskilling and adaptation to new trends in the sector. Half of them currently have job vacancies, which are somewhat difficult to be filled with well-qualified, well-educated and well-trained employees. The main hard skills gaps that they experience are in the fields of *Food legislation knowledge*, *Market Research*, *Supply chain management*, *Logistics and operations management* and *Transportation, Regulations of transportation of goods* and *Transport network design* (in descending order). Hard skills shortages were also indicated in *Project management and monitoring, ICT/Digital skills, Business management* and *Investment and financing skills.* Soft skills gaps include *leadership, teamwork*, *flexibility and adaptability* and *learning new ideas, methods and techniques*.

Regarding the emerging technological trends in the sector, they estimate that *automated processes*, *digitalization of processes* (e.g. SAP software, digital logistics platforms, etc.) and *Track and Trace systems* will affect them until 2025. *Blockchain* and *Internet of Things (IoT)* are also anticipated to affectthe sector in the mid-term horizon (until 2030). In addition, they highlighted that *Track and Trace systems*, *Smart reefer containers*, *Environmental management* and *Climate change* will have an impact on the skills and qualifications of their workforce.

To tackle these gaps in a timely manner, it is considered that attendance of *M.Sc. programs* and *on-the-job trainings* are appropriate for addressing hard skills, while *targeted training programs and seminars* (i.e. Professional Certificates), *V.E.T. programs* and *in-house training* for transferring experience and knowledge of older professionals to younger ones are the most appropriate for soft skills acquisition. The integration of skills related to emerging trends in the sector into current undergraduate programs

(i.e. B.Sc. programs) was also highlighted as a good practice for addressing the current and future skills gaps.

Skills mismatch between E&T offers and the industry needs and requirements

An assessment of the E&T offers vis-à-vis the industry needs and requirements produced several observations. More specifically, the total number of the available E&T programs in Agrologistics is considered to be quite limited, explaining to some extent the relevant gaps and recruitment difficultiesin the agribusiness industry. Focusing on the hard skills gaps and shortages, resulting from the co- assessment of the E&T offers and the skills requirements from the industry it is noted that only 8% of the reviewed E&T programs provide skills in *Business Management*, while *Supply Chain Management* and *Transport Network Design* are included in 10% of these programs. To this end, such a limited provision of E&T can negatively affect the adequacy of skills and knowledge by the current and potentialworkforce of the sector as well as the efficacy of the sector.

Inadequate or complete absence of skills and knowledge provision is observed in fields such as *market research, project management and monitoring, investment and financing*, which are strongly desired bythe industry. One out of the 116 programs offered such skills (e.g. Market research in Business management and marketing). Furthermore, complete absence of skills and knowledge provision has been identified in the fields of *Project management and monitoring* and *Investment and financing*.

Regarding knowledge in fields relevant to Agrologistics, *ICT/Digital skills* and *knowledge of food legislation* are not adequately covered through the current educational system, while the contents of the relevant available courses do not meet the industry requirements. For instance, there is a market need for professionals qualified in specialized ERP systems (i.e. SAP), which is not provided by any course included in the analysis. The same applies to knowledge of food legislation which is taught through several courses of programs relevant to Food Science, but its application in practical arrangements of the sector is considered to be insufficient. This assessment raises the importance of practical training and internships in the sector as well as of VET programs.

The majority of the assessed curricula did not provide any detailed information on their soft skills provision strategy (e.g. team projects that cultivate teamwork, oral presentations, etc.). To this end, thesoft skills gaps are considered to consist of *leadership*, *teamwork*, *flexibility and adaptability* and capabilities to *learn new ideas, methods and techniques*, as they were pointed out by the questionnairesurvey targeted to the industry.

FUTURE DIRECTIONS

Based on the aforementioned findings of the study, it can be concluded that the development of Agrologistics hubs would enhance the further development of the primary agricultural activity in Greece. Considering also their continuous emergence, new technologies should be adopted, integrated and extensively used in the Agrologistics value chain activities.

Within this context, several technological solutions can support the sector and contribute to its improvement. An indicative example is the development and use of electronic auction platforms or smart agriculture, exploiting Internet of Things and Big Data analytics, to add value to the sector. The development of clusters for enhancing exports and building synergies with the tourism sector would also be a sustainable business solution.

Industry 4.0 is gradually integrated in the Agrologistics sector. This integration is anticipated to be accelerated after the Covid-19 crisis, while innovation, digital ecosystems, virtual rural communities ande-Logistics will be imperative in order to ensure business sustainability, reduce operational risks and efficiently interconnect primary production with all key stakeholders. The secondary and tertiary sectors should be enhanced in order to support the balance between supply and demand of agricultural products and optimize it in terms of time, costs, volume and quality.

Further investments in Agrologistics are necessary in Greece in order to leverage its potential through current and emerging technological advancements.

Investments are also required in the enhancement of the existing and the development of new E&T programs in Agrologistics. Such investments have the potential to improve employment opportunities in the sector, increase its attractiveness as a career path especially for young professionals and enhanceits capability of providing higher quality and higher paying jobs compared to its current status. Servicesthat provide information about relevant career opportunities in the sector and about key enablers in terms of skills and competences should also be improved in order to better meet the labor market requirements. Within this context, Internet-based campaigns may be rather effective, given that the main source of information for the majority of young professionals is the Internet and media. In addition, counseling and mentoring services are also strongly recommended in order to facilitate job-seeking through a better and more targeted guidance. Other means of providing valuable insights on the industry requirements are seminars with industry experts, industry placements via educational programs and talks/seminars with alumni of educational institutions.

Collaboration channels and synergies between education and training providers and the industry shouldbe established, aiming at strengthening employment opportunities. Apprenticeship programs should also be strengthened, to enable young professionals acquire the skills and competences that the industrycurrently requires.

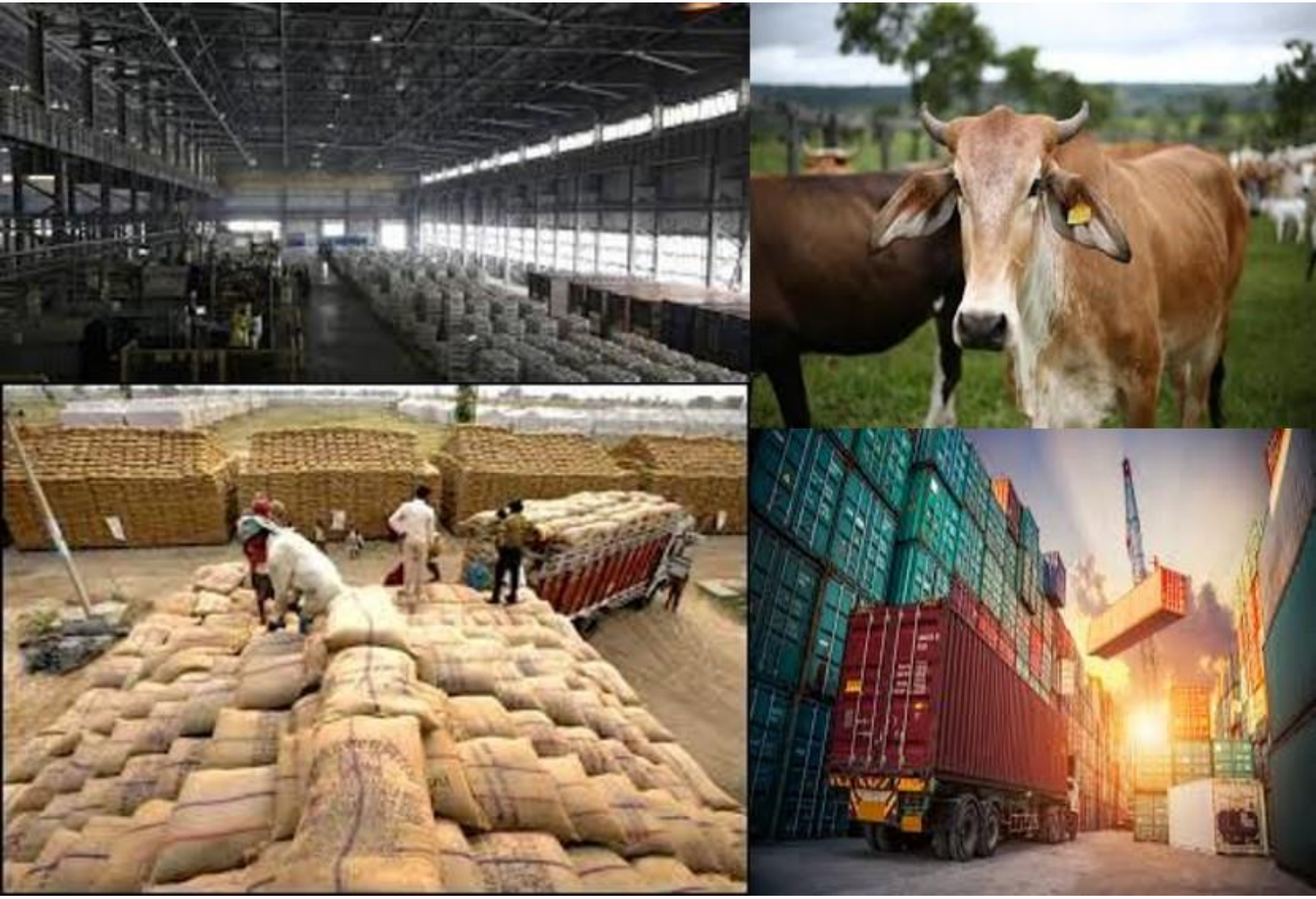
Stronger investments by the private sector are also required in order to increase the number of new hires in the sector. In this way, employability in the sector can be effectively strengthened, complemented by on-the-job training, skilling strategies and skills development programs. The establishment of new skills development programs with short duration (up to 4 weeks), low cost of participation or sponsorship opportunities should be further enhanced.

A disconnection between supply (E&T programs) and demand (industry) has been identified with regard to job opportunities and skills. The industry mentions that there are job vacancies with difficulties to befilled due to lack of applicants with the required skills and competence, while prospective employees

highlighted that there is a lack of job availability. Considering, however, that most of the prospective employees indicate that their qualifications level is average, the development of more and better targeted programs for skills acquisition becomes necessary.

The main hard skills gaps are focused on food legislation knowledge, market research, supply chain management, logistics and operations management, transportation of goods regulation knowledge, transportation network design related skills. The majority of them seem to be related to the transport and handling processes and these should be integrated in future training programs. The main soft skillsgaps consist of leadership, teamwork, flexibility and adaptability and capabilities to learn new ideas, methods and techniques.

Hard skills are best acquired through on-the-job training and in-house transfer of knowledge and experience, while soft skills are better acquired through VET programs. These findings comply with the aforementioned recommendations for industry placements in education and training programs, and apprenticeship programs. The existing programs should improve their structures and include in their curricula skills related to emerging technological trends that are gradually adopted from the sector.



JUNE 2020

Founding Donor

ΙΣΝ/SNF ΙΔΡΥΜΑ ΣΤΑΥΡΟΣ ΝΙΑΡΧΟΣ
STAVROS NIARCHOS FOUNDATION