Δημήτριος Βλάχος
Διευθυντής, Εργαστήριο Ποσοτικής Ανάλυσης,
Logistics & Διαχείρισης Εφοδιαστικής Αλυσίδας, ΑΠΘ

Dimitrios Vlachos
Director, Laboratory of Statistics & Quantitative Analysis Methods, Logistics & Supply Chain Management, AUTh
Academia and Business Collaboration: Success Stories

Prof. Dimitrios Vlachos
Mechanical Engineering Department,
Aristotle University of Thessaloniki
vlachos1@auth.gr

President of the Board,
Greek Association of Supply Chain Management (EELBE)
Agenda

- Introduction?
- Our experience
- Success stories?
- Wrap-up
Innovation Capacity Building by Strengthening Expertise and Research in the Design, Planning and Operations of Green Agrifood Supply Chains

Objectives:
- Develop A.U.Th.’s research excellence in the areas of Agrifood Supply Chain Management and Logistics.
- Reinforce and consolidate A.U.Th.’s overall research potential in Agrifood Logistics Management.
- Develop strategic partnerships with international, well acknowledged research entities.
- Promote synergies with European stakeholders and policy-makers.
- Assist the Agrifood sector SMEs in the Southeastern European and Mediterranean Region in becoming more competitive, by adopting new SCM techniques and logistics practices developed through research.
- Foster transnational cooperation in the Agrifood sector between A.U.Th. and the participating organizations.
- Enable a comprehensive approach towards the Agrifood Supply Chain by promoting Agrifood waste management issues.
- Unlock the full research potential of A.U.Th. for a better integration in the enlarged European Research Area.
- Increase the overall capacity of the Southeastern European and Mediterranean region in enhancing science and technology based economic development, focused on the Agrifood Industry.
- Raise business awareness about Corporate Social Responsibility (CSR) in the field.

Funding: European Commission, FP7 Framework
Forecasting of Clingstone Peaches
Annual Yield for Greece

Objectives:

- Design of a system for collection, organization of yield-related historical data
- Geographical representation (GIS) of clingstone peach production per variety
- Development of a software application for supporting forecasting of annual yield per area and peach variety
- Performance analysis and calibration of the proposed system.

Funding: Greek Canning Peach Association (a cluster of 17 Canned Peach Manufacturer)
Strategic Supply Chain Design and Best Inventory Management Practices

Objectives:

- Strategic design of company’s warehouses (Number, Location, Capacity, Purpose)
- Feasibility study for the establishment of a new finished goods warehouse
- Design and planning of tactical inventory management policies (raw materials, semi-finished and finished goods).

Funding: ZANAE S.A.
Design of Bio-refinery for peach kernels

**AIM**

**Sustainable valorization of by-products** from the peach industrial processes and the design of an integrated bio-refinery of peach kernels and pits

\(\sim 18,900\) tn peach stones/yr

Can we use them as raw materials for high added value products?

**Identification** of the composition of Greek peach kernels & recovery of potent bioactive compounds

Improve the production process based on the characteristics of Greek peaches

**PEACH KERNELS**

- Peach industries cover a large part of the food production in Greece
- Industrial processes of peaches (canned peaches, jams, juices) result in a significant amounts of waste stones
- Peach stone is 5-7% of the peach weight (\(\sim 18,900\) tn/yr)

**PEACH KERNEL**

- Mesocarp
- Exocarp (skin)
- Seed is 5-6% of the stone weight
- Seed (kernel)
- Endocarp
- Endocarp (pit)

- **Strong antioxidant activity**
- **Low concentration of amygdalin**
- **Greek peach kernel oil can be used in cosmeceuticals and food supplements**

Sustainable exploitation of waste peach stones (kernels & pit) to reinforce cyclic economy by the transformation of industries’ waste to high added value products.
Data analytics for urban distribution and last-mile logistics in Thessaloniki

Dataset
- Region: Metropolitan Thessaloniki
- Observation period: 2 months
- Fleet: 383 Vehicles (small and medium-sized trucks) of a 3PL company
- GPS produced timestamps (4 per minute)
- Information about timestamp, Longitude, Latitude and Vehicle speed included

Project goals
- Better understanding of vehicle’s behavior in the city
- Qualitative observation of driving behavior in the city of Thessaloniki
- Quantification of vehicle’s speed and delays for different time windows
- Cost analysis of 3PL services.
Supply Chain Digitalization

IoT products integrated into packaging

Sensors

Tags

Gateways

Smart container → Smart supply chain → Controlled distribution
Blockchain Agrifood Supply Chains

App step: Farming

App step: Processing

App step: Distribution

App step: Retailing

Port of Origin

Shipping Line for Maritime freight

Port of Destination

Legend:
- SC Actor
- Distribution Agent
- Product Flow
- Information Flow
- Distribution Phases
- Transaction Blocks
- Blockchain Node
Agrifood Blockchain Application
Unmanned (Ground, Aerial, Maritime) Vehicles for Supply Chain Management

**Applications:** Warehouse Management, Intralogists, Flexible Manufacturing Technologies, Precision Farming, Hazardous Environments.
3D Simulation in Precision Farming using drones

1. Orchard Field

2. Mapping for precision farming activities

3. Video Stream and Image Processing for precision farming activities
**PLANT UP | AUTh Core Node | Research Infrastructure**

6 laboratories | 7 academic staff | 8 new researchers

**Exploitation of Natural Products (NP) from Hellenic biodiversity**

- Laboratory of Quantitative Analysis, Logistics and Supply Chain Management
  - Feasibility and sustainability studies
  - Green supply chains management
  - Logistics

- Laboratory of Organic Chemistry
  - Technological applications of NP-Isolation-Metabolomic Analysis-standardization of extracts with NPs-Production scale up

- Laboratory of Food Chemistry and Technology
  - Study of chemical composition of NP
  - Biological activities of NP

- Laboratory of Systematic Botany and Phytogeography
  - Collection, systematic identification and characterization of NP

- Laboratory of Pharmacognosy
  - Isolation of bioactive compounds from natural sources
  - Structure standardization

- Laboratory of spectroscopy
  - Study of the materials with Raman spectroscopy

**Aim-Objectives**

- Creation of a panhellenic-based excellence infrastructure based on state-of-the-art technologies
- Recording of the chemical diversity in the Greek herbal capital
- Development and production of certified propagating material for aromatic, medicinal plants and native plants
- Implementation of innovative technologies, production and cultivation systems
- Sustainability study of processes related to industrial scale “green” production of Natural Products
- Develop new and long-term research collaborations, transfer knowledge among research institutions and improve research and innovation at international level

**Expected Results**

- Protocols to optimize cultivation and agronomic practices
- Provide innovative, patentable solutions for the efficient use of plant material to produce high added value products
- Protocols for the analysis of active ingredients contained in food, food supplements, pharmaceutical and para-pharmaceutical preparations, cosmetics
Greek Aromatic & medicinal plants exploitation

3 Research partners | 1 SME

RESEARCH - CREATE - INNOVATE (project code: T1EDK - 04174)

Faculty of Engineering | Faculty of Health Sciences | Faculty of Sciences | Vessel Essential Oils

Aim-Objectives

- To characterize & botanically identify medicinal and aromatic plants (MAP) provided by several growers by DNA barcoding
- The determination of constituents of extracts and distillates from MAP and the standardization of such products
- To improve & optimize the parameters involved in the extraction/distillation processes
- The exploitation of MAP and their products as natural antioxidants and/or preservatives for foods/cosmetics and pharmaceuticals
- The systematic exploration of the constituents biosynthesized in the conventional field cultivation in comparison to the hydroponic technique

Expected Results

- MAP biodiversity conservation and sustainable cultivation
- Boost the development and standardization of value-added high-quality products in the agro-food, pharmaceutical, cosmetic industry
- Transfer knowledge and technology from academic partners to industry and strengthen the cooperation between academia and industry
- Enforce synergies between companies and scientists to develop strategies for MAP exploitation and quality control
Η Ελλάδα συντονίζει την έρευνα και την καινοτομία στην αιγοπροβατοτροφία της Ευρώπης (www.isage.eu)
SMAll RuminanTs breeding for Efficiency and Resilience

https://www.smarterproject.eu/

Εργαστήριο Ζωοτεχνίας Τμήμα Κτηνιατρικής Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης
Wrap up

• Agri-food chains become more technology/data driven
  • may cause shifts in roles and power relations among supply chain players.
  • Open infrastructure, hardware, software and business models are key issues.

• Small and Medium Agrifood companies need to participate in networks and clusters

• Quick wins are possible in collaboration with local innovation and technology providers/integrators.
Thank you for your attention!