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RESEARCH, INNOVATION & TECHNOLOGY TRANSFER: NORTH MACEDONIA

Study on the research, innovation and technology transfer capacities and on the recent agricultural policy developments in the context of the EU approximation process in the pre-accession countries

INTRODUCTION

- ✓ **Aim:** To assess research, innovation and technology transfer capacities in the agri-food sector in the North Macedonia
- ✓ **Objectives:**
 1. Provide the inventory of all relevant agri-food research capacities, advisory and extension services and business incubators
 2. Analyze all relevant agri-food research capacities, advisory and extension services and business incubators and how research findings are transferred into the agri-food chain
 3. Analyze the role of farmers' cooperation in prompting technological and knowledge transfer and adoption and examine to what extent research findings are transferred onto farms
 4. Analyze the capacity of small agri-food firms to adopt innovations and new technology and examine to what extent research findings do get transferred into innovative agri-food chains
 5. Analyze the role of business networks/clusters in promoting transfer and adoption of innovations and technology and examine what means are used for technology transfer in the agri-food chain

METHOD

SECONDARY DATA COLLECTION

- ✓ Review of national documents: National Strategies, Programmes, Statistics, Atlas of Clusters, Country Reports
- ✓ Review of national legislatives
- ✓ Review of self-evaluation reports of the educational and research institutions
- ✓ Review of project documents
- ✓ Review of online sources

➤ Most of the data in the draft report are based on the this type of data

METHOD

PRIMARY DATA COLLECTION

- 1. Questionnaire design:** Standard templates given by the project (x 3)
- 2. Surveying method:**
 - On-site visits and email/telephone correspondence with educational and research institutions so to introduce them for the aim of the project and for explaining them the questionnaire (January-February) => **none questionnaire was answered and returned back**
 - Email/telephone correspondence with MAFWE and MoE, so to introduce them for the aim of the project and for explaining them the questionnaire: **1 questionnaire answered**
 - Email/telephone correspondence with NGOs and Clusters so to introduce them for the aim of the project and for explaining them the questionnaire, and online survey (in Microsoft Forms) sent to them: **4 answered** (by NGOs)

RESULTS

INTRODUCTION

- The basic environment for research and innovation of the agri-business sector is generally improving
- Different governmental institutions provide support to micro and small agri-businesses for innovation and technology development
- National funds are lacking to support research and innovation process of the education and research institutions; funds are mostly available through the international donor funding projects

RESULTS

✓ Support by MON:

- Very little funds available to support the education and research institutions in their research and innovation process

✓ Support by MAFWE and AFSARD for investments in agriculture and RD:

1. Rural Development Programme
2. IPARD

Support to agri-food companies, and cooperatives

- No funds available to support the education and research institutions in their research and innovation process of the agri-food complex

RESULTS

- ✓ Support by MoE and APE:
 1. Programme for Promotion of Entrepreneurship, Competitiveness and Innovation of **Small and Medium Sized Enterprises (including agri-food firms)**
 - Voucher Scheme of Counseling
 - Info Pult - a project to be implemented in cooperation with regional business support centers
 - Entrepreneurial Education
 - Organization of training on business plan preparation
 - Organization of training for teachers/professors, educators of the subject - Entrepreneurship and Business
 - Organization of training for students to prepare successful job applications
 - Calls on the European Week of SMEs
 - Organization of mentorship between experienced entrepreneurs and start-up companies
 - Organization training for local consultants
 - Organization training on increasing the competitiveness of SMEs
 - Organization training on social awareness and promotion of the social entrepreneurship
 - Support of Woman Entrepreneurship
 - Co-financing donor projects

RESULTS

- ✓ **Food processing industry** received support for innovative projects of 2.604.028 EUR (5% from the all approved projects = 17 projects)
- ✓ **Agriculture** received support for innovative projects of 1.237.973 EUR (3% = 15 projects)

✓ Fund for Innovation and Technology Development

1. Programme for Financial Support from the Governmental Plan for Economic Development

- Co-financed Grants for Technology Development for Overcoming the Consequences Arisen from COVID-19
- Co-financed Grants for Technology Development
- Co-financed Grants for Innovation Improvement
- Co-financed Grants for Micro and Small Companies with a Tendency for Fast Growth and Co-financed Grants for Micro Companies
- Co-financed Grants for Soft-skills Development of the Young Newly Employed People

2. Programme for Support Financed with a Loan from the WB

- Co-financed Grants for Newly Established Companies 'Spin-off' and 'Start-up'
- Co-financed Grants for Commercialisation of Innovations
- Co-financed Grants for Technology Expansion
- Co-financed Grants for Commercialisation of Innovations
- Co-financed Grants for Establishing, Operating and Investment in Business Technology Accelerators

RESULTS

✓ National development bank

1. Lending

- ✓ Agriculture
- ✓ Agroindustry
- ✓ Micro Businesses
- ✓ SMEs
- ✓ Self-employment
- ✓ Export
- ✓ COVID interest-free credit line

2. Insurance

- ✓ Domestic accounts receivables
- ✓ Export accounts receivables

3. Factoring

- Export factoring

RESULTS

✓ **Online R&D platform in development**

- Mapping of the R&D Infrastructure by FINKI
- Delayed process – little cooperation by institutions
- Financed by MON for ESFRI

INVENTORY & DESCRIPTION OF FACULTIES AND SECONDARY SCHOOLS

University / Institution	Research institute	Institute location
UKIM	Faculty of agricultural sciences and food	Skopje
	Faculty of Technology and Metallurgy	Skopje
	Faculty of Veterinary Medicine	Skopje
UGD	Faculty of Agriculture	Stip
	Faculty of Technology	Stip
	Faculty of Tourism and Business Logistics	Stip
UKLO	Faculty of Biotechnical Sciences	Bitola
	Faculty of Veterinary Medicine	Bitola
	Faculty of Technology and Technical Sciences	Veles
	Faculty of Tourism and Hospitality	Ohrid
UFS	Faculty of Agriculture and Biotechnology	Tetovo
	Faculty of Food Technology and Nutrition	Tetovo
UMT	Faculty of Technological Science	Skopje

13 Secondary schools - education institutions that include agri-food curriculums

RESULTS

INVENTORY & DESCRIPTION OF RESEARCH INSTITUTIONS

1. Macedonian Academy of Science and Arts (6 departments – 1 agri-food related, 8 research centres – 3 agri-food related)
 - ✓ **Department for Natural, Mathematical and Biotechnological Sciences** – deals with scientific areas, such as agriculture, biology, biotechnology, forestry, and many other technical sciences, and it publishes a biannual journal with contributions in natural, mathematical and biotechnical sciences
 - ✓ **Research Centre for Energy and Sustainable Development**
 - ✓ **Research Centre for Genetic Engineering and Biotechnology ‘Georgi D. Efremov’**
 - ✓ **Research Centre for Environment and Materials**

RESULTS

INVENTORY & DESCRIPTION OF RESEARCH INSTITUTIONS

2. University 'Ss. Cyril and Methodius' in Skopje

- ✓ **Institute of Agriculture** (Skopje and Kochani)
- ✓ **Institute of Cattle Breeding** (Skopje)
- ✓ **Institute of Economics** (Skopje)

3. University 'Ss. Climent of Ohrid' in Bitola

- ✓ **Tobacco Institute** (Prilep)
- ✓ **Hydro-biological Institute** (Ohrid)

4. University 'Goce Delchev' in Shtip

- ✓ **Research Centre** (Shtip)

5. University of Tetovo 'Fadil Sulejmani'

- ✓ **Institute for Ecology and Technology** (Tetovo)

RESULTS

INVENTORY & DESCRIPTION OF CENTRES OF EXCELLENCE

- There are several Centres of Excellence in the country, but **none** of them are particularly involved in agri-food sector
 - ✓ they support management skills development, mainly in the ICT sector, as well as in finance and medicine sectors

RESULTS

INVENTORY & DESCRIPTION OF ADVISORY AND EXTENSION SERVICE

- **National Extension Agency (NEA)** - provides direct advisory assistance to independent individual farmers (practical implementation of certain technologies - technical information related to the agricultural production process compiled as technical responses to questions, aimed at increasing the quality and quantity of agricultural production).
- ✓ **CSOs – developed:**
 - National Federation of Farmers (NFF), Macedonian Association of Agricultural Cooperatives (MAAC), Rural Development Network (RDN), MCG Consulting, EPI CENTAR

RESULTS

INVENTORY & DESCRIPTION OF BUSINESS INCUBATORS

1. Classic business incubators/centres (**3 incubators** but with **mixed focus**)
 - ✓ **Youth Entrepreneurial Service (YES) Foundation**
 - ✓ **Business Start-up Centre**
 - ✓ **Business Centre Bitola (BSC Bitola)**
2. Industrial zones/parks (**14 Technological-Industrial Development Zones**)
 - ✓ All are at different stages of development
 - ✓ Managed by Directorate for Technological Industrial Development Zones (**TIRZ**), on behalf of the Government
 - ✓ Offer **100%** foreign ownership, **0%** taxes and customs, **exemption** from utility fees, **symbolic price** for land lease and direct state aid in the amount of up to **EUR 1,000,000**
3. Technical and scientific parks and virtual business incubators - **none**

RESULTS

INVENTORY & DESCRIPTION OF CLUSTERS (1)

- ✓ Not as defined by EU, but mostly as associations **registered as clusters in MoE**
- ✓ Initiated in 2002 by donor projects
- ✓ Supported by MoE since 2009
- ✓ Become part of the Programme for Competitiveness, Innovation and Entrepreneurship (PCIE) since 2013
- ✓ Within the programme, funds to support only projects since 2014
- ✓ Support and development of cluster associations since 2018

Number of cluster's projects financed per year

2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	TOTAL
7	2	6	10	6	5	12	10	10	16	84

RESULTS

INVENTORY & DESCRIPTION OF CLUSTERS (2)

✓ 30 clusters in total, among which 16 clusters in the agri-food sector, 3 in tourism and 1 in ICT

✓ Regional Centres for Development

1. The Centre for Development of Skopje Planning Region
2. The Centre for Development of Northeast Planning Region
3. The Centre for Development of Vardar Planning Region
4. The Centre for Development of East Planning Region
5. The Centre for Development of Southeast Planning Region
6. The Centre for Development of Polog Planning Region
7. The Centre for Development of Pelagonia Planning Region
8. The Centre for Development of Southwest Planning Region

➤ Agriculture (9 clusters):

- Agro-helix Cluster (Veles)
- Dairy and Meat Cluster (Skopje)
- Rice Cluster (Obleshevo)
- Seeds Cluster (Skopje)
- Field Crops Cluster (Skopje)
- MAC Bee Cluster (Gevgelija)
- Organica Cluster (Veles)
- Wild Forest Fruits Cluster (Veles)
- Federation of Organic Producers Cluster (Skopje)

➤ Food (7 clusters):

- MAP F&V Cluster (Skopje)
- TWR Tikvesh Wine Route (Negotino)
- Confectionary Industry Cluster (Shtip)
- Milling & Baking Industry (Skopje)
- Wine Cluster – Enolozi (Kavadarci)
- Wines of Macedonia (Skopje)
- Agri-exporters Cluster (Skopje)

➤ Tourism (3 clusters):

- EDEN South-West Region (Ohrid)
- Osogovo Tourism Cluster (Kriva Palanka)
- Polog Tourism Cluster (Tetovo)

➤ ICT (1 cluster):

- MASIT (Skopje)

RESULTS

THE CAPACITY OF SMALL AGRI-FOOD FIRMS TO ADOPT INNOVATIONS AND NEW TECHNOLOGY (1)

- Results from the questionnaire:
 - The capacity of the **individual farmers** to adopt innovations and new technology is **lacking**
 - The capacity of the **farmers' organisations** to adopt innovations and new technology is **present, but not enough**
 - The capacity of the **small agri-business firms** to adopt innovations and new technology is **present, but not enough**
 - **Farmers' cooperation** is **encouraging** the transfer of knowledge, **but not enough**
 - The most important **boosters** of knowledge and technology transfer and sources of information on innovations and technological development of small agri-food firms are: **participation to fairs, advises from extension services, business clusters** and **business incubators**

RESULTS

THE CAPACITY OF SMALL AGRI-FOOD FIRMS TO ADOPT INNOVATIONS AND NEW TECHNOLOGY (2)

✓ MON and MoE

- Smart Specialization Strategy (**in process of development** in collaboration with JRC)
 - **Smart specialization** - a tool for concentrating economic investment in areas where the country has a critical mass of knowledge, capacities and competences and innovation potential for placing country within global markets
 - **Priority areas identified** (19 industries, among which **3 in food sector**, **2 in food service**)
 - C10.6 Manufacture of grain mill products, starches and starch products
 - C10.8 Manufacture of other food products
 - C11.0 Manufacture of beverages
 - I.56.1 Restaurants and mobile food service activities
 - I.56.2 Event catering and other food services
 - **Priority areas selected** (6 sectors, among which **agri-food**, **tourism** and **energy sectors**)
 - Sustainable food and beverage production and value chains
 - Sustainable tourism and catering
 - Energy for the future

RESULTS

- ✓ The agriculture sector is supported by a **well developed educational system** (faculties specializing in the agriculture field, food technology and biotechnology), and secondary schools with branches in agriculture
- ✓ Study programs need to be **constantly adapted to the changing labor market** in the agri-food sector (especially emphasized by the business sector)

THE ROLE AND CAPACITY OF THE EDUCATION SYSTEM IN SUPPLYING EDUCATION AND SKILLS REQUIRED IN THE LABOR MARKET IN AGRICULTURE

Some examples ...

➤ Faculty of Agri. Sc. and Food (UKIM):

1. Field crop production
2. Animal biotechnology
3. Processing of agricultural products
4. Plant protection - Phytomedicine
5. Eco-agriculture
6. Agricultural economics
7. Fruit production, viticulture and wine production
8. Food quality and safety

Horticulture

➤ Faculty of Tech. and Metall. (UKIM):

1. Food technology and biotechnology
2. Environmental engineering

➤ Faculty of Vet. Med. (UKIM):

1. Veterinary medicine

➤ Ins. Of Agric. (UKIM):

- ✓ 4 study programmes

➤ Faculty of Agri. (UGD):

1. Agro-management
2. Vegetable production
3. Enology
4. Viticulture and fruit production
5. Crop biotechnology
6. Fitomedicine
7. Processing of animal products
8. Field crop production
9. Rural tourism
10. General agriculture

➤ Faculty of Tour. and Buss. Log. (UGD):

1. Tourism
2. Business logistics
3. Gastronomy, nutrition and dietetics
4. Hotel-restaurant course

➤ Faculty of Tech. (UGD):

1. Tourism
2. Business logistics
3. Gastronomy, nutrition and dietetics
4. Hotel-restaurant course

➤ And more ...

RESULTS

THE ROLE OF OTHER RELEVANT STAKEHOLDERS IN AGRI-FOOD SECTOR IN PROMPTING TECHNOLOGICAL AND KNOWLEDGE TRANSFER AND ADOPTION (1)

FARMERS' COOPERATION

- ✓ **Farmer's organizations** (7-10) – less than 1% of individual farmers included in these organisations
- ✓ **Cooperatives** (57 in total, out of which 20 new since 2019 established through project support and financing)
 - **Small-scale** with **no or very little capacity** for investment in research or innovation – main obstacle in the innovation process
 - **Private organizations** with very little governmental funding in research (approx. 5%), and most of the funding comes from international projects (approx. 50%), other public funds (approx. 20 %) and own sources (approx. 15%)
 - **Research advancement** is **outsourced** (no researchers employed in the cooperatives)
 - Activities mainly aimed on improvement of **production techniques and equipment** (i.e. harvest and post-harvest activities), **based on the needs of the environment or initiated by the members**
- ✓ Support in trainings on national and international level (conferences, visit to fairs etc.)
- ✓ Dissemination of experience to other farmers through seminars, presentations, trainings, lectures

RESULTS

THE ROLE OF OTHER RELEVANT STAKEHOLDERS IN AGRI-FOOD SECTOR IN PROMPTING TECHNOLOGICAL AND KNOWLEDGE TRANSFER AND ADOPTION (2)

BUSINESS NETWORKS/CLUSTERS

- ✓ The clusters developed in their own path: Some of them became a **recognized leaders in the sectors (MASIT, MAP - food processing, Agro Helix, MAC bee, tourism)**
 - There is no specific model for the formation and operation of clusters: Each one is a story about themselves - utilizing advantages given by the location, networking, being together, working together, performing together, sharing the costs together, having joint training, interacting in a number of common areas
 - Existing clusters mainly were created with the purpose of “grouping of small enterprises” to better sell on the markets and have done much less in the area of sharing and creating economies of scale in purchasing, applicable research and development, and innovation
 - Big companies are generally not active members of Macedonian clusters
- ✓ **Key weakness:** lack of their potential for innovation, new products and services development to better compete on the global markets
 - Successful clusters around the world - gather, apply and expand knowledge and create innovative solutions to business challenges (**these qualities of clustering still need to evolve in Macedonia**)

RESULTS

THE ROLE OF OTHER RELEVANT STAKEHOLDERS IN AGRI-FOOD SECTOR IN PROMPTING TECHNOLOGICAL AND KNOWLEDGE TRANSFER AND ADOPTION (3)

FOREIGN DIRECT INVESTMENTS

- ✓ FDI - **core part** of the economy, but **rarely** enter the agricultural sector and even more rarely as greenfield investments (mostly as acquisition and re-branding of established brands)
- ✓ FDI targeted the **manufacturing sector**, in the last 10 years (including rice, milk and other sub-sectors)
- ✓ FDIs are still below the expectations of the public and policymakers
 - Contributed to the economic growth, exports, and employment, but have not brought significant upgrade of the economy, and often contributed to deterioration of labor standards and environmental degradation

RESULTS

THE ROLE OF OTHER RELEVANT STAKEHOLDERS IN AGRI-FOOD SECTOR IN PROMPTING TECHNOLOGICAL AND KNOWLEDGE TRANSFER AND ADOPTION (4)

RETAIL COMPANIES

- ✓ **Retail companies** – have the strongest position in the agri-food chain
 - Have **some** influence on agri-food firms in introduction/developing of new products
 - Have **introduced** some innovations in their marketing activities to attract more customers
 - **Online retail** – especially evident during the period of COVID pandemic
 - Have **not much invested** in adopting advanced product distribution technologies

RESULTS

THE ROLE OF HORIZON EUROPE OR STRUCTURAL FUNDS OR IPA (E.G. FUNDING) IN CONTRIBUTING TO THE RESEARCH, INNOVATION AND TECHNOLOGY TRANSFER CAPACITIES

- ✓ **EU's Horizon programme** - support funds for innovation are **available**
 - The programme is particularly intended for development and commercialization of innovative products for companies, universities and other actors
- ✓ Only **few small and medium-sized** companies from the country have used the support from the Horizon 2020 programme
 - ✓ **Free assistance** regarding the application procedure for this programme by the Enterprise European Network, but **barely a dozen companies** from the country **have asked for help** from the local coordinators
 - ✓ Most of the **domestic entities** were **not the main applicant** for this fund, but were partners to other institutions
- ✓ The **university professors and experts** have significant experience in participation in the European programs FP7, Horizon 2020 and COST as well as in bilateral and multilateral cooperation; also they are leading the research and innovation activities supporting sustainable production of high-quality food

CONCLUSION

- Developed infrastructure for education and research in the agri-food sector – enthusiastic researchers
 - The country does not invests to support the development of its researchers, and thus the process of innovation
- Not developed unique databases of the national research workload – it should be developed in order to trace the success in research
- Low cooperation between different education and research institutions in the country
 - Very similar study programmes at different universities in the field of agri-food sciences
- There are not any alumni networks of the academic institutions engaged in agri-food science that shall further promote the institutions' work and that shall work together with the institutions in developing the science

THANK YOU FOR THE ATTENTION!

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