# D.3.1. - Study of the State of the Art of Agri-food Sector – Overall Study

## (D.3.1.1 Greek Side Study & D.3.4.1 Bulgarian Side Study)


Responsible Beneficiary:

CHAMBER OF SMALL & MEDIUM SIZED INDUSTRIES OF THESSALONIKI (Lead Beneficiary)

with the contribution of:

PB2: SMALL ENTERPRISES' INSTITUTE OF THE HELLENIC CONFEDERATION OF PROFESSIONALS CRAFTSMEN AND MERCHANTS

PB3: GREEK ASSOCIATION OF SUPPLY CHAIN MANAGEMENT

PB4: REGIONAL CHAMBER OF COMMERCE AND INDUSTRY – BLAGOEVGRAD

PB5: RENEWABLE ENERGY SOURCES CLUSTER



https://agrofficiency.eu

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# 1. Summary

## 1.1. Examined Area

The Greece-Bulgaria cross-border cooperation area is one of the poorest in the European Union, as the GDP per capita is below 50% of the E28 average. This has not changed considerably in the last 10 years, even though short-lived improvements were noted during 2002-2004 and then again in 2006-2009. The CB area is also characterized by large internal disparities, especially as it concerns the dichotomy between Bulgarian and Greek territories. Bulgarian districts exhibit a much lower level of economic development (below ¼) than their Greek counterparts, mainly attributable to the fact that Bulgaria has long been a transition economy. The 2006-2009 period was marked by economic growth on both sides of the border, as was the general trend all over Europe. After 2009, the global recession effects resulted in slowing down the growth rates in the Bulgarian part (0,25% annually) and in negative growth rates in the Greek part (-9% annually).

Even though the CB area has been gradually converting from an agricultural/industrial economy to an industrial/service economy, this conversion has been rather slow. Compared to EU27, the economy remains considerably more agricultural, less industrial, and more service-dependant. However, this is far from being homogeneous. The Greek CB-area is considerably less agricultural and industrial than the BG CB-area part, and more service-oriented. This heterogeneity is even more pronounced at district level. We can discern 2 types of districts in the BG part, and 3 types of districts in the GR part:

- Blagoevgrad/Haskovo: industry and trade dominated
- Smolyan/Kardzhali: industry and agriculture dominated


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- Exros/Drama/Thessaloniki: public administration and industry dominated
- Xanthi/Rodopi: public administration and agriculture dominated, and
- Kavala/Serres: industry and public administration dominated.

More than half of GVA produced in the CB area (59%) is produced in the district of Thessaloniki. All other areas exhibit low percentages. Particularly low percentages are observed in the Bulgarian districts Haskovo, Smolyan and Kardzhali (1-2%).

Some of the noteworthy intra-territorial structural developments that have taken place recently include:

- A gradual conversion between the two parts in terms of the portion of GVA attributable to the primary sector. Still, there remains a large differential between the two sides, with the Bulgarian territories being more heavily agricultural than the Greek territories, and even more heavily agricultural than the national (BG) average.
- A significant diversion between the two parts in the secondary sector, mainly attributable to the considerable losses of industrial activity experienced in the Greek part after 2006 (mainly due to relocations of labour-intensive industries in cheaper neighbouring countries).

Total labour productivity in the CB area is significantly lower than the EU27 avg. (approx. 1/5) and exhibits high differentials between the Greek (32,800€/employee) and Bulgarian (5,800€/employee) parts. CB area productivity is also below the respective national averages for both parts:

- for the Bulgarian part: ranging from 60% to 78% of the BG national average, and
- for the Greek part: ranging from 60% to 84% of the GR national average.


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Tourism – and especially eco-tourism - has long been heralded as the "growth-industry" of the CB area, as it includes a significant number of pristine areas of high ecological value. Yet, it has a rather modest number of accommodation establishments compared to its population (43 establishments/100.000 inhabitants, when the EU27 average is 111), and unevenly distributed. The largest concentrations of accommodation establishments and beds are in the districts of Kavala, Thessaloniki and Smolyan.

Both Greece and Bulgaria have outlined national or regional strategies for innovation in the context of "smart specialization". Yet, Bulgaria is lagging far behind the other EU countries and is listed as a "modest innovator" in the 2014 "Innovation Union Scoreboard", while Greece, although in a somewhat better position, falls below the EU average and is listed as a "moderate innovator".

Yet, the CB area possesses significant research facilities currently, which are however not significantly collaborating with each other or with the business community. It also possesses similar productive systems, therefore exhibiting important opportunities for coupling entrepreneurship initiatives with innovation. The critical mass of research centers and other academic structures is located in Thessaloniki with the following fields of excellence: biotechnology, advanced production systems for chemical processes, energy and environmental technologies, information processing, virtual reality, security services, etc. R&D activities in East Macedonia and Thrace are concentrated in the public sector and particularly in the Demokritos University of Thrace (with a unique Genetics Department) and to a lesser degree in the Technical Education Institute (TEI) of Kavala.

On the Bulgarian part, most important research infrastructure is located outside the CB area (mainly in Sofia and Plovdiv) and only Blagoevgrad



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seems to have any significant research structures. The South-West University "Neofit Rilski"- with nine faculties offers PhD programmes in many liberal arts fields (Education and Pedagogy, Literary Studies and Linguistics, History and Archaeology, Social Sciences, Law, etc. and Arts - with a specializations in choreography and cinema). Of particular importance for the CB area are the programmes in Economics (with a specialization in Tourism), Geography and Environmental Sciences, and IT technologies. Also, in Smolyan there are branches of the "Paisii Hilendarski" University of Plovdiv with its Technical College and the Varna Free University "Tchernotisets Hrabar".

The CB area is characterized by many and important natural resources, including a large number of protected natural sites (86 Natura 2000 areas, 5 Ramsar wetlands, etc) many of which are of pristine character. The CB landscape consists of densely forested mountains, straits of rivers, valleys, plains, lakes, coastal wetlands, seasides and river deltas. The area comprises the mountain ranges of Rila, Pirin and Rhodopi, featuring outstanding forests, the cross-border rivers Strymon (Struma), Nestos (Mesta), Ardas (Arda) and Evros (Maritsa) and more than 400 kilometers of coastline. These important natural resources have not been sufficiently exploited for development purposes in the past.

In terms of the state of the environment, industry is among the major polluters on both parts of the border, and pollution hot-spots are concentrated in southwestern Bulgaria and near the Kavala urban area. Both cross-border rivers - Nestos and Evros - are polluted with urban as well as industrial effluents (e.g. BOD). The major problems in the management of urban wastewater result from the lack of sewage treatment infrastructure in settlements between 2,000-10,000 inhabitants. The problem is more acute on the Bulgarian portion of the CB area. In Bulgaria only 46% of the population is covered by wastewater treatment systems and most of the


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treatment capacity (71%) is located in the Danube and Black sea river basins (which are outside the CB area). On the Greek portion 88% of the population is covered by wastewater treatment systems.

The area possesses significant transport infrastructures. It is served by three ports of national/international importance (the Thessaloniki port, the double port of Kavala and the port of Alexandroupolis) and three main airports (the International Airport "Makedonia", in Thessaloniki, the Airport "Alexander the Great" in Kavala and the Airport "Democritus" in Alexandroupolis), all of them on the Greek side.

The most important transport infrastructure is the road network and overall connectivity has improved significantly in the past:

- with the construction of the Egnatia motorway and several vertical axes connecting Greece to Bulgaria and
- the construction of large portions of motorways A3 and A4 in Bulgaria.

Nevertheless, lower-level roads are at various stages of disrepair (especially on the Bulgarian part) making interconnections difficult and reducing mobility especially in the mountain ranges. At the same time, several Egnatia vertical axes as agreed in the Transnational Agreement between Greece and Bulgaria in 1998 are still missing or under construction (such as the connection of II-86 to the Greek transport system) and the motorways on the Bulgarian part are incomplete. The area is deficient in terms or railway and multi-modal infrastructure (despite the existence of important ports and airports). Both Greece and Bulgaria have been recently investing in the CB area railway network but it requires considerable investment, which is outside the financial capabilities of the present programme. This heavy dependence on road transport also increases considerably the environmental footprint of transport activities in the area,


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especially at the border crossings (e.g. long lines of trucks) and especially during the tourist season. Last but not least, the area lacks accessible public transport for people with disabilities and cross-border public transport services.

While in 2007 unemployment rates for the CB districts were on the average near or below the national rates and below the EU27 average rate, unemployment started to rapidly increase – especially in Greece - soon after the wake of the economic crisis in 2008 reaching record high levels in 2013. The Bulgarian districts succeeded to keep unemployment rates near or lower than the EU27 average. Currently, the high disparities among the CB districts have not dissipated. The latest data exhibit the following high unemployment rates (2013): Xanthi 37,5%, Drama 36,8%, Thessaloniki 32,1%, Serres 22,9%, Kavala 22,8%, Evros 22%, Smolyan 20,3% and Rodopi 16,8%. In addition, long term unemployment rates have increased sharply - especially for the Greek regions - after 2009, indicating a risk of large structural unemployment which in turn implies the existence of inefficient labour markets and a mismatch between labor market demand and the available skills and locations of the workers seeking employment. According to the ESPON DEMIFER project the CB area shows significantly higher values of long-term unemployed persons compared to the EU27.

Youth unemployment rates display similar trends and are attributed to the lackluster economic growth, the rigid labour market, and the mismatch between potential employee skills and employers' needs in Greece and Bulgaria.

In addition, the CB area exhibits considerably higher than EU27 percentages of population at risk of poverty or social exclusion (3-4 times higher). The main reason for the large divergence is the comparatively higher long term unemployment rates, and the higher share of people living in areas with low work intensity and low income levels. With respect to the latter, the share of



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people living in areas with low work intensity has been rising since 2010 in Bulgarian and Greek territories alike. The large number of people experiencing poverty and social exclusion in the CB area is also attributable to the presence of various vulnerable groups such as minorities, internal migrants, asylum seekers and foreign persons under subsidiary protection. The higher risk of poverty and social exclusion among these groups is primarily connected to long-term unemployment and economic inactivity. The rising incidence of poverty has many social consequences, one of which is the deteriorating public health conditions. Even though the CB area enjoys the availability of basic health care resources (e.g. hospitals and doctors) at levels near, or even better in several cases, than the EU27 average, the average life expectancy is lower than EU27 levels and many epidemiological indicators record higher values. Overall, Greek districts have exhibited higher life expectancy than Bulgarian districts in the past, but since poverty forces more people to resort to hospital care (more than a 20% increase has been documented in Greece after 2010), it appears that Greek districts may be more at risk of deteriorating health care conditions in the near future, thereby lowering overall public health levels in the CB area.

The CB area exhibits many strengths and considerable development potential which includes:

- A rich natural environment with many protected natural areas which conveys a high quality of life and tourist development potential;
- Rich water, forest, mineral and energy resources which can be used for strengthening the local economy;
- Proximity to sea (Aegean, Black sea) which presents many opportunities for combined transport and a relatively mature TEN-T network, combined with the large urban and transport center of Thessaloniki which acts as a European "gateway";


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- A critical mass of research capacity mainly concentrated in Thessaloniki but with lesser concentrations in Thrace and in the Bulgarian part;
- Considerable agricultural potential in the entire CB area; and Considerable industrial potential and a specialization in IT in the Bulgarian part.

It is however plagued by many and serious weaknesses, which need to be overcome:

- The area is predominantly rural, mountainous and remote (compared both to the territory of the 2 countries and as well as to the rest of EU), and exhibits a low urbanization level (i.e. medium-small cities);
- It suffers from depopulation and an ageing population;
- It exhibits severe infrastructure challenges in environment (urban effluents in BG) which leads to pollution problems and in transport (low cross-country accessibility and low multi-modal accessibility) which leads to low goods transport potential and low commuting potential;
- It has low broadband connectivity and low digital content;
- The production system is characterized by stagnant growth trends, low innovation content, and a low tourist capacity;
- The characteristics of the production system combined with the low education levels and a mismatch between labor demand and supply have led to high unemployment (mainly in the Greek part), poverty and social exclusion;
- The CB area is very susceptible to climate change due to low institutional capacities; and


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- The area population is faced with considerable health challenges, especially in remote areas and areas of concentration of special population groups.

## 1.2. Description of Work

A state-of-the-art study describes the existing level of development in a field. It is an assessment or evaluation of where advancement has reached so far in the field. It is meant to provide more of a benchmark of the sectoral progress. It may broadly indicate the level to which the industry needs to go next, but not necessarily provide any specific directions for doing so. It is also not meant to be an analysis of the level of advancement.

This state-of-the-art study will reflect the current situation of the agri-food industry in the Cross Border area. More specifically, through the analyzation of primary and secondary data the researcher aims to draw conclusions about the forces in the industry and its wider ecosystem. Based on the data required during the study, depicting the institutional, economic and business environment, thy study aims to examine and capture the current state of the industry and the wider agri-food ecosystem of the cross-border area.

In the state-of-the-art study in the field of agri-food, among others, the main characteristics of the agri-food sector, the prevailing market conditions, will be defined, along with the SWOT analysis of the sector. The ultimate objective of the study is to record the current situation of the Agri-food sector and its wider ecosystem, while projecting some suggestions and conclusions regarding its future development, based upon the findings of the research.



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## 1.3. Outcome

The project's Overall Objective (OO) is to enhance support offered to established and newly established small and medium-sized enterprises (SMEs) of the Cross Border (CB) Agri-food sector. A project's OO is a long-term objective that concerns a widespread problem and cannot be achieved solely by the project. The project, aims to contribute to the attainment of the OO, by comprehending a very targeted group of its fundamental pillars. Specific Objective (SO) is a short-term goal that can and should be achieved by the project's implementation. AGROFFICIENCY's SO is to offer holistic support to 20 Agri-food SMEs in the CB area, by the end of the project. The correlation between the project's SO and OO is the fact that the accomplishment of the first contributes to the achievement of the latter. The project's SO is to be achieved by creating a one-stop-shop support mechanism and more specifically a Business Support Center (BSC).The project offers a holistic solution to all CB area entrepreneurship problems that mainly concern shortage of know-how, best practices, knowledge and information regarding investment tools, missed opportunities, lack of contacts and inadequate skills of HR. The implementation of the project will result in Agri-food SMEs and their wider ecosystem, to survive and prosper, as they will have the means and opportunity to develop their operations, beyond their borders. The scope of establishing a BSC is to encourage and facilitate the entrance of potential SMEs in the market and to assist existing SMEs to progress, by offering them concrete solutions to bottlenecks that influence their strategies and business decisions. Those solutions will regard the modernization and sustainability of their business models and operations, by incorporating and promoting initiatives regarding the Green Deal and contemporary Logistics. CB collaboration will create added value to the Agri-food and RES sectors and will contribute into achieving operational optimization.



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Project outputs regard the direct results associated with a project. AGROFFICIENCY, aims to provide holistic support to agri-food SMEs and therefore its main outputs concern the establishment of all mechanisms that will attribute to creating this effect and implicate SMEs in the process of doing so.

- Training Sessions and Workshops; they will offer several advantages to the participants, such as significant savings in time, speeding-up of processes, setting smart goals, action plans etc.
- Targeted consulting of SMEs about existing Green Labeling Schemes (GLS) and Circular Economy (CE) best practices; SMEs will be oriented about existing GLS and their benefits that include gaining recognition, credibility and access to new opportunities, cost saving practices and obtaining a competitive advantage, as well as about CE best practices that include ways to reduce waste, carbon footprint, enhance security of supply of raw materials etc.
- E-Support Platform; the digitalization of business operations is considered extremely beneficial for SMEs. The project, will create a digital environment including all BSC services that concern digital applications, digital networking etc. Furthermore, through this platform, entrepreneurs will be able to find available funding resources in order to jumpstart investments in innovative ideas and trigger their business growth.
- Hybrid Networking & innovation forum for Agrofood Sector Stakeholders; will offer to SMEs the opportunity to interact and communicate with each other, so as to build bridges between the two countries' Agri-food ecosystem, by promoting business synergies. The holistic character of the whole venture will create added value to the CB sectors of Agri-food, RES and Logistics, whereas by realizing all outputs mentioned above, AGROFFICIENCY


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will achieve the effective and direct holistic support to all Agri-food ecosystem's SMEs in the CB area.

The expected result of the project is the enhancement of support services offered to agrifood businesses in the CB area. The result indicator's measurement unit is entrepreneurship barometer is related to the Agri-food sector's performance – state across 5 main pillars of entrepreneurship;

- Access to Funding,
- Entrepreneurship Culture,
- Tax & Regulation,
- Education &
- Training and Coordinated Support.

The project by default cannot make changes to Tax & Regulation, as both programme's budget limitations, and implementation horizon, pose as barriers and discourage such interventions. However, the project directly addresses the other pillars, by creating a holistic support mechanism that specializes in supporting SMEs operating in the Agri-food Sector that focuses not only on one of the above-mentioned barriers, but contributes effectively to alleviating all of them simultaneously. The project's Work Plan is designed in such way, which unswervingly addresses issues related with those pillars that pose as barriers for business survival and development, and affect the entrepreneurship environment in the area. The establishment the BSC will cultivate a breeding ground for the creation, survival and development of SMEs. The BSC follows two main approaches, to effectively support in key places. Firstly, it follows the incubator approach that aims to train and consult the sector's newly established SMEs and equip them with all fundamental knowledge and business tools to seek funding. Secondly, it aims to develop and provide the tools and guidance needed, to become cost efficient by integrating practices of CE and


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Contemporary Logistics that will help them cultivate a competitive advantage and boost their growth. Both approaches use mentorship, training, ICT technologies and networking, to achieve maximum impact and offer applied, substantial support. By doing so the project, directly affects 4/5 parameters of the result indicator and will contribute to its increase by its ending.

## 1.4. Contents

Agrofood sector and its wider ecosystem show great potential for development, but lack of support structures stimulating the creation, survival and growth of enterprises operating in the field.

As the project's consortium face this problem on the daily, due to the direct contact with local SMEs, Project Partners decided to act collectively and create an organization through which everyone's expertise, know-how and network, will join forces and result in a series of holistic support services, aiming to fully equip newly established and potential SMEs to stand on their feet and contribute to the value chain's growth and prosperity.

AGROFFICIENCY was developed accordingly in order to ensure the achievement of its objectives that were jointly determined by the Project Partners, taking into account the current situation and needs of the Cross Border area, as well as its special characteristics and potential. All activities have been scheduled in a feasible and realistic manner and divided into six Work Packages.

**Work Package 1; Project Management & Coordination**

The first Work Package includes all activities related to the Project Management. The purpose of project management is to establish common objectives, clear principles, transparent processes and effective monitoring of the project.


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- Deliverable 1.2: the Project Management & Reporting
- Deliverable 1.3: The Steering Committee Meetings
- Deliverable 1.4: Internal Evaluation
- Deliverable 1.5: Verification of Expenditure

**Work Package 2; Communication & Dissemination**

The second Work Package includes all activities related to the Communication & Dissemination of the project, which is very important as it ensures that the project's message and outcomes are communicated adequately to all potential target groups and beneficiaries. Therefore, it is crucial that all actions and activities concerning the project's dissemination are planned very carefully and thoroughly.

- Deliverable 2.1: The Project Communication Plan
- Deliverable 2.2: Project's Promotion via Internet & Social Media
- Deliverable 2.3: Dissemination Material
- Deliverable 2.4: Project's Events
- Deliverable 2.5: Project's Publications

**Work Package 3; Capacity Building – Planning**

The third Work Package includes all necessary research that needs to be done in order to lay the foundations of supporting the agriculture sector in the CB area in key places.

- Deliverable 3.1: Study of the State of the Art of Agrifood Sector
- Deliverable 3.2: Study on Circular Economy & Environmental Impact
- Deliverable 3.3: Strategic Planning

**Work package 4; Establishment of Support Mechanisms**

Work Package 4 is all about the creation of the mechanisms and tools that will be used to achieve the project's goals. It consists of the following:


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- Deliverable 4.1: Business Support Center
- Deliverable 4.2: E-Support Platform
- Deliverable 4.3: Development of "Circularity Strategies for SMEs" Handbook

**Work Package 5; Pilot Support Services**

Work Package 5 includes a series of pilot activities that will be part of the services provided by the Business Support Center after the project's ending. These services include training seminars, workshops, consulting and networking activities, in order to provide necessary information, education and orientation to the local agrifood SMEs.

- Deliverable 5.1: Training Seminars & Counselling Workshops
- Deliverable 5.2 : Targeted Consulting to Agrifood SMEs about Green Best Practices
- Deliverable 5.3 : Hybrid Networking & Innovation Forum for the agrifood stakeholders
- Deliverable 5.4: Capitalization Actions for Sustainability

**Work Package 6; Activities Outside the CB area**

- Deliverable 6.1: Participating in an International Fair
- Deliverable 6.2: The Transfer of Knowhow

## 1.5. Abbreviations

BG: Bulgaria

CB: Cross Border

DEMIFER: Demographic and Migratory Flows Affecting European Regions and Cities



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ESPON: European Observation Network for Territorial Development and Cohesion

EU: European Union

EU27: European Union 27 Member States

GDP: Gross domestic product

GR: Greece

GVA: Gross Value Added

IT: Information Technology

PhD: Doctor of Philosophy

R&D: Research & Development

TEI: Technical Education Institute

SMEs: Small and Medium Enterprises

OO: Overall Objective

SO: Specific Objective

BSC: Business Support Center

ICT: Information & Communication Technology

# 2. Introduction

## 2.1. Scope of the Report

This report aims to study the current situation of the Agri-food sector and its wider ecosystem. Food remains a central need of all human societies. Key global trends are shaping the demands that modern agriculture and food production have to meet: A rising global population requires access to safe and reliable sources of nutrition. Aging and more health-conscious



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societies need different types of food products, with new functional characteristics. In addition, a global ecosystem under intense pressure asks for an agro-food industry that significantly reduces its environmental impact.

Agrofood is also an important economic driver for European many regions. It emerged as one of the most prominent domains with EU regions smart specialization strategies. It is also one of the key thematic orientations of applications and selected cluster projects for new industrial value chain. Agriculture and food processing remain important sectors especially in regions with lower levels of current prosperity. The success that some advanced countries have in these markets suggests that there is potential to upgrade. Agriculture and food are also in more advanced regions important sectors for achieving shared prosperity, providing employment and development opportunities for less-skilled parts of the labor force.

Agrofood is changing. Examples of key issues emerging in response to the global trends and societal challenges pointed out above are traceability and bioeconomy. Traceability captures the notion that consumers increasingly want to know where food products are coming from, how they have been produced, and through which channels they have made their way to their homes. This requires the use of new technologies as well as different business models and value chains. Bioeconomy refers to the use of biologically produced inputs into other industries, from biofuel to bio-based chemicals, plastics, and other products. Here a key issue is how to develop these new bio-based inputs in a way that is not creating trade-offs with food production and leads to better overall environmental outcomes.

## 2.2. AGROFFICIENCY Project Overview

When reviewing the Cooperation Programme Interreg V-A "Greece-Bulgaria 2014-2020", it is evident that the CB area's economy is primarily supported


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by the Agri-food sector and the businesses operating in its wider ecosystem. When addressing the matter of economic growth and development in the area, agriculture seems to be the starting point, since it has an immense impact to the region's economy and prosperity, as a great portion of its population is still actively engaged with the agricultural industry.

However, even though the Agri-food ecosystem is a fundamental pillar that supports the regional economy, it is apparent that the current situation of the entrepreneurial climate is in bad shape and in urgent need of radical change and improvement. Newly established SMEs operating in the field of agri-food, struggle to make ends meet and survive, whereas enterprises with years of experience cannot seem to find the right recipe to achieve exponential growth. At the same time, the entrepreneurial climate is not favorable upon start-ups either, as the number of business created annually decreases as the years go by.

Businesses face crucial bottlenecks that obstruct their operations and trammel their development and prosperity. The lack of networking, management skills, know-how, investment capital and innovative business ideas is just the tip of the iceberg of the numerus factors negatively affecting business creation and entrepreneurial success. AGROFFICIENCY project aims to contribute to the rise of the competitiveness and innovation in the CB area, by directly and holistically alleviating burdens and obstacles that concern the access to funding, education and training, entrepreneurship culture and coordinated support, by establishing mechanisms that aid newly established SMEs and guide them towards innovation and competitiveness. Naturally, there are already a few support mechanisms in the CB area, but their services aim at solving extremely specific problems the sector may encounter separately and not in conjunction with other obstacles. This trend unfortunately does not provide


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sustainable results and in the long run the bottlenecks not only persist, but are getting augmented, as other regions prosper and grow, while the CB area lags behind, adopting quick fixes and half measures.

AGROFFICIENCY's solution to the years of inertia and insufficient support is the establishment of a One-Stop-Shop Business Support Center. Its creation will enhance the quality and effectiveness of institutional support offered to enterprises operating in the area by implementing its two-approach model towards supporting the local SMEs. The first approach regards operating in an incubation-hub-like model, for the newly established and potential SMEs, by offering key services, so as to facilitate their fundamental needs for know-how, guidance, and best practices. To be more specific, the center aims to provide the necessary training, mentoring, one-to-one consulting and networking, allowing local SMEs to develop the crucial skills needed to prosper, generate new ideas, and at the same time, equip them with all the necessary knowledge and business tools, in order for them to become capable of properly and sustainably design and realize their growth strategies, on their own.

Through the support center the newly and potential SMEs will have access to the much-needed training regarding business tools. The center will provide them with training seminars and workshops, teaching them how to create a business plan, in order to get funding, how to manage their enterprise effectively and how to create a competitive advantage that will make their business more enticing to potential investors or to national, cross-national or even European subsidy programmes.

In addition, the same SMEs will be trained on how to effectively create a marketing plan and other vital communication and dissemination tools, in order to attract not only investors but also consumers and publicize themselves, while not getting lost in the vast pool of the open market. All in all, the training sessions and the workshops will also educate them on how


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to properly create a strategy plan, aiming to bring them one step closer to success and prosperity by sharing the value of having, smart goals and a clear strategy on how to achieve them.

The business support center will, also provide, through its pilot activities, the coveted networking, by organizing two Hybrid Networking & Innovation Forums with participants from the cross-border agri-food ecosystem. Through these forums the local existing and potential SMEs, and local stakeholders will be able to exchange views, innovative ideas, practices, strategies and create invaluable contacts that may lead to potential synergies, collaborations, assistance, and funding. Moreover, the participation of SMEs in a prestigious international fair, will be opening the gates of extroversion, helping them disseminate their businesses – innovative ideas and build their network.

The second approach of the Business Support Center focuses on educating the local newly established SMEs and startups, about cost efficient practices. It is a fact that most enterprises in the agri-food sector and its wider ecosystem, are quite energy intensive and this is affecting negatively their margins of profit, as production costs are maintained in high levels, while intense competition forces businesses to keep their pricing policies low. The support center will develop material and one-to-one consulting sessions through which it will disseminate the value of Circular Economy, Green Entrepreneurship and Contemporary Logistics, while suggesting targeted and viable solutions, practices and methodologies, through which SMEs will be able to integrate those business models and entrepreneurial philosophies in their existing operations, in order to cut down on costs, become energy efficient and develop a more environmentally friendly outlook that will further contribute to their growth.

Through the thirty years of Interreg Greece – Bulgaria experience, both countries have witnessed smart and promising ideas and projects vanish


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after the end of their implementation period, leaving their outputs headless and their results elapsing into the limbo. The Programme acts as an idea incubator, with the majority of the projects ending without an exit strategy. As AGROFFICIENCY aims to provide holistic support on the long run, its sustainability and continuity is as important and thought for, as its whole Work Plan. The project's consortium is a key factor in ensuring its sustainability, as it is composed of experienced Partners with extensive expertise in supporting and aiding enterprises, that will pose as guarantee for its continuity.

To be more specific, the sustainability of the project and its results, will be achieved through the commercialization of its activities. To ensure that, the consortium has included, in the Work Plan, a set of specialized capitalization activities, one of which is a capitalization workshop, where the beneficiaries and other stakeholders, potential shareholders, bodies both of public and private law, will engage in brainstorming and negotiating sessions, in order to determine and define the best suited shareholders of the Business Support Center that will maintain the ownership of the project after its ending. The institutional structure of the Business Support Center will be entrenched by the capitalization agreement, which will be created during the project's implementation and signed by all future shareholders. Moreover, after the agreement is set and stone, a Capitalization Plan will be drafted, in order to duly justify the sustainability of the project's commercialization, while at the same time a Strategic Plan will be created taking into account the findings of the project's studies, as well as the feedback earned by the implementation of the pilot activities, so as to crystallize the future strategy of the whole venture.

The CB area exhibits a great demand for such a venture, that is impossible to fully satisfy through the programme, due to budget and chronological limitations. During the project's implementation, the services of the support


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center will be offered to a limited number of local newly established and potential SMEs. However, the cross-border entrepreneurial climate will still be in great need of such services, support, and knowledge, after the project is over. There are numerus potential entrepreneurs with innovative ideas, lacking know-how, and other fundamental skills that will continue searching for a holistic support mechanism that will help them reify their dreams. At the same time, existing businesses with years of experience will continue to search for synergy opportunities, to incorporate innovation into their operation and increase their growth and extroversion, and businesses facing legacy issues will continue hunting their linkage to the future.

With an experienced and influential shareholder scheme, a promising product, an under saturated market and a clear vision turned into plan, AGROFFICIENCY is here to stay.

# 3. Literature Review – Regarding the Greek Side

## 3.1. Regarding the Greek Side

### 3.1.1. Current Situation of the Agrifood Sector

The food and drink sector, according to Eurostat data, accounts for 12.1% of total consumer spending in Europe, third most expensive for a household after housing, water and energy. Our country ranks ninth in the EU with 16.9%, while by far the highest percentage was recorded in Romania, where 27.8% of consumer expenditure (1/5) is spent on food and non-alcoholic beverages, more than double the EU average.

According to the results of the annual Survey on the Production and Sales of Manufactured Products (PRODCOM) of the Hellenic Statistical Authority (ELSTAT) for the reference year 2020, 1,418 companies are


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active in the food industry in Greece, which shows a slight decrease compared to 2019 with 1,624 companies.

The value of products sold decreased from 9,290.34 million euros in 2019 to 7,494.12 million euros in 2020. The share of the sector in the total value of products sold decreased by 0.5% from 21.6% in 2019 to 21.1% in 2020.

| Division of economic activity (NACE Rev. 2) | Number of enterprises | | Value of sales (EUR million) | | Contribution to the total value of sales of manufactured products (%) | |
|---|---|---|---|---|---|---|
| | 2019 | 2020 | 2019 | 2020 | 2019 | 2020 |
| Sector C: Manufacturing | 5.194 | 4.5534 | 42.340,47 | 34.863,84 | 98,3 | 98,1 |
| Manufacture of food products | 1.624 | 1.418 | 9.290,34 | 7.494,12 | 21,6 | 21,1 |
| Total (B&G Sector) | 5.297 | 4.646 | 43.083,96 | 35.542,08 | | |

*Table 1: Value of sales of manufactured products by division of economic activity, 2019 - 2020 Food industry (ELSTAT, 2022)1*

The six (6) largest divisions in industry account for 71.5% of the total value of sales of manufactured products in the year 2020 and for 74.8% of the total value of sales of manufactured products in the year 2019.

The food industry is one of the 6 most important sectors of Greek industry, accounting for 21.6% of the total value of products sold (in million Euros) by sector of economic activity.

[1] https://www.statistics.gr/en/statistics/-/publication/SIN06/2020



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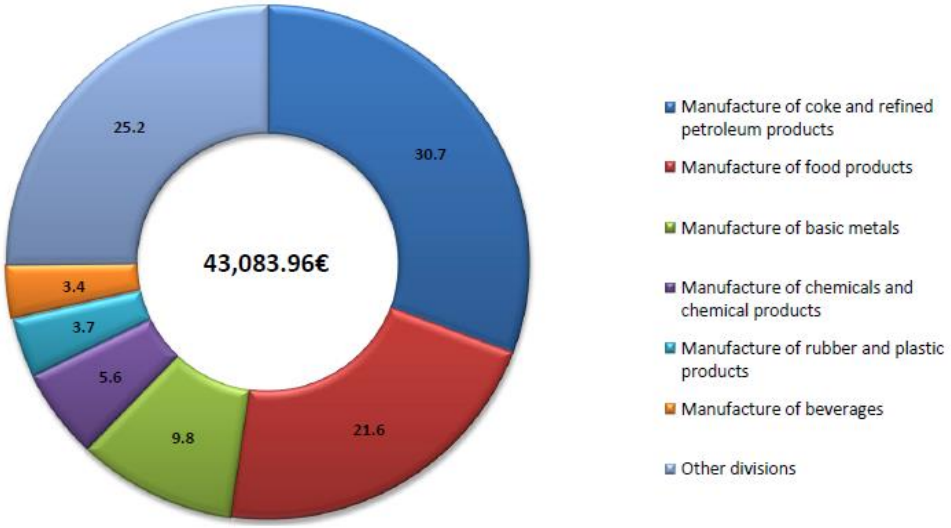


*Figure 1: Percentage contribution (%) to the total value of sales (in million euro) by division of economic activity NACE Rev. 2, 2019 (ELSTAT, 2021)*

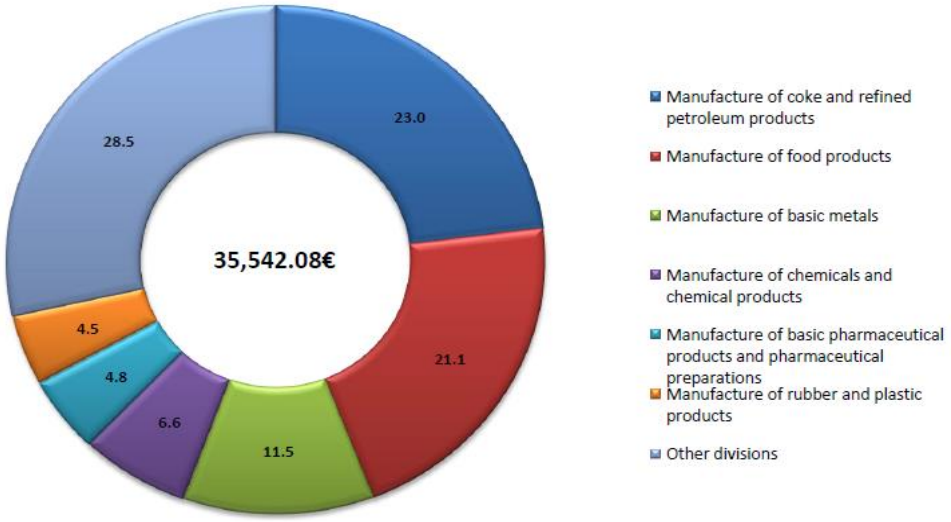


*Figure 2: Percentage contribution (%) to the total value of sales (in million euro) by division of economic activity NACE Rev. 2, 2020 (ELSTAT, 2021)*

## Cost indices for the Factors of Agricultural and Livestock

The Cost Indices for the Factors of Agricultural and Livestock Production are compiled on a yearly basis for Greece total. The Cost Indices for the Factors of Agricultural and Livestock Production are compiled on the basis of data collected on the agricultural wages (Labour), on land rents



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(Land) and on machinery rents and agricultural loans interest (Capital) and are intended to measure the relative change in the cost-price paid by producers.

The evolution of the General Cost index for the Factors of Agricultural and Livestock production for the year 2020, is as follows:

The General Index in 2020, compared with 2019, increased by 0.3%. The corresponding index in 2019 had recorded an increase of 2.7%, compared with 2018.

The change in the General Cost Index for the Factors of Agricultural and Livestock Production (3% increase) in 2020, is on account of the following changes in the individual indices of the main groups:

- 2.0% increase in the Labour Remuneration Index (agricultural wages)
- 0.2% decrease in the Land Rents Index (land rents)
- 1.3% decrease in the Capital Cost Index (4.1% decrease in loans interest and 0.1% increase in machinery rents)

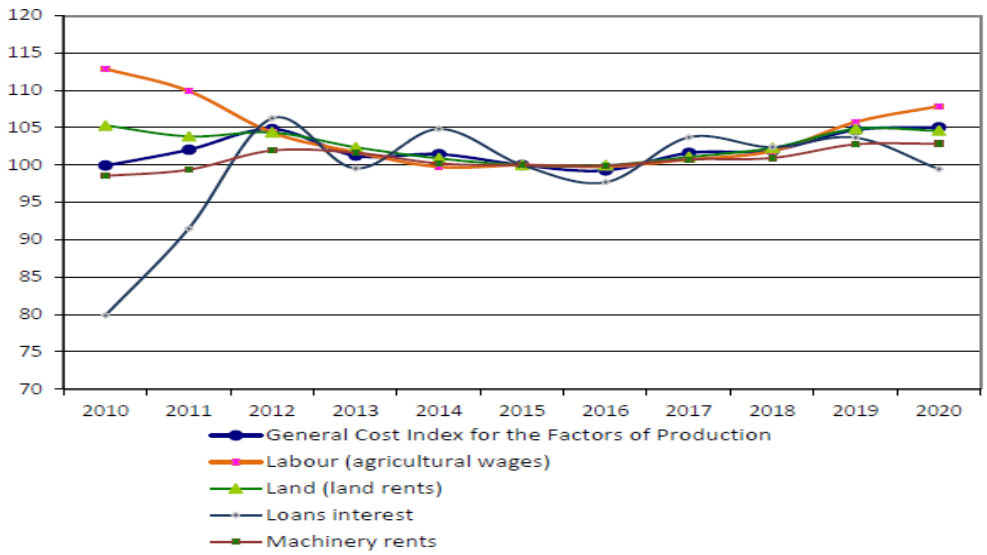


*Figure 3: Evolution of the Cost Indices for the Factors of Agricultural and Livestock Production (2015=100.0)*



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## Input and Output Price Indices in Agriculture – Livestock

The purpose of the Output Price Index is to measure the relative change in the prices that the producers receive in the agricultural – livestock sector from the sale of their products. The purpose of the Input Price Index is to measure the change in the prices paid by producers for the purchase of the means. goods and services used in the production process.

The Output Price Index is composed of the crop and the animal output sub-indices. The Input Price Index consists of the sub-indices of intermediate consumption and of fixed capital formation goods.

As regards the Output Price Index. the prices collected are the market prices of the products. The market price is defined as the price received by the producer without subsidies. transport expenses and excluding VAT or other taxes or levies.

As regards the Input Price Index. the collected prices refer to the prices paid for by the producers to buy the goods and services they need for their agricultural and livestock production. excluding VAT and transport expenses.

The evolution of the Input and Output Price Indices with base year 2015=100.0 for November 2021, according to provisional data, is as follows:

The Output Price Index in Agriculture – Livestock (excluding subsidies) increased by 16.1% in November 2021, compared with November 2020. The corresponding index in November 2020 had recorded an increase of 1.5%, compared with November 2019 (Graph 5). The increase of 16.1% in the Output Price Index in November 2021 compared with November 2020 is on account of increase 18.4% of the price index in crop output group and mainly on the rates of change of the groups cereals (including seeds) and industrial crops.


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The Output Price Index in November 2021 decreased by 2.2%, in comparison with October 2021. The twelve-month weighted average output index from December 2020 to November 2021 increased by 8.7%, compared with the corresponding index of the period from December 2019 to November 2020.

### The place of the agri-food sector in the regional economy

The rural economy in Greece is one of the pillars of the country's economy. A large part of the population is active in the primary sector, and it is also one of the main sectors of the country's export activities.

The products produced on Greek land constitute the third largest category of exported products with around 15% of total exports, while the deficit in the trade balance of agri-food products has been significantly reduced in recent years. Equally important is that about 1/3 of the direct investments in our country are directed towards the agri-food sector.

The agri-food sector is characterized by extroversion, with Greek agri-food products improving their position and participating with a high percentage and increasing figures in the total exports of the country, as the sector contributes about 7.5% to the total Gross Added Value of our country.

Agriculture within the European Union now accounts for 6% of European GDP with 15 million businesses and 46 million jobs and, with rural areas accounting for over 77% of the territory of the EU (47% farmland and 30% forests) and hosting around half of its population (rural communities and other residents). At EU level, there are 12 million (full-time) farmers, half of whom grow very small (less than 2 ha) farms, according to the European Commission (2013).

At the same time, it is a major factor in halting unemployment as it accounts for around 15% of total employment in Greece. According to data from the


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Hellenic Statistical Authority (ELSTAT) the approximately 700,000 farms in the country supply 15,000 businesses and employ 1.2 million workers.

### The position of the agricultural sector in the Greek economy

Despite the significant problems faced by the agricultural sector in Greece, it is one of the key sectors of the Greek economy, contributing 2.9% of the country's GDP and 14% of employment, rates very high compared to the corresponding averages in the European Union.[2] Agricultural products are the country's largest export category, with exports amounting to €4.3 billion (data for the period January-October 2021), which include the one-digit categories of the Standard International Trade Classification (STC), where 0: food and live animals, 1: beverages and tobacco and 4: oils and fats of animal or vegetable origin. The largest export category is food ingredients with exports of €3.4 billion, followed by oils and fats of animal or vegetable origin with around €503 million, and beverages and tobacco with €464 million (Table 3).

| | Ε.Ε. | Τρίτες χώρες |
|---|---|---|
| **0. food and live animals** | **3.379,3** | **1.438,1** |
| **1. beverages and tobacco** | **464,8** | **307,3** |
| 2. Non-food raw materials, except fuels | 447,6 | 968,1 |
| 3. Fossil fuels, lubricants, etc. | 2.041,5 | 7.004,0 |
| **4. Oils and fats of animal or vegetable origin** | **503,4** | **103,0** |
| 5. Chemicals and related products (n.e.c.) | 3.325,6 | 1.398,9 |
| 6. Industrial articles classified mainly by raw material | 3.403,8 | 1.695,6 |

[2] *National Bank of Greece (2015). Unlocking the potential of Greek agro-food industry. S - December 2015. Athens.*



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| | | |
|---|---|---|
| 7. Transport machinery and hardware | 1.976,8 | 1.118,8 |
| 8. Various industrial items | 1.845,3 | 564,3 |
| 9. Items and transactions not classified by category | 190,4 | 225,0 |
| Total | 17.578,5 | 14.823,2 |

*Table 2: Exports - Shipments by TDCA Categories October 2021**

The strong export interest in the above products, and in particular foodstuffs, is particularly important. A key element in attracting the interest of foreign markets is the consistent quality of the products and their certification, given that in recent years there has been a shift of consumers towards local-traditional-unique products. The increase in demand for such products is an opportunity for the region which can diversify its products, as well as strengthen its endogenous potential[3].

In recent years, consumers have started to shift towards local, traditional and distinctive products, i.e. products that are considered to be of superior quality compared to those that are the result of mass production. This consumer shift is due to many reasons, such as, for example, recent food crises, the higher incomes of a certain proportion of consumers, growing concern about food quality and safety, people's growing environmental concerns, and their move away from the countryside, which has renewed consumer interest in products that are 'authentic' and associated with tradition, heritage and culture[4].

At this point it is necessary to understand what "local" products are. According to one of the prevailing definitions, local products are considered

[3] *Kizos, Th. (ca.) Primary sector: Quality products as a means of supporting agricultural production. Department of Geography. University of the Aegean, Mytilene, Mytilini, Greece.*
[4] *Kizos, Th. (ca.). Primary sector: Quality products as a means of supporting agricultural production. Department of Geography. University of the Aegean, Mytilini.*


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to be 'the physical goods or services produced or provided by different enterprises in rural areas and having a recognised socio-economic identity»[5]. As can be seen from the above definition, the concept of 'local' can refer to a geographical area that is clearly defined or to the particular 'intrinsic' characteristics of the products of this region. It may also concern a completely different case of products than so-called mass or global products.

As for the concept of quality, it is a socially inspired concept, which takes on different meanings depending on products, regions and the social context in which it is developed. In general, it can be considered as the degree of superiority of a product or service over similar products or services.

More specifically, there are three categories of quality:

i. The "real" quality of the product refers to the quality of the materials used, the production process, the recipe, the technology, the nutritional value of the product etc.
ii. The quality derived from various certification schemes, either for the origin (e.g. PDO, PGI etc.), or for the production process (organic, integrated management, etc.) or for the assurance - standardisation of the production process (e.g. ISO or HACCP, etc.).
iii. "Symbolic" product quality refers to the quality attributed to a product because of specific cultural, ideological, or symbolic relationships that develop between the product and the consumer.

It is worth noting here that symbolic value is linked to the other two categories of quality. On the other hand, many times, products without certifications or even without "real" quality, have so much symbolic value, which covers their disadvantages. This is because products, such as food in

[5] *Ilbery, B. and Kneafsey, M. (1999). Niche markets and regional speciality food products in Europe: towards a research agenda. Environment and Planning A, 31, pp. 2207-2222.*



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this case, are also symbols of a region or a geographical unit, while there are often historical and symbolic links between regions and foods, which give consumers the feeling that through specific products they can identify and acquire a kind of "access" to the tradition, history, values and way of life of a specific region. In fact, the attraction created in the consumer towards such a product results in his preference and search in various markets.

As regards specific character, this is an attempt by the EU to introduce specific certifications related to the use of also specific or traditional raw materials, specific production methods and with an identifiable geographical origin. The concept of specificity essentially complements the concept of locality and limits its wide scope, offering more possibilities for the creation and development of classification systems. At EU level, reference is made to PDO products (Protected Designation of Origin), PGI (Protected Geographical Indication), PGI (Special Traditional Product Guaranteed), OPAP, OPC and V.Q.P.R.D. (Quality Wines). However, in addition to these 'formal' specificity markings, in many regions there are also products with 'atypical' specificity, which may be recognised by consumers but do not bear the relevant formal marking.

On the basis of the above definitions, it is possible to classify the various local products according to the local nature of their raw materials and their specificity. This classification results in four categories:

1) Local specific products with local raw materials,
2) Local peculiar products without local raw materials,
3) Non-indigenous local products with local raw materials, and
4) Non-indigenous local products without local raw materials.

Local products are involved in local development processes in various ways, as they contribute to the creation of the "identity" of a region, creating links between products, landscape-space and culture, thus preserving the local


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cognitive - gastronomic heritage. This combination of products with local images or local memories results in a higher symbolic quality and an increase in the final value of these products, resulting in a higher added value.[6]

In summary, and based on the above, the production of local products plays a central role in the processes of synergy between different economic activities, particularly in cases where local resources are used, between producers of raw materials, producers of finished products and distributors, thus creating positive external economies. This coexistence can therefore make a real contribution to the development of these regions by increasing productive activities and employment, encouraging entrepreneurship, and strengthening economic structures and social cohesion[7].

### 3.1.2. Challenges & prospects of the Agri-food sector

The agri-food sector is one of the most significant parts of the Greek economy. More specifically, the primary sector and the agri-food industry are of strategic importance for a country. Except for their economic activity, they contribute to the food security of the country, enhance regional growth rates and play an important role in the maintenance of the quality of the natural environment. Finally, food tradition is a key component of a region's cultural identity, with important implications for the promotion and by extension the export of local products abroad.

Greece holds a lead position in the agri-food sector since it has significant competitive advantages. They are mainly based on the diversity of the country which leads to a variety of agricultural species. Moreover, Greece enjoys the favorable conditions of the natural environment in the lowland areas of the country that contribute to the

[6] *Ilbery, B. and Kneafsey, M. (1999). Niche markets and regional speciality food products in Europe: towards a research agenda. Environment and Planning A, 31, pp. 2207-2222.*
[7] *OECD (1995). Niche markets as a rural development strategy. OECD, Paris*


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high quality and nutritional value of a relatively wide range of agricultural products which are internationally recognized. These advantages have not been efficiently capitalized because of chronic structural weaknesses such as:

- small and fragmented farms,
- low productivity,
- inefficient structure,
- low integration of new and innovative technologies and equipment,
- inadequate vocational training,
- low level of R&D and,
- high dependence on subsidies and
- inadequate promotion and branding of Greek agri-food products.

The implementation of specific strategies in our country sets new goals and challenges and is estimated that will enhance significantly the conditions and the long-term forecasts in the agri-food industry. Firstly, the Farm to Plate Strategy is part of the Green Deal and aims to move towards sustainable food systems. Research and innovation are the main key drivers for its implementation. Secondly, the Biodiversity Strategy 2030 will be implemented simultaneously with the Farm to Plate Strategy and the Common Agricultural Policy (CAP). It aims to reverse the loss of biodiversity and specify how Europe can contribute to this goal through actions and commitments to protect and conserve nature in the EU.

Agri-food sector in Greece have some special characteristics. Economic approaches to the structure of agricultural production in the country highlight as a key weakness the fact that a large part of farms is of low economic importance (FEIR, 2020). It is important to be mentioned that the vast majority of farms in Greece are of very small, small, or medium


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size and by extension of low capacity. To be more specific, 90% of the Greek farms are less than 20 hectares in size. Moreover, the average age of Greek farmers in comparison with the other EU countries, differs significantly upwards, with over 60% of them being over 55 years old. However, although the phenomenon of the intense fragmentation of agricultural holdings has a negative impact on the economics of Greek agriculture, is at the same time responsible for the special mosaic of rural landscapes of the Greek countryside (Terkenli, 2004).

It is commonly known that Greek rural landscapes are considered as being of high cultural and environmental value. Thus, they are ideal for a return to nature and the values of the countryside. Following that, they are also appropriate for the development of soft forms of agri-tourism and gastro-tourism. Moreover, the long history of agriculture in Greece makes the food products that are traditionally produced to be distinguished for their high quality. Olive oil, olives, raisins, figs, preserved vegetables, tomato paste and yoghurt are the products with the strongest advantages in the markets and therefore those that are in the biggest demand abroad. The country's agricultural production mainly benefits from the production of olive oil, fruits, and vegetables. In contrast with the previously mentioned products, fruits, and their derivatives, like wine, are highly competitive not due to their higher quality, but especially because of their lower prices compared with other competitive similar products.

Every opportunity to consume local products in their place of production has significant benefits for Greek farmers. In this way, a relatively accessible market is created for their agricultural products, which is particularly important for small farms. Furthermore, transport costs and the cost of fuel and other forms of energy are reduced contributing at the same time to the protection of the natural environment. It is


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important to be referred that there are dozens of Greek products that are sold in bulk without any quality control or certification, such as olive oil in which only 27% of its whole production meets standardization levels.

### Priorities and strategies of the UN and European organizations

One of the most basic prerequisites for most of the seventeen Sustainable Development Goals set by the UN for 2030 is sustainable nutrition (UN, 2015). For this reason, the new trends in the food sector are implemented taking into consideration the sustainability of processes, both in primary agricultural production as well as in the industrial production and in distribution and consumption. (Science Advice for Policy by European Academies, 2020). In general, the term sustainability sets the following requirements:

- reduction of inputs to agriculture,
- improvement of the energy and water footprint at all stages of the supply chain,
- reduction or reuse of all forms of waste and carbon emissions.

However, the sustainability of the food chain additionally includes issues of employee safety. For instance, ensuring decent working conditions for personnel as well as the protection of the general population of the areas which are close to the production places. The fulfillment of the conditions of an "ethically correct" work is now a concern for large Greek companies. Nevertheless, in the future, it is expected that it will also affect the smaller and medium ones, especially those who operate as suppliers of foreign trading companies. The above issues also have serious economic consequences, affecting the image of businesses, sales prices as well as consumer demand for their products.


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## Strategic priorities to support the agri-food sector

New Programming Period 2021-2027

The new Competitiveness Programme largely reflects the Commission's new priorities and the country's new development priorities. The Competitiveness 2021-2027 Programme is an integrated intervention that will support the productive, competitive and outward-looking sectors of the economy in their transition to a growth model driven by the Knowledge Economy. The Programme is also in line with the European Union (EU) policies for the digital and green transformation of the Greek economy, promoting interventions and investments that contribute to the objectives set at European level. In the long term, the aim of the Programme is to transform Greek enterprises into outward-looking ones and restructure them in order to re-establish them as an engine of growth of the Greek economy.

Common Agricultural Policy (CAP) for the period 2021 – 2027

The new CAP will be implemented through the adoption and approval of a CAP Strategic Plan per Member State, covering both the Pillar I (direct payments, sectoral interventions) and the Pillar II (rural development). The operating model of the new CAP will concentrate on:

- maximizing the contribution of the CAP to the protection of the natural environment and climate change via the setting of ambitious environmental and climate targets by the CMOs.
- establishing a new relationship with the Member States,
- strengthening the principle of subsidiarity and planning flexibility, while moving from a system based on compliance to one based on "achieving results" and
- promoting innovation, knowledge and new technologies (e.g. digitalisation) in agriculture.



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The Strategic Plan of the Common Agricultural Policy 2023-2027, is the key policy document for the development of the primary sector and rural areas of the country. Through its interventions, it signals the shift to a new production model for Greek agriculture and the entire agri-food industry. The new Strategic Plan is based on improving competitiveness ensuring at the same time a fair agricultural income for the producer. Moreover, it is adapted to the demands and challenges of climate change, aiming to reduce the environmental and climate footprint of agriculture while providing consumers with safe and healthy food. To sum up, it is immediately connected with the social, environmental, and economic sustainability of rural areas acting in synergy with the NSRF Operational Programmes and the resources of the National Recovery & Resilience Plan "Greece 2.0".

The main goal of the Common Agricultural Policy (CAP) Strategic Plan for the period 2023-2027 is to support the sustainable development of the agriculture and food sectors. Something which is translated into ensuring sustainable agricultural incomes and enhancing competitiveness, as well as strengthening the socio-economic fabric of rural areas. Of course, the whole of the previously mentioned is expected to contribute significantly to the achievement of environmental and climate aims at the national and European level.

The new CAP is concentrated on smart and resilient agriculture, enhancing care for the environment and climate and strengthening the socio-economic fabric of rural areas. More specifically, these ambitions are expressed via the following targets which are characterized as necessary to be accomplished:

- Supporting sustainable agricultural incomes and resilience across the European Union to support food security


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- Strengthening market orientation and increasing competitiveness, including a greater focus on research, technology and digitisation
- Improving the position of farmers in the value chain
- Contributing to climate change mitigation and adaptation and contributing to the production of sustainable forms of energy
- Promote sustainable development and efficient management of natural resources such as water, soil and air
- Contributing to the protection of biodiversity, enhancing ecosystem services and conserving habitats and landscapes
- Attracting young farmers and facilitating business development in rural areas
- Promoting employment, growth, social inclusion and local development in rural areas, including the bio-economy and sustainable forestry
- Improving the responsiveness of European Union agriculture to society's food demands and health, including the requirement for safe, nutritious and sustainable food, management, to address the issue of food waste, and animal welfare.
- Modernising the agricultural sector by promoting and disseminating knowledge, innovation and digitalisation in agriculture and rural areas and encouraging their adoption.

New European Agri-Food Strategy F2F (Farm to Fork), "From farm to plate"

Sustainable Development is a global challenge for the evolution of society and the economy and a top priority for the Greek Food Industry. In May 2020, the European Commission published a report on the EU's path to 2050 entitled "From farm to fork" outlining the new strategy for a fair, healthy and environmentally friendly food system (EU 2020). In this


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context, an integrated approach to how Europeans should assess food sustainability is proposed. It highlights that creating an enabling environment for food that facilitates healthy and sustainable food choices will benefit the health and quality of life of consumers and reduce the social costs to citizens' health. Furthermore, it should be noted that the Covid-19 pandemic has made more obvious the close interconnection between public health, ecosystems, supply chains and consumption patterns, pointing out how important is a resilient and sustainable food system.

According to the European Commission, the 'Farm to Plate' strategy:

- is a key element of the European Green Deal, which it is aimed to become the global standard for sustainability.
- will strengthen their efforts to tackle climate change, protect the environment and preserve biodiversity.
- will help to significantly reduce the dependence, risk and use of chemical pesticides, as well as fertilisers and antibiotics.
- will also contribute to achieving a circular economy.
- will stimulate sustainable food consumption and promote affordable food for all.

In closing this paragraph, it is necessary to present the goals regarding sustainable primary production until 2030. They are the following:

- 50% reduction in the use and relative risk of chemical pesticides and the use of the most hazardous pesticides
- 20 % reduction in fertilizer use
- at least 50% reduction of nutrient losses by ensuring soil fertility
- 50% reduction in sales of antimicrobials for farm animals and aquaculture
- 25% of agricultural land to be under the organic farming status


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### 3.1.3. Agri-food sector

The exploitation of the comparative advantages of the agri-food sector can be significantly enhanced by implementing actions along the following lines:

- Enlarging farms: Enhanced financial incentives for participation in cooperative schemes (producer business groups and cooperatives) and increased vertical integration of agricultural production (development of processing activity by agricultural cooperatives and strengthening of contract farming programs). Legislation is needed to increase the autonomy, internal organization and business orientation of cooperatives.
- Modernization of holdings: The enlargement of farms is also a key step in their modernization. In addition, capital transfers to the agricultural sector should also play an important role for investments in modern equipment and innovative techniques.
- Improving human resources. There is a need for systematic training programs that are specific to modern developments in the agri-food sector. In addition, incentives are needed to attract young farmers who are better educated and better response to the use of modern production methods and business strategies.
- Strengthening cooperation with universities and the research community. Part of the high international productivity is due to the introduction of innovations (precision agriculture and the use of robotics) which have emerged through the close cooperation of production (agricultural cooperatives and private companies) and the research community. In this direction, measures leading to a stronger start-up environment are important (startups) the agri-food sector, as well as the fullest



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possible use of the Agricultural Knowledge and Innovation System (ASGM) of the EU.

The study and application of good practices from other countries in this direction is an essential component of the domestic agri-food strategy.

- Increasing the added value of agri-food products. Cost reduction and productivity increase can be achieved by proper management of plant protection, selection of high quality certified seeds, rational purchase of agricultural equipment and fertilizers, efficient irrigation and techniques such as intercropping. In addition, promotional actions and marketing strategy at regional and product level contribute to the promotion of product standardization and further development of domestic branding. The concentration of sales under common brands and a national brand leads to more effective product promotion, concentrating production, attracting finance and reducing production and distribution costs. The closer linking of agri-food with other sectors of the economy (tourism, culture, processing of other products) has a positive impact, under common promotional strategies. In this direction is also the support for the organization and participation in sectoral trade fairs in Greece and abroad.
- Better interconnection of the agri-food sector with tourism with two-way and multi-level benefits. The presence of distinctive Greek food products, preferably branded and recognizable, can significantly increase sales not only to hotels and cruise lines but also when visitors return to their home country and throughout the year through local sales. Important are actions that will strengthen the economies of scale of producers and their


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interconnection with international networks and with digital and other modern sales methods

### 3.1.4. Supply Chain and Logistics

#### Definitions

The definition of supply chain is a complex issue and for this reason a very wide range of definitions can be found in the international literature. Initially, according to Quinn's definition (1997) supply chain is defined as all the activities and processes related to the design and production of products and services, distribution and customer service, with the aim of meeting the customer's needs. In essence, the supply chain is about aligning the businesses that bring their products or services to market and includes manufacturers, suppliers, carriers, warehouses, wholesalers, retailers and other intermediaries, as well as customers. (Lambert et al., 1998).

To sum up, the supply chain is a network of interdependent organizations working together to control and improve the flow of materials and information from suppliers to the consumer (Towill et al., 2005). According to Chopra and Meindl (2007), the supply chain consists "of all those parts that are directly or indirectly involved in order to meet the needs of consumers". According to Ayers' definition (2001), the supply chain includes (i) the processes of the product's or service's life cycle, physical and economic information and the information flow, aiming at satisfying the requirements of the end-user of the product or service, thus it covers wide range of activities such as manufacturing, supply, transport, storage, sale and support of the product or after-sales service. Finally, Lambert et al. (2005) define the supply chain as the integrated procedure of planning, implementing and controlling of


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all the processes that can convert inputs from suppliers into products and services that add value to customers".

It is worth mentioning that sometimes the term "supply chain" is accompanied or confused with the term logistics. There are researchers who claim that these terms are identical (Stock & Lambert, 2001) and others who consider that logistics is a subset of the supply chain that optimizes the flow within the different stages of the supply chain (Ballou, 2004).

### Global supply chains

According to studies conducted by the International Monetary Fund (IMF), the cost of the supply chain represents about 12% of each country's GDP.

The global supply chain sector is estimated to account for 13.8% of global GDP (EUR 5,400,000,000) (Klassen & McLaughlin, 1996). In Table 3 in Annex I: Logistics Performance in Greece, Greece ranks 42nd out of 160 countries around the world regarding the overall Logistics performance index for the year 2018 (45th, 48th ,35th and 38th regarding the country's tracking and tracing ability, competence and quality of logistics services, ease of arranging competitively price international shipment and the country's quality of trade and transport related infrastructure), which demonstrates the need to improve this sector in Greece.


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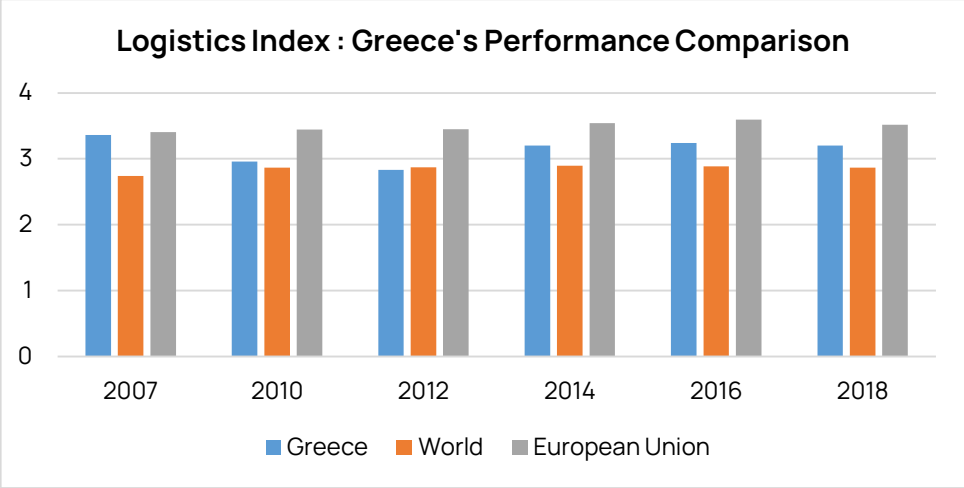


*Figure 4: Logistics Performance Index since 2007: A comparison among Greece, the World and the European Union (Logistics performance index: Overall score - World Bank, 2018)*

The country's performance seems to have decreased over the years, especially compared to the overall performance of the European Union as shown in Figure 4; however, it is still higher than the world average. Thus, taking steps into bettering the supply chain and logistics sector is an achievable goal that would be of particular help to the Greek economy both in terms of consumers (better prices) and at national level (better competitiveness in the global market, greater profits for industries, greater economic growth with the direct consequence of reducing unemployment etc.).

## The supply chain in Greece

In Greece, the applications of Supply Chain Management are increasing exponentially in recent years. The factors that contributed greatly to this increase are considered to be the invasion of multinationals in the Greek market, the expansion of Greek businesses, the emergence of non-profit companies aiming at the dissemination of supply chain management and logistics, as well as the continuous development of technology and the creation of logistics information systems. In addition, the 2004 Olympic Games significantly boosted the sector in Greece. It is characteristically



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mentioned that in the years 2002 and 2003 there was an increase of the sector in Greece by 12.3% and in 2004 by 12.8% (Folinas, 2014).

In Greece, the participation of the supply chain sector in the GDP reaches about 10% and from this one concludes the importance of the sector and the need for optimization, as explained in Subsection 1.2.

The problematic points that have been identified in the supply chain sector in Greece are:

- Low percentage of outsourcing (about 18%), compared with the corresponding grades in the rest of Europe (about 80%).
- Absence of multimodal transport and minimal integration of rail transport into commercial transport. The direct result of this is that Greece remains highly dependent on commercial road transport (97.5% of land transport in Greece is road, whereas in the rest of Europe it is at levels of 76.3%).
- High transport costs. With the rise in fuel prices, the increase in the cost of tolls and insurance premiums, the operating cost of transport has increased significantly.
- Bad road network with poor infrastructure.
- A deterrent environment for entrepreneurship and investment, with acute bureaucratic problems.
- Lack of strategic spatial planning.



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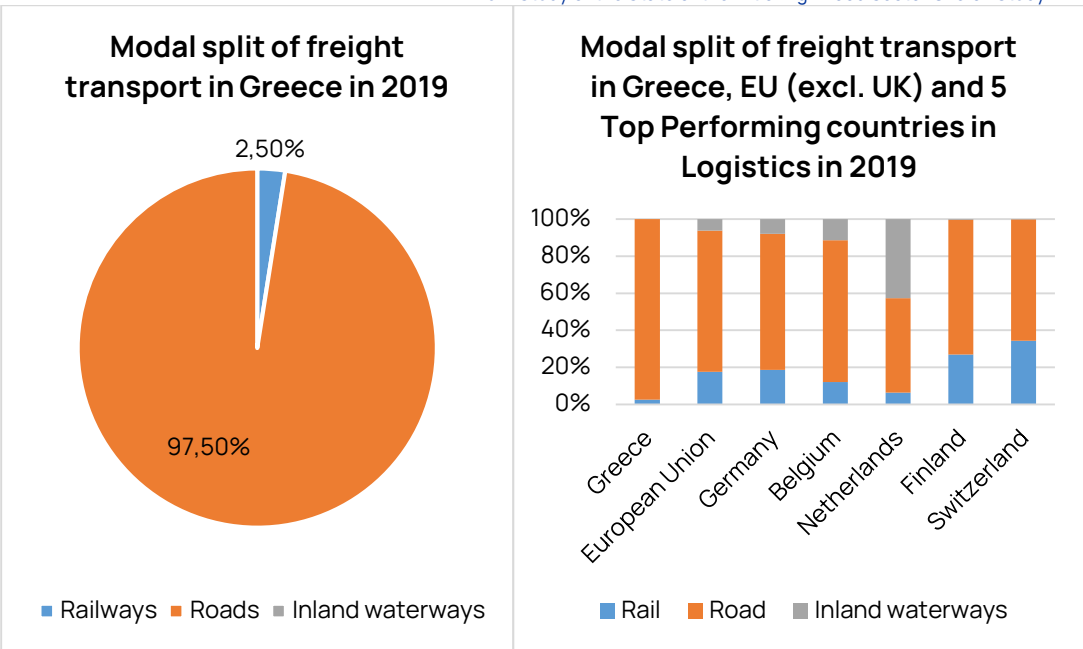


*Figure 5: The Modal split of transport in Greece in 2019 (left) and the Modal split of freight transport in Greece, the EU (excl. UK) and Top Performing Countries according to the Logistics Index (as shown in Annex I and Table 3) with available data in the Eurostat database*

The economic crisis worsened the above problematic points of the Greek supply chain and Logistics, resulting in a 12% reduction in the volume of transported cargoes from 2010 to 2011 and from 31% to the transport work. In addition, national transport that year fell by 33%, while the fall in international transport was 17%.

### The importance and the targets of the supply chain

The importance of the supply chain is great both for businesses and the consumer, but also for the environment. Consumers benefit because throughout the supply chain the needs of the consumer are set as a key objective and in this way the real needs are translated into satisfaction through different modes of transport. In addition, through supply chains, the variety of goods to which the consumer has access is increased, the quality of products and services is secured, and the availability of goods is ensured so that the consumer can find the product he wants, in good



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quality and at the time he/she wishes. The supply chain for businesses is of great importance, as through the cooperation actions that take place in the supply chain, it increases its adaptability and sustainability to the new market conditions is achieved. Within this collaborative framework, better solutions and practices at operational level, greater innovation and the identification of cheaper and better-quality raw materials can be achieved.

In the case small and medium-sized enterprises in particular, the importance of the supply chain is crucial, because it gives them sustainability opportunities in the highly competitive environment of the global market (Malindretos, 2015). Finally, the importance of the supply chain is also great for the protection of the environment. Specifically, the development of Sustainable Supply Chain Management and Green Supply Chain Management integrate the protection of the environment in its design and organization. Various practices that are promoted are the wider ecological awareness, the establishment and observance of a legal framework for the protection of the environment in enterprises, the use of renewable energy sources, the recycling of products and the utilization of waste at all stages of the supply chain (Malindretos, 2015).

The main objective of the supply chain is to satisfy business goals with the smallest possible cost and therefore it is necessary to pursue high quality at all stages of the supply chain, while at the same time keeping as low as possible the cost. Other objectives of the supply chain are the high level of service with proper inventory management, the minimization of deviations from forecasts and uncertainties and the control of the quality of services at all stages (Malindretos, 2015).


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### 3.1.5. Agricultural Logistics

Zhang & Li (2012) defined the supply chain of agricultural products as an 'agri-food supply chain'. It represents a network of companies related to food through which food is moved from production to consumption, including pre-production processes (supplies, etc.). In this definition, however, we do not see the involvement of logistics. A number of changes in the agro-food industry has led businesses and stakeholders to redefine their roles, activities and strategies. For example, production, supply and demand are no longer confined to only small regions or states but have become international processes. In addition, the varieties of these products have increased considerably, while the demands of the markets in terms of quality, traceability while maintaining the tradition and sustainability of agricultural products are also constantly increasing.

In response to the constant changes and challenges, businesses and those involved in the field of agricultural production and food are working on innovation by designing and introducing techniques to improve quality, logistics processes and information systems (IS). The logistics of agricultural production are part of the modern logistics and signify the process of natural flow of agricultural products and related information, from the primary agricultural production to the consumption of these goods. This includes:

- Production
- Resale
- Transportation and loading/unloading
- Packaging
- Storage and distribution
- Sale to the final consumer
- The flow of information



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Thus, agrilogistics is the common denominator of the sectors of production, transport and consumption, connecting producers with consumers of agricultural products through various stakeholders such as traders-resellers, standardization or processing industries, transporters, etc. The aim of Agri-logistics is to overcome the barriers of time, cost and distance by promoting the safe and efficient transport and storage of goods, as well as to improve the added value of these products while reducing the costs and risks incurred by the stakeholders (Chen & Xie, 2007).

Agri-logistics cover these logistics processes for mainly three categories of products:

1. The supply chains of agricultural products cooperatives (such as wheat, soybeans, coffee, etc.) which have similar quality characteristics (i.e., commodities). In these international agri-food supply chains, agricultural products are traded in open markets to be used primarily as raw materials for industries that will process them to produce final food products. An important trend in such chains is the creation of supply chains "loyal" to de-commoditizing of goods with specific and agreed specifications.
2. The supply chains of perishable agricultural goods (such as fresh vegetables, fruits, fish, potatoes, etc.). The quality characteristics of the above products remain (or need to remain) intact through the supply chain, a fact that adds value. The main procedures that are followed are: the receipt, the storage under specific conditions (temperature, humidity etc), the packaging, the transportation and especially the trading of these items. An important trend here is the increase of synergies between stakeholders on an international level through long-term cooperation agreements.


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3. The supply chains of high value products that have been processed (e.g., dairy, meat products). These supply chains produce goods intended for retail and are characterized mainly by close professional relationships between stakeholders often on an international level through long-term contracts with clearly defined specifications.

Thus, agri-logistics include all those processes in a supply chain, that match the production of agricultural products from the farm to fork. The goal is to end-up with the right agricultural products, at the right place, at the right time, in accordance with the appropriate requirements (fullfilling quality and sustainability standards), at the lowest possible price. The stakeholders involved in such chains are aware of the dangers where the quality of product can easily decline due to the recklessness of another stakeholder, which can jeopardize food safety.

#### 3.1.5.1. Designing the Agri-food Supply Chain

Agri-food supply chains are financial systems that distribute benefits and risks among their stakeholders. Therefore, they strengthen internal mechanisms and strengthen incentives along the chain in order to ensure quality production efficiency and commitments on agreed upon product deliveries (Iyer & Bergen, 1997 / Lambert & Cooper, 2000). The supply chains and their stakeholders are thus linked to the values of mutual programming by sharing information and complying with the quality standards and the agreed upon production volume.

The abovementioned attributes contribute to the addition of value for the agricultural products and require from each participant in the supply chain proper cooperation and continuous improvement. Any actions that will endanger a link in the supply chain are determined in


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part by the actions taken or not taken by other stakeholders. Thus, it is understood that extensive planning is needed from the beginning to the end of the chain, in order to positively influence factors such as sales forecasting, market and production planning, sales promotion and the introduction of new products in the market or a new market. to be explored.

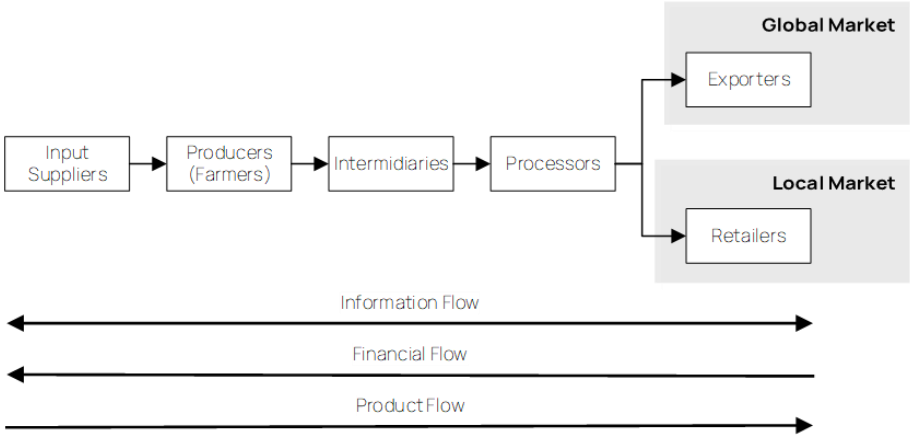


*Figure 6: The Agri-food Supply Chain*

### 3.1.5.2. Agri-food Network

The Agri-food Chains network consists of the supply and the distribution channels. In this section, an overview of these is presented, in order to be able to separate them and better recognize the potential challenges.

#### 3.1.5.2.1. Supply Channels in Agri-food Supply Chains

In Greece, the predominant form of agricultural supply networks is the independent production of food and agricultural products, where the producer transports the produced products to local markets and negotiates the selling price of the products directly with the end-consumer. Over the past few decades, globalization and the economic and technological development have made both the individual transport of agricultural products



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and the individual negotiation in their selling price economically unprofitable. As a result, according to Malindretos (2015), other professionals that specialize in issues of distribution, storage and distribution of agricultural products, also called as intermediaries are involved in this supply chain.

In a typical agri-food supply chain. The network initially includes the stage of collecting agricultural products from producers and transporting them to (specially designed) warehouses. An agreement is then made between the intermediary and the producer, with the third-party undertaking procedures for the sorting, standardization, storage and distribution of the final agricultural products, before making them available to the final consumer.

The achievement of economies of scale is also the competitive economic advantage that is given through these processes, while added value to the product is obtained through the organization of distribution supply channels (following the product flow). The distribution of agricultural products is ensured through international quality assurance standards (Malindretos, 2015).

#### 3.1.5.2.2. Distribution Channels in Agri-food Supply Chains

In the case of distribution channels, the main characteristics are (i) the complexity in the two-way relationships and (ii) the dependencies of companies and producers with (a) the organizational structure of the distribution channels, (b) the required collaborations between consumers and suppliers, (c)



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the uncertainty of supply and demand and (d) the involvement of companies in more than one operation (Malindretos, 2015).

| | |
|---|---|
| **Types of Agri-food Distribution Channels** | Supermarkets |
| | Local Grocery Stores |
| | Open-air Markets |
| | Street Vendors |
| | E-Commerce (i.e., ordering via a website or app) |
| | Central Markets |

*Figure 7: Types of Agri-Logistics Distribution Channels*

The role of stakeholders in agricultural and food supply chains also determines how supply networks are structured and can be categorized as follows (Malindretos, 2015):

- Vertical supply chain structural model: a single body owns and manages all supply chain functions, from farm to fork.
- Collaborative supply chain management model: the collaborating stakeholders and companies participate according to their purchasing and productive power.
- Central management and coordination: all activities and functions of the supply chain are managed by a single body (e.g., super market).



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### 3.1.5.3. Structure and Operation of Agri-food Supply Chains

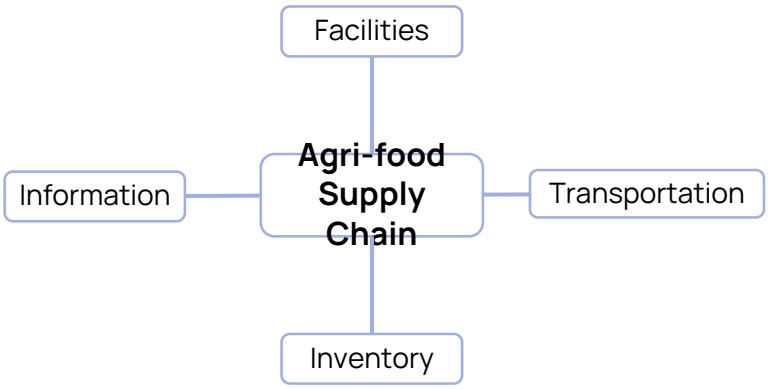


*Figure 8: Main Components of Operation of the Agri-food Supply Chain*

#### 3.1.5.3.1. Transportation

Transport is divided into land transport by road transport (e.g., lorries), rail transport (i.e., train carriages), water transport by river and merchant ships, and finally air transport, which is carried out by commercial aircraft. According to Vidalis (2009), in agri-logistics, transport is defined as the movement of food and agricultural products from one point to another within the network the supply chain and this process can be carried out in various ways and modes of transportation and by combining routes. In Greece, the movement of final agri-food products and to the final points of consumption is usually carried out by trucks, while international transport of products of the primary productive sector can be carried out by specially designed trucks (refrigerated or not depending on the product), with railway wagons (transport of fruit), as well as in some cases with the use of aircraft. Maritime means of transport are mainly used for the handling of bulk agri-food goods, such as cereals.



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The mode of transport of food and agricultural products plays a key role in the efficiency of a supply chain, especially in the case of perishable goods, as the humidity and temperature conditions prevailing in the transport of food and agricultural products affect the quality of these goods. Product handling under adverse conditions can lead to low quality finished products and increased transport costs in the supply chain. Another important factor is the transport fleet availability, which affects the response of the supply system and whether it will meet the demand without potential delays.

#### 3.1.5.3.1.1. Load Unit

Depending on the size, weight and nature of the packaging material of agri-food products, as well as the modes and transportation and warehousing types, different types of load units can be chosen. The main load units in an agro-food supply chain are the following (Mpitas, 2020):

- Pallets: rectangular metal, wooden or plastic surfaces where product packages are placed and categorized in euro - pallet (800cm * 1200cm) and industrial pallet (1000cm * 1200cm)
- Crates: the most common means in an agri-food chain, made by wood, paper, plastic or metal. The nature of the box construction material depends on the product.
- Container: for large volumes of cargo, easily configured and used in road, rail and sea transport. Based on the capacity measurement unit which is the Twenty-foot equivalent unit (TEU), in Greece, the


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containers are usually divided into two categories type 20 ft (1 TEU) and type 40 ft (2 TEU).

#### 3.1.5.3.1.2. Modes of Transport in agri-food supply chains

**Road Transport**

Road transport services are categorized into full truck load transport and less than truck load. Trucks are the world's leading means of transporting agri-food products, with freight flows involving the movement of goods from the farms to the central markets of urban areas or to large warehouses.

**Rail Transport**

The train is considered a suitable means of transport for long distances and large volumes of cargo, with the ideal case of application the cereal supply chains, which are characterized by high product life. However, they are not preferred in the fresh fruit and vegetable supply chains, due to the relative delays in their loading and unloading processes. Many companies operating in the primary production sector include rail transport as part of their value chain, especially in environmentally resistant products, such as dried products (Malindretos, 2015).

**Maritime Transport**

Maritime transport is estimated to account for 98% of world trade transport, playing a key role in the prosperity and sustainability of the global population (Malindretos, 2015). Due to its lower unit cost of goods and sutiability for longer



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distances. it is preferred for heavy and low value products, which are not sensitive to disasters.

**Air Transport**

According to Malindretos (2015), air transport has a major impact on international trade, as it is estimated that about 1% of the global freight (quantity) is handled, which corresponds to 30% of the total transported value. Although it is the fastest means of transportation for the case of long distances, it is also costly and has certain weight and volume constraints that other means of transport do not, thus in agri-logistics it is usually preferred for transport of perishable goods that need to be transported through long distances.

**Multimodal Transportation**

Multimodeal transportation is when at least two of the abovementioned means of transport are used in carefully planned way that optimizes the supply chain by (i) creating integrated distribution networks, (ii) reducing transportation costs and (iii) achieving greater speed in product delivery,

In order to decide which means of transportation to choose and design the distribution network, according to Mpitas (2020) one should keep in mind:

- The type of the transported product (e.g., texture, composition perishability, humidity/temperature needs).
- The characteristics of the transported product (e.g., shape, weight. volume, dimensions):



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- The purchase vs transportation costs of the transported product: low purchase cost agricultural products lead to low transport costs.
- The need for urgent transportation (e.g., perishable goods with close expiration dates).

| Mode | Pros | Cons |
|---|---|---|
| **Road** | • reliability<br>• shipping costs<br>• flexibility<br>• faster than maritime<br>• cheaper than air | • volume restriction<br>• weight restriction<br>• slower than air<br>• costlier than maritime |
| **Rail** | • suitable for long distances and large cargo | • volume restriction<br>• weight restriction<br>• slower than air<br>• costlier than maritime |
| **Water** | • low cost per unit<br>• for long distances<br>• for heavy, low value products | • long duration<br>• delays<br>• high uncertainty due to unforeseen factors (e.g., weather, canal closure) |
| **Air** | • fast<br>• low packaging cost<br>• low risk of damage<br>• timely deliveries | • high transport costs<br>• weight and volume constraints |

*Table 2: Advantages and Disadvantages of different modes of transportation according to Malindretos (2015) and Vidalis (2009)*

#### 3.1.5.3.2. Inventory

The term "inventory" includes the raw materials, the semi-finished and the finished products within the supply chain network, and is important in the design and efficiency of the


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supply chain. Proper inventory management help meet unforeseen demand and supply products to the end consumer without delay and shortages. However, the existence of large quantities of inventory is associated increased inventory management costs, causing problems in the efficiency of the supply chain (Vidalis, 2009). In agri-logistics, the inventory management has to be able:

- to address the perishability of some products,
- to keep the stocks traceable, both geographically but also it status
- to take into account the variability of the prices of the products (both on a supply and a sale level).

The inventory can be divided as follows (Malindretos, 2015 and Mpitas, 2020):

- Raw and auxiliary materials: products stored and preserved for the production of final products
- Intermediate products: products that are used the production process to make other goods
- Finished goods: the final products
- Consumables: e.g., fertilizers, field – supplies
- Packing and Packaging materials: e.g., glass bottles, paper packaging, plastic bags.
- Cycle Inventory: quantity of stock used until the refill order arrives
- Safety stock: the stock aims to balance the uncertainty to be able to meet customer demand
- Anticipated/Smoothing Inventory: aims to compensate for differences in the harmonization of supply and demand


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- Decoupled Inventory: stock held in order to prevent the distruption of supply of products in the supply chain
- Transit Inventory: products in transit between different geographical areas and stages of the supply chain
- Speculation Stock: this type of stock covers product shortages or price increases and not current demand needs
- Seasonal Products Stock: the stock of products where their supply and demand are seasonal
- Excess Inventory: leftover inventory that was left after meeting the demand

The existence of inventory guarantees the smooth operation of the supply chain and uninterrupted customer service. However, without careful inventory management, a company risks having:

- Freezing funds
- Payment or loss of interest (opportunity cost)
- Need for larger storage spaces
- Greater damage and losses to products and materials
- Higher storage costs
- Higher premiums
- Risk of depreciation of stocks

The appropriate ways to reduce the level of inventories, without affecting the smooth operation of a business and the degree of its service to consumers, are the following (Malindretos, 2015):

- Improving demand forecasts
- Reduction of the time interval between two receipts
- Reduction of supply uncertainty


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- Emphasis on improving the efficiency of non-storage resources, such as mechanical equipment and human labor.

#### 3.1.5.3.3. Information Flow

Information consists of all the data and the analysis of this data (data analysis) that relates to transportation, inventory, infrastructure and the final consumers across the supply chain is an important tool in the effective management of the supply chain.

In agri-food chains, key information for the management of supply networks and distribution channels for agricultural products and foodstuffs includes data on the quantity and type of stocks (weight, volume, the absolute number of quantity of stocks of finished products), their quality and status (temperature, humidity in storage facilities and means of transportation), as well as their geographical identification. Position within the supply chain network (Vidalis, 2019).

Data management tools used for inventory data are the databases and E.R.P. information systems, while for inventory quality information computer networks and telematics are utilized (Vidalis, 2009). The position of the product is tracked via tracking information systems, barcodes and radio frequency devices (RFIDs). Given the complex nature of agri-food supply chain systems, tracking systems are a key factor in the development and management of agri-food supply chains worldwide.



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#### 3.1.5.3.4. Infrastructure

Infrastructure is generally divided into product processing facilities and product storage facilities. In the case of primary supply chains, processing facilities include slaughterhouses, cheese and dairy and cereal processing plants, wineries and mills, liquid cargo and product storage facilities. Transport infrastructure are nodes of transport systems, such as ports, airports and railway stations, where there are storage facilities for food and agricultural products (Vidalis, 2009).

A strategic decision when managing a supply network is the area of the facility development. The decision is made by a combination of factors such as the distance between the production areas and the location of the finished products, the ease of access to road and rail networks, access to energy and telecommunications networks and the climatic conditions prevailing in the installation areas of storage units and treatment units. Strategic decisions regarding site selection, storage capacity, processing capacity and plant flexibility play a key role in the efficiency of an agri-food supply chain.

#### 3.1.5.3.5. Warehouses – distribution and logistics centers

Warehousing ensures the smooth management and flow of raw materials, information and final products from the point of production to the point of final consumption. Thus, due to the importance of storage units, the development of storage infrastructure where the final products are stored is an important node of agro-supply networks, in which a huge volume of goods and information is evaluated and distributed (Malindretos , 2015).



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The result of this development is the creation of distribution centers.

The distribution centers carry out complex processes, such as the temporary receipt and immediate shipment of products (cross docking), the packaging and marking (bar coding) of products, inventory management, the fulfillment of electronic orders and the interconnection, through information systems, of the company. with various other departments and its customers.

In the case of agri-food supply chains of primary products, the logistics centers are called "agro – parks"; this term defines a spatial cluster of agricultural and non-agricultural activities, which are concentrated in a specific industrial area and operate in the primary production sector(Kaselouris, 2016). According to Mpitas (2020), an agro-park can:

- favor the creation of partnerships for efficient land use,
- increase the efficiency of the supply chain due to reduced transport costs,
- promote collective learning through the interaction of cooperating companies, and
- reduce the environmental waste and minimize of environmental impact of the stakeholders.

Agro-parks and their infrastructure fill the gaps of the agri-food supply chain from the producer (farmer) to the final consumer (customer - user), acting as a logistics node that integrates the agri-food supply chains processes (e.g., sorting of agricultural products, packaging, standardization, refrigeration, storage, transport, distribution and sale of agricultural products).


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#### 3.1.5.4. Important issues in Agri-food supply chain design

The agri-food supply chain design is a complex decision-making process, which becomes complicated when we have to deal with fresh, consumable and seasonal products which are governed by high liquidity during their supply and demand in the market.

According to Tsolakis (2012), there are 13 axes on which the design of an agro-supply chain is based:

- Selection of cultivation technologies: During the Industrial Revolution, the relative improvement of the mechanical equipment used in agricultural production developed as a means of meeting the growing demand for mass production of goods. Today, the variety of costs of using this equipment, the need for crop diversification, food safety and environmental regulations, as well as biological and meteorological implications, indicate the need to develop scientific models for optimal equipment selection. Today, outsourcing the use of equipment needed for farming is seen as a wise choice.
- Financial planning and investments: The main risk in an agri-food supply chain lies with local producers and their potential lack of required professionalism, know-how and financial resources needed to meet strict "quantity". "quality" and "price" standards set by international retailers.
- Relationships between partners and other stakeholders: Modern agro-supply chains are structured in multiple scales, including a significant number of shareholders with common but also conflicting purposes. Thus, strong and long-term relationships need to be established through cooperation.



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- Defining the network within the chain: Supply chain design is a vital issue throughout its operation and needs to be efficient in the long run. It includes critical and strategic decisions regarding materials, products and information along with the corresponding costs. These decisions include the purchase/supply, distribution and storage in local warehouses, promotion in processing units, the design of the distribution network, the design of the network of retailers and the selection of the markets where the products will be promoted along with the necessary estimations for the quantities and space that will be needed and the uncertainties. Adaptability to future changes is also important, as the consumer habits change and unexpected events may occur.
- Performance measurement: Practice has shown that in order to ensure the success of an organization in the long run, administrations must establish a system for measuring the performance of the supply chain. A "Performance Measurement System" allows the recording and evaluation of overall effectiveness through the years and in comparison to other companies with similar characteristics and/or products, while also providing data for comparisons of sizes and indicators that help in strategy and decision making.
- Risk management: Over the past two decades, there has been a growing interest from governments, international organizations, banking institutions, consumer organizations and other international and local stakeholders in agri-food risk management. This interest is driven by factors such as the globalization of the economy and the supply chains, food


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security issues and climate change. In the beginning of 2020, when the pandemic became an issue, the disruptions in the supply chain were significant, with transportation of goods being an issue not only between countries but within them, with significant delays and cancellations in the delivery of goods. The closure of the Suez Canal in 2021, also showed the vulnerability of these supply chains.

Numerous studies have been conducted on risk management, and in the case of agri-food chains the World Bank, through the "Agricultural Risk Management Team", has developed a methodology based on three pillars: types of risk (production, market, enabling environment), categories of stakeholders affected (producers, commercial sector stakeholders, public sector), and risk management strategies (risk mitigation – ex ante, risk tranfer – ex ante, and risk coping – ex post). The instrument to operate risk management strategies are (i) policy reform, (ii) agricultural investment and (iii) technical assistance. In 2015, the same team published a report especially with regard to climate change, highlighting the significance of climate change mitigation for the agricultural supply chains.

- Sustainability: The viability of an agro-supply chain is of paramount importance when designing and operating networks in which the pillars of economy, environment and society must be balanced. Stakeholders are encouraged to adopt a certain level of commitment to sustainable practices, based on "Corporate Social Responsibility" activities, mainly due to regulatory pressures from Governments, in the case of Greece the EU, NGOs, activists and competion.


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- Quality control: The term "quality control" and the development of product quality standards are linked to food safety, i.e., the method of how food is prepared, handled, and stored in order to prevent food-borne illness. These standards provide specific information about products, services, processes and preparations to help producers become more competitive. In 2005, the International Organization for Standardization (ISO), the largest international standards organization, established ISO 22000:2005 which sets out the minimum standards for the development and use of a food safety system. These indicate that the body that has it has the ability to control potential nutritional risks, so that the final product is safe when consumed by humans. Similar organizations exist locally by country (e.g, Britain, Australia) and can be governmental, which establish their own quality criteria.
- Transparency, food safety and traceability: Ensuring transparency in the chain is an important component that guarantees production control, promotes food safety and quality, ensures consumer confidence, supports product diversity through innovation and can ultimately be profitable. The term "transparency" can be analyzed from different perspectives. In logistics it can be defined as the extent to which all stakeholders have their own share of understanding and access to information about the products, without delays and distortions (Hofstede et al., 2005). Thus, it is the responsibility of all partners in the chain (suppliers, growers, intermediaries) to facilitate the flow of information and cooperation between them. Transparency is associated with the term traceability. Wilson and Clarke (1998) define


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traceability as the necessary information that describes the background of a product through the supply chain, including all the processes, up to the final consumer.

- Crop planning: Agri-food chains are mainly characterized by a significant issue; the imbalance between supply and demand for goods, especially given the seasonality of the raw materials. In this respect, the proper planning of the harvest has an impact on the whole chain. Planning is difficult in conditions of unstable weather and lack of sunshine, plant diseases, poor soil performance, etc. The problem becomes more complicated in the case of vulnerable agricultural products, where time is an important dimension that affects every part of the whole plan. At the strategic level, factors such as worker scheduling, sowing schedule, crop variety, fertilizers and resource management among competing crops are important to achieving producers' goals of reducing costs while increasing profits at the same time. etc. Finally, at the operational level, the work done is related to soil preparation before sowing, irrigation planning, sowing frequency, packaging and storage, and manpower and equipment management.
- Logistics Procedures. The need to manage the flow of goods, which will be identified with performance criteria and regulations in modern agro-supply chains, highlights the need for sophisticated logistics processes. According to van Beek et al. (1993), it is important to distinguish processes at two levels:
    a. Transformation: At this stage, the goods are transformed into forms that are easier to handle and transport. In other words, processes of unitization,


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packaging, stacking, wrapping, etc. take place. Agricultural products take on a smaller shape, become intermediate or final products, with the desired characteristics and are promoted to the next link in the chain.

b. Transport: At this level we refer to the transportation of goods as they flow through the supply chain. An important factor is inventory management.

- Waste management and return logistics: The integration of agricultural waste management is a new field of research for agro-supply chains, which is made up of practices on agricultural production and food. An agricultural waste management system generally consists of six basic functions: nominal production, collection, storage, treatment, transport and utilization/exploitation, and are often associated with high logistics costs and complicated design (US Department of Agriculture, 2012). This waste can be used, either for recycling, or for further exploitation as value-added products (feed, fertilizers, energy production, etc.).
- Fleet management: The management of the fleet of vehicles using a supply chain and the planning of the routes and the use that each one will make, go beyond many steps of the chain, as the transport is one of the "key" factors and determines the operational efficiency of the chain, the costs and environmental impact of the system. The optimization of the transport system of an agro-supply chain is also a field of research of many researchers. For example Higgins et al., (2004) proposes a model for improving the efficiency of the cultivation process as well as transportation in the Australian


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sugar industry, while other researchers have dealt with cotton in the USA.

Fleet management in agricultural production requires proper allocation of resources, planning, optimal routing and real-time monitoring of vehicles and goods. Procedures are undertaken by either the farmer producers themselves or contractors who work for a fee. Intensive production systems include complex scheduling and tuning that deal, among other things, with factors such as crop yield, weather conditions and machine yields to ultimately optimize distribution.

#### 3.1.5.5. The impact of agrofood supply chains to the stakeholders

The advantages of an agri-food supply chain can help the stakeholders in a number of ways:

- Expanding the traditional local markets far beyond their region, resulting in an increase in the volumes of goods for sale.
- Reducing the total cost of products (production, distribution, etc.) compared to what would exist if they acted individually, resulting in an increase in their profits.
- Through targeting consumers with products specific to their needs and differentiating the characteristics of the products that they will promote in each market, they can increase the satisfaction of the consumers and thus be able to charge higher for the products they sell.



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#### 3.1.5.5.1. The market impact of the agri-food supply chain

Agri-supply chains, bring enormous mutual benefits to their stakeholders and to the consumer:

- Long-term relationships between members lead to improved profits and better market knowledge for producers.
- The reduction of the volumes of products produced that were spoiled during transport and storage, as a result of the optimal planning of the individual actions along the chain.
- The quality and freshness of the products is significantly improved.
- Sales can be significantly increased through the exchange of market information.
- Well-designed chains tend to deliver to the consumer products of very high added value, the sale of which brings more revenue to producers, as long as they meet the high standards of consumers in high-income markets.

### 3.1.6. The Agrilogistics Sector in Greece

In Greece, the agricultural sector is a sector with great growth potential since the country has significant advantages for its development (climate, geographical position etc.). The agricultural sector is of particular importance to any country, because its development contributes:



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- In the regional development of the country, which in turn ensures the balanced development of the countryside with the urban centers.
- In the preservation of the natural capital, given that the agricultural sector is the main user of the territorial resources of each country.
- Ensuring food security for each country by maintaining the possibility of domestic production of basic agricultural products.

However, according to Galanopoulos (2017) there are certain issues in the case of Greek agricultural supply chains, with the most important being:

- The inability to adapt the crops: Greek farmers, backed by subsidies and state aid, continue producing "traditional" products, regardless of cost and demand conditions.
- The inability to organize producers. In Greece, there are 6,350 agricultural cooperatives, 114 associations of agricultural cooperatives, 19 central associations and the tertiary association, the Panhellenic Confederation of Associations of Agricultural Cooperatives (PASEGES). However, only 11% of the value of fruits and vegetables goes through the producer groups, compared to 75% in the Netherlands.

#### 3.1.6.1. Agro-supplies

The agro-supply sector is considered to be a capital-intensive sector par excellence; as significant capital is required for the importation into the industry of products of the sector. It mainly includes:

- Nutrition products (fertilizers),


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- Pesticides (plant protection products),
- Propagating material (seeds, seedlings, etc.),
- Farm machines,
- Irrigation tools.

In Greece, there are a total of about 100 wholesalers – companies. The products are channeled by wholesalers (some of whom have their own retail outlets) to specialized agrochemical shops and to agricultural cooperatives. Across the country, there are approximately 1670 retail stores for agricultural supplies, while there are 140 cooperatives (Galanopoulos, 2017).

#### 3.1.6.2. Agricultural Cooperative

An agricultural cooperative can also be defined as a "society" which belongs to the users (farmers and producers), is controlled by them and its primary goal is to safeguard their interests, to promote research in the latest applications of the agricultural sector and to promote mutual understanding of issues and financial cooperation between members, but also between cooperatives (ICA, 1995).

Agricultural cooperatives are a vital part of the agricultural sector and also an important part of the supply chain. Across Europe, cooperatives are found in many sectors of the economy such as agriculture, banking, retail, insurance, health services, etc. The 132,000 cooperatives in the European Union employ 2.3 million people (European Union, 2001) mainly in of agriculture. For example, in 1996 the market share of agricultural cooperatives was 83% in the Netherlands, 79% in Finland and 55% in Italy (Hendrikse, 2004). In Greece, the history of cooperatives begins in 1900 in Almyros (Volos) and was founded as an association and not as a cooperative, because there was no relevant legislation yet. The initial activity of


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the Almyros cooperative was the granting of loans to its members and then the provision of threshing machines (Galanopoulos, 2017).

#### 3.1.6.3. Data on Agri-Logistics in Greece

Over the past 10 years, Greece has managed to limit the imports of food products, worth around 7 billion $ in 2011 and 5,8 billion $ in 2020, while in the European Union they have risen from 379,9 billion $ to 409 billion $, showing Greece has managed to . At the same time, Greece has managed to raise the value of exported food products by 37.5%, a significant increase compared to the 14.35% increase the EU during the same era. This is significant, especially considering Greece went through an economical crisis during that time, as well as the pandemic of COVID-19 that still affects the supply chain and actually appears to have had a positive impact for the Greek agri-food products.

According to FAO, Greece ranked 14th among the 27 EU countries regarding the export values for food products; however, this metric excludes fish, which is a significant sector for the Greek agri-food market.

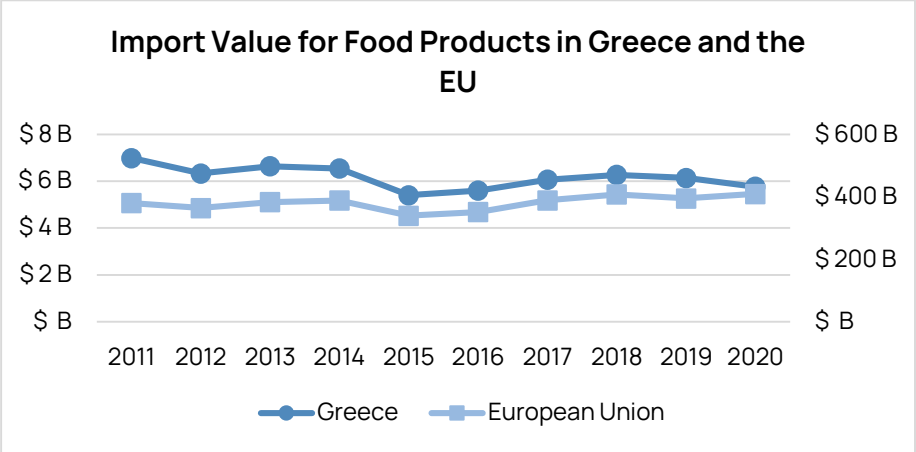


*Figure 9: Import Value for Food Products in Greece and the EU according to FAO (2022)*



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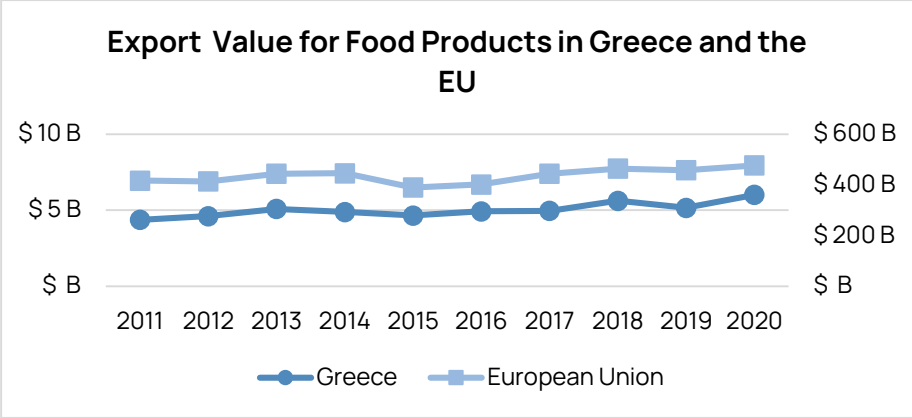


*Figure 10: Export Value for Food Products in Greece and the EU according to FAO (2022)*



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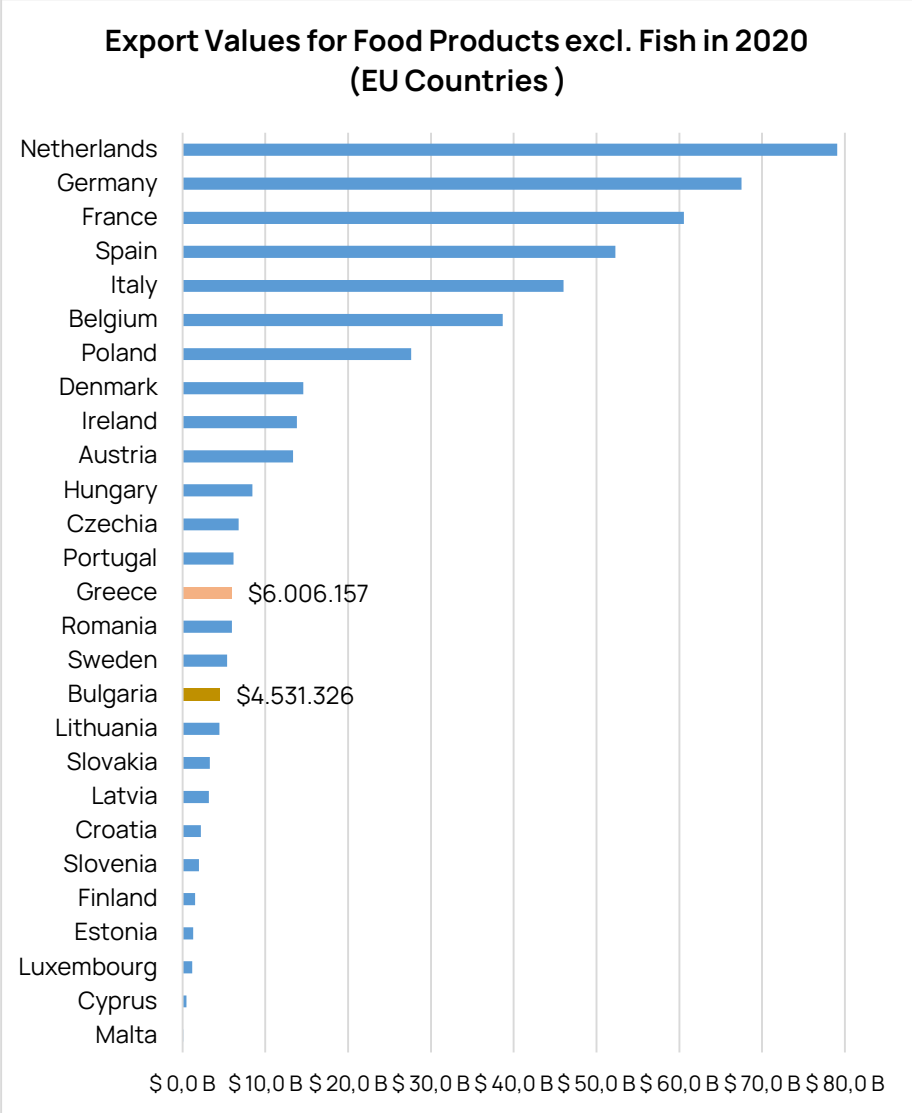


*Figure 11: Export Values in EU countries according to FAO (2021) (in billion $)*

### 3.1.6.4. Exports and Imports by Product

The main agri-food product (in quantities) that was exported in 2020 was fruits, followed by vegetables and cereals, following the trend of the past 10 years .However, the value of the exports results is not proportionate to the quantities, with cereals falling to the 8th place, being replaced by dairy products, a product the consistently rises its export value over the past decade, which can be explained by the popularity of Greek yogurt and feta cheese and the comparison to the price per unit of mass for these products. The vegetable oil



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category, which includes the olive oil, is 6th and 4th regarding quantity and value of export respectively.

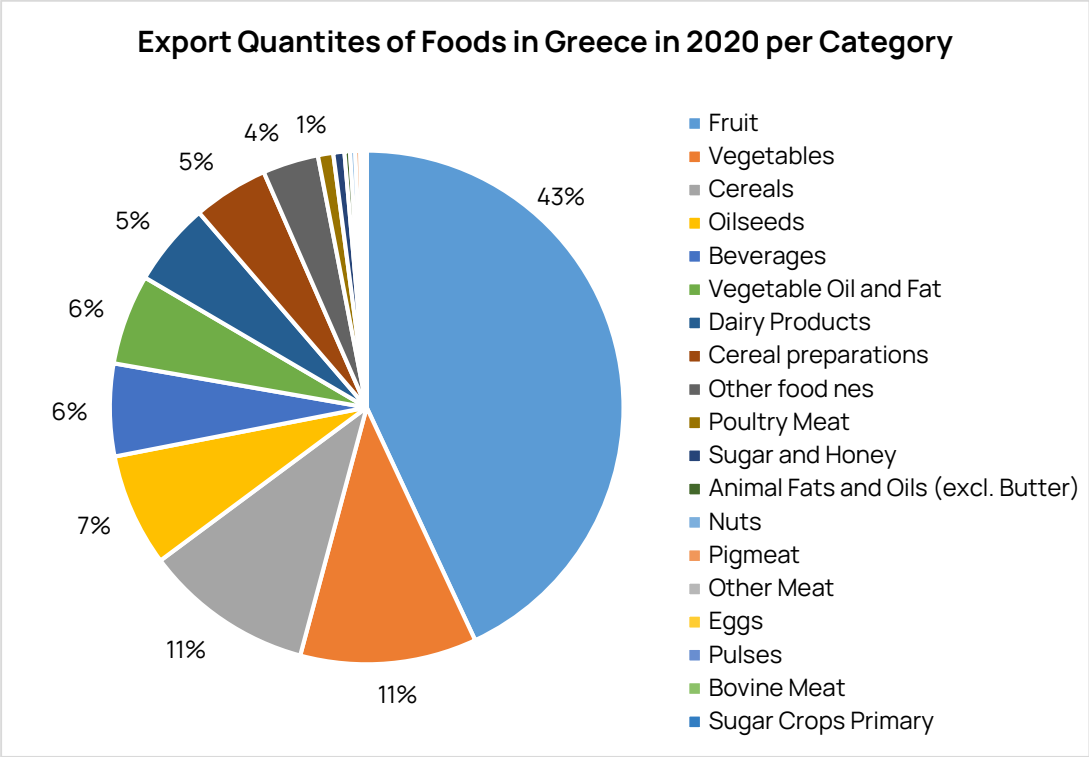


*Figure 12: Export Quantities of Foods in Greece in 2020 per Category (FAO, 2021)*

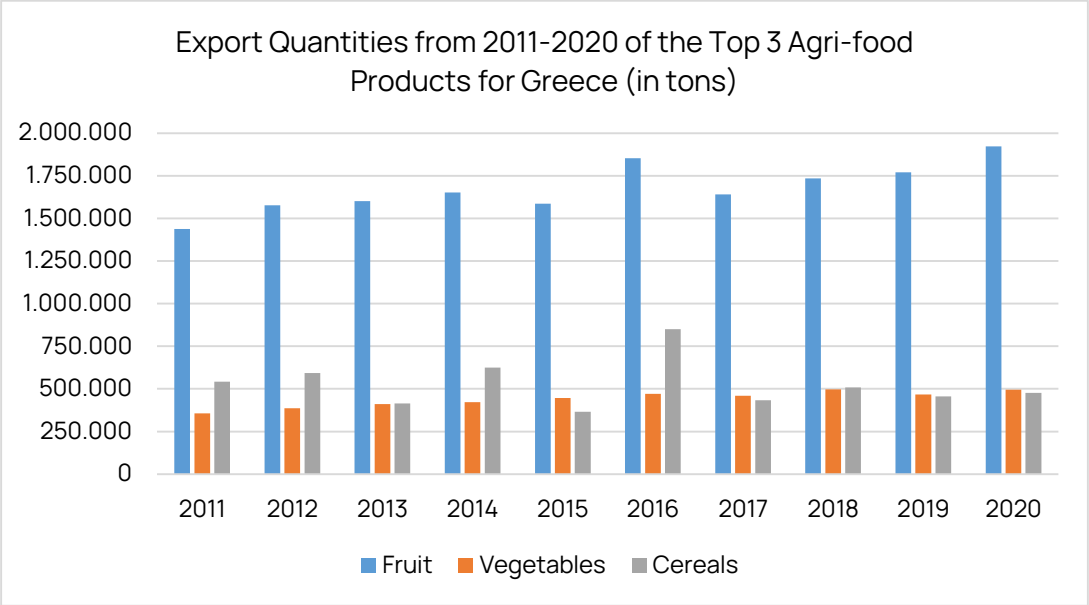


*Figure 13: Export Quantities of Foods in Greece from 2011-2020 of the top 3 exported agri-food products of 2020 (FAO, 2021)*



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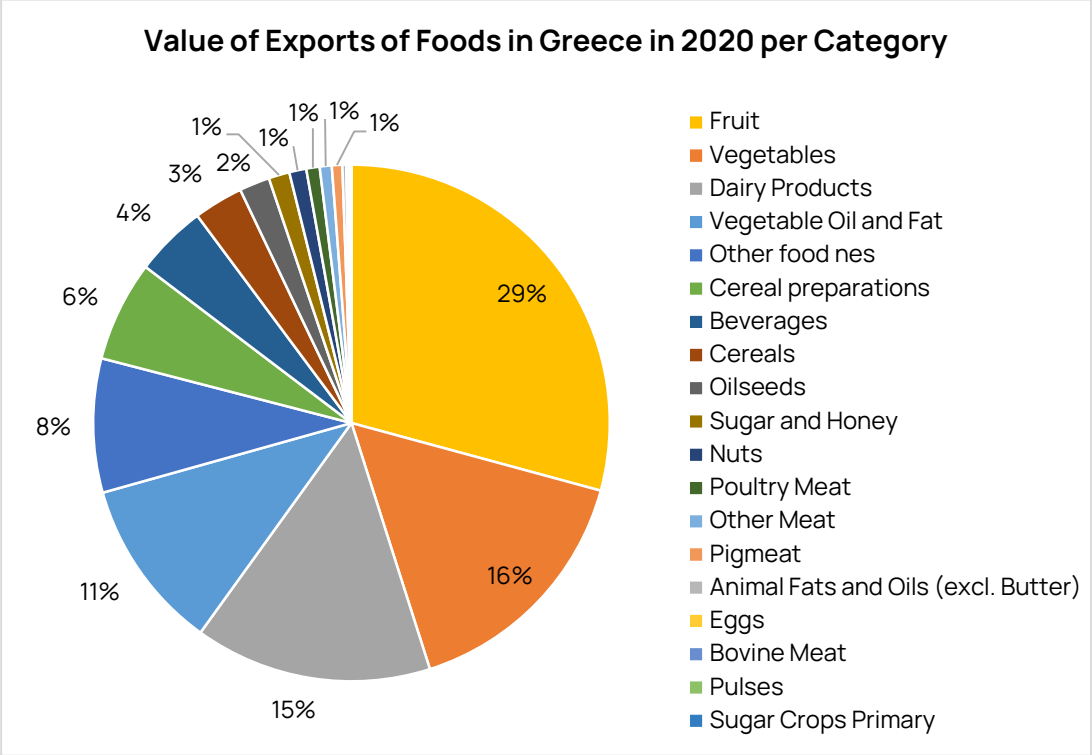


*Figure 14: Value of Exports of Foods in Greece in 2020 per Category (FAO, 2021)*

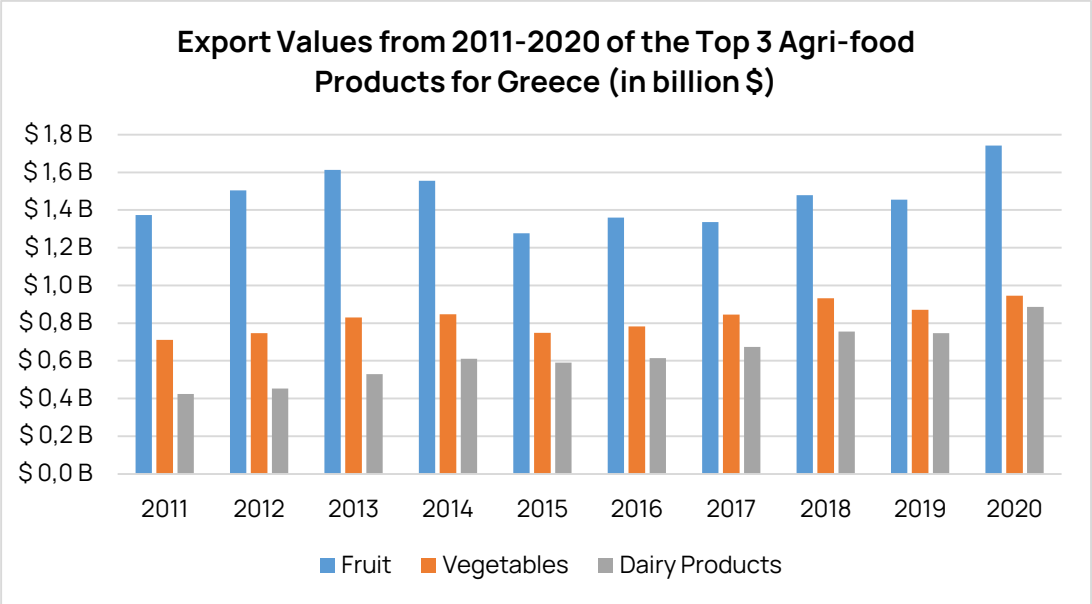


*Figure 1 Value of Exports of Foods in Greece from 2011-2020 of the top 3 exported agri-food products of 2020 (FAO, 2021)*



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These results are comparable to the 2021 study by the National Bank of Greece, based on Eurostat data. In that study, the authors concluded that the dairy and the fruits and vegetables categories stand out, with exports increasing by 14% and 11% in value and share in European exports. by increasing by 16% and 9% respectively. After a slight decline in 2019 from the last 5 years' average performance, in 2020 the exports of olive oil are back closer to the average performance, recording the highest increase percentage (40%) in exports value from 2019 to 2020. In the case of fruits, stone fruits (+ 39%), citrus fruits (+ 32%) and strawberries (+ 29%) had the most significant performance increase, while Germany, Spain, and Poland had the highest net change of value of exports. In the case of dairy, yogurt leaded the exports increase, followed by feta, with their share in European exports increasing by 23% and 17% respectively.

In 2020, import quantity leaders in agri-food products were cereals, sugar and honey, and dairy products, thus two out of the three most exported categories of products are imported in Greece. Through the past decade, cereals' import quantities have fluctuated the most, with dairy products' exports only fluctuating significantly the first 3 years of the analysis.



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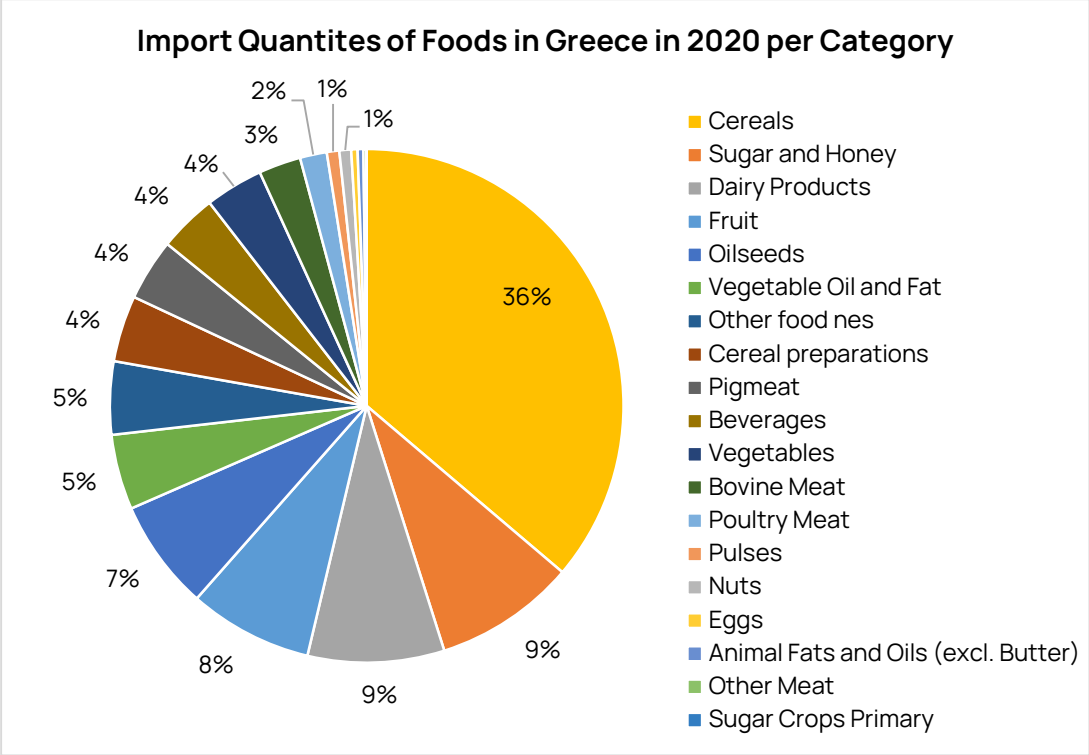


*Figure 16: Import Quantities of Foods in Greece in 2020 per Category (FAO, 2021)*

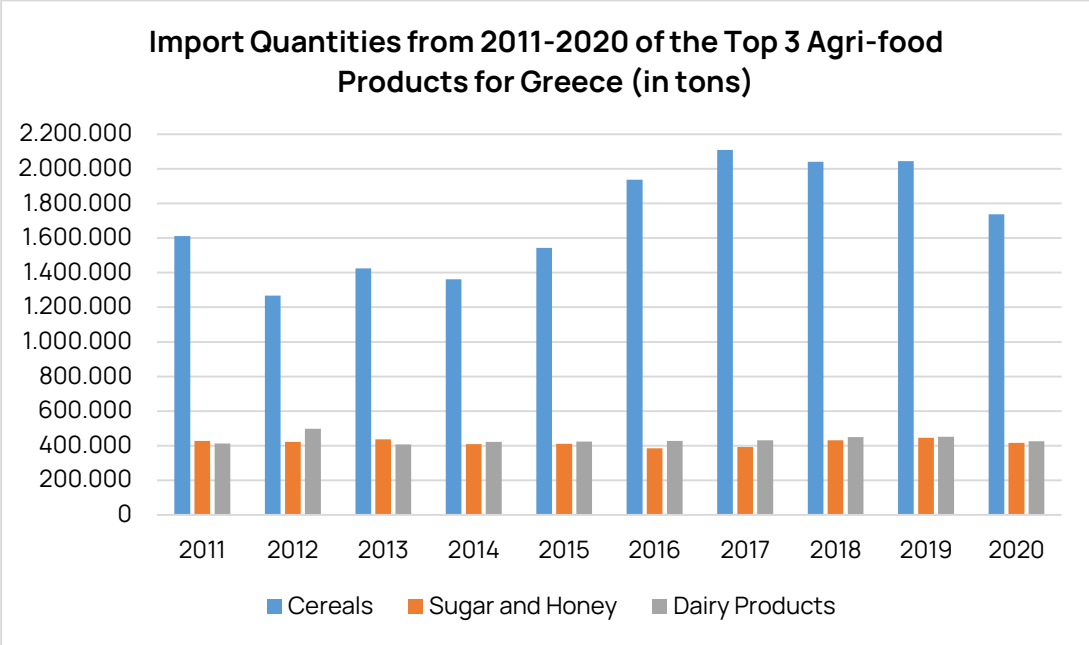


*Figure 17: Import Quantities of Foods in Greece from 2011-2020 of the top 3 exported agri-food products of 2020 (FAO, 2021)*

Regarding the value of imports, in 2020 other foods (i.e., that do not belong in the main food categories according to FAO), dairy products



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and bovine meat had the highest percentage. However, over the past decade, the value of imports of dairy products has decreased.

In Alpha Bank's study (2020) on the agri-food chain, the authors pointed out that imports in the agri-food sector increased annually on average by 1.1% in the period 2009-2019. Food and beverages value of imports increased by 11% and agriculture, forestry and fishing products by 14%. According to the same study, in 2019 food and beverages accounted for 75% of total value of imports of the agrifood sector, whereas agriculture, forestry and fishing for 25%. In 2019, the top imported agri-food products are processed meat, dairy products, cereals, leguminous crops and oil seeds, processed and preserved fish, oils and fats and other processed fruits and vegetables, while Netherlands, Germany, Italy, France and Bulgaria are the top importing partners of Greece.

Finally, given the results of the analysis above, Greece's performance has improved through the years. The higher export to import ratio indicates a more self-sufficient country, less dependent on other countries regarding agri-food goods, while at the same time the sector has an important role for the Greek economy and overall exports performance. Although the Greek economy suffered due to the COVID-19 pandemic that prevailed in 2020, tha agri-food sector proved to be resilient, as agriculture achieved a 3% increase in turnover, while the food industry's turnover decreased only by 1%, as compared to the 14% decrease of the rest of the industries.


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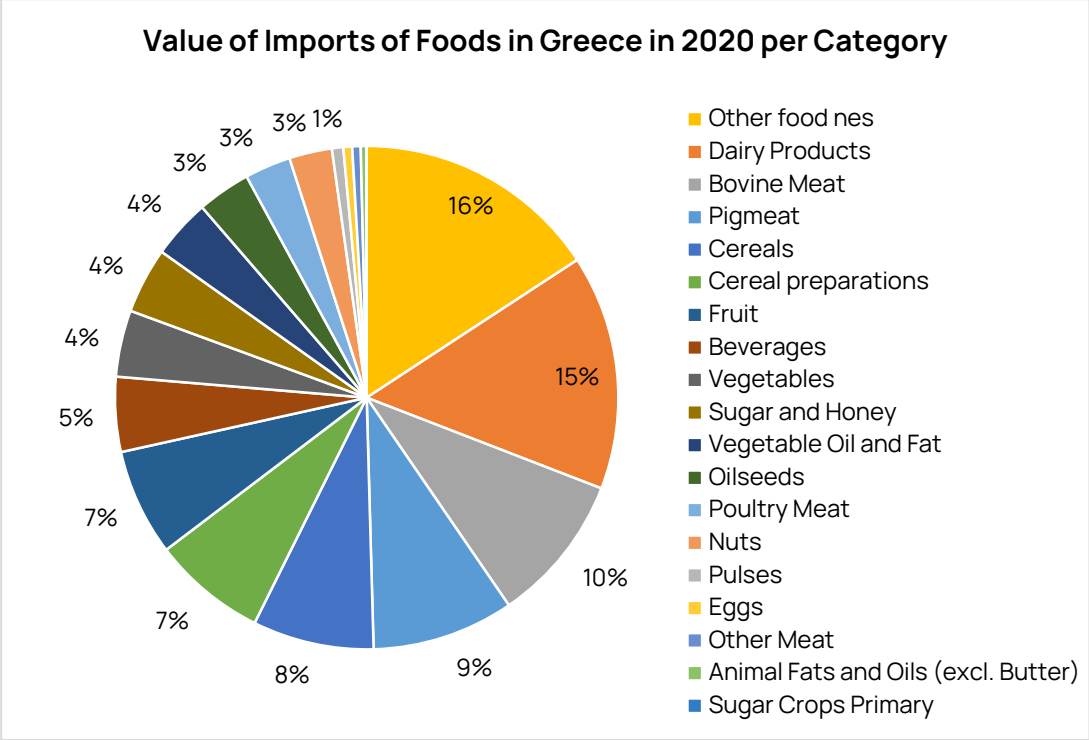


*Figure 18: Value of Imports of Foods in Greece in 2020 per Category (FAO, 2020)*

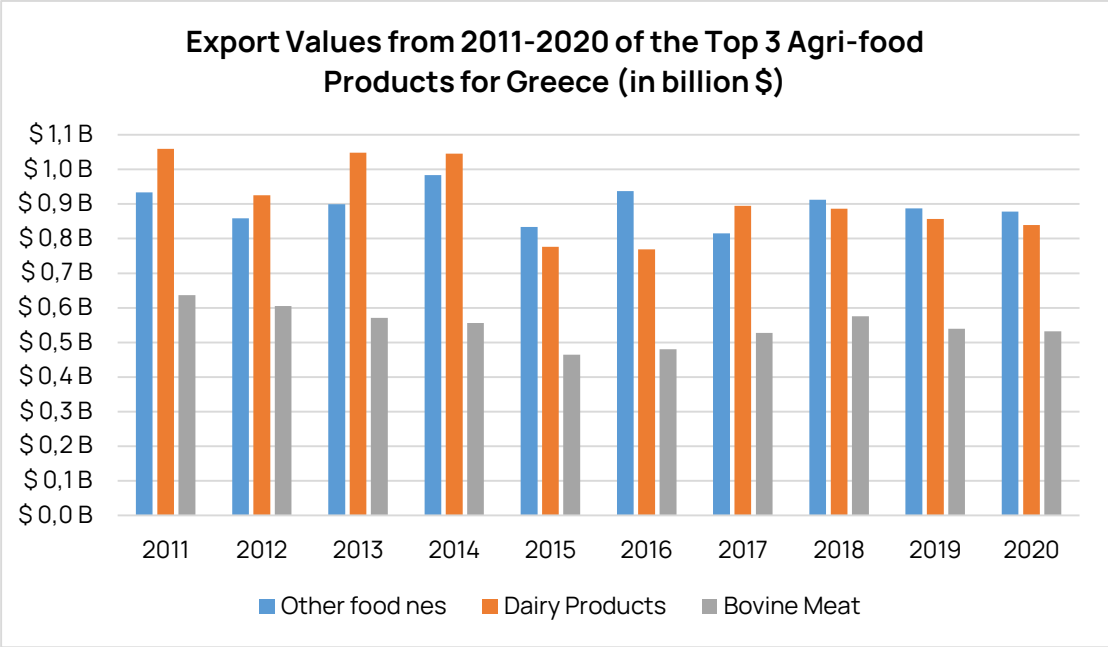


*Figure 19: Value of Imports of Foods in Greece from 2011-2020 of the top 3 exported agri-food products of 2020 (FAO, 2020)*



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### 3.1.6.5. Distance of Transportation

In Greece the road freight transport, which is the main mode of transportation, served mainly short distances. In general, and throughout the past 5 years, the amount of products transported is inversely proportional to the distances. However, in the case of both food products, beverages and tobacco and products of agriculture, hunting, and forestry, fish and other fishing products, short distances are the leading distances covered, however there is an increase in transportation from 50 to 149 km radius. Long distances (over 6000km) are not available, probably due to the small size of the country. Thus, local and regional supply chains appear to be preferred in Greek networks.


| | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| 6 000 km or over | | | | | |
| From 2 000 to 5 999 km | 697 | 1.884 | 2.130 | 2.260 | 2.395 |
| From 1 000 to 1 999 km | 1.409 | 4.547 | 4.328 | 4.178 | 3.287 |
| From 500 to 999 km | 6.341 | 8.033 | 8.311 | 6.869 | 4.895 |
| From 300 to 499 km | 9.736 | 7.989 | 8.451 | 8.659 | 7.377 |
| From 150 to 299 km | 17.762 | 16.381 | 17.834 | 17.289 | 15.693 |
| From 50 to 149 km | 38.583 | 36.739 | 37.315 | 41.297 | 36.890 |
| Less than 50 km | 344.706 | 313.342 | 283.592 | 273.538 | 218.716 |

*Figure 20: Annual road freight transport by distance class for Total Transported Goods – Greece*



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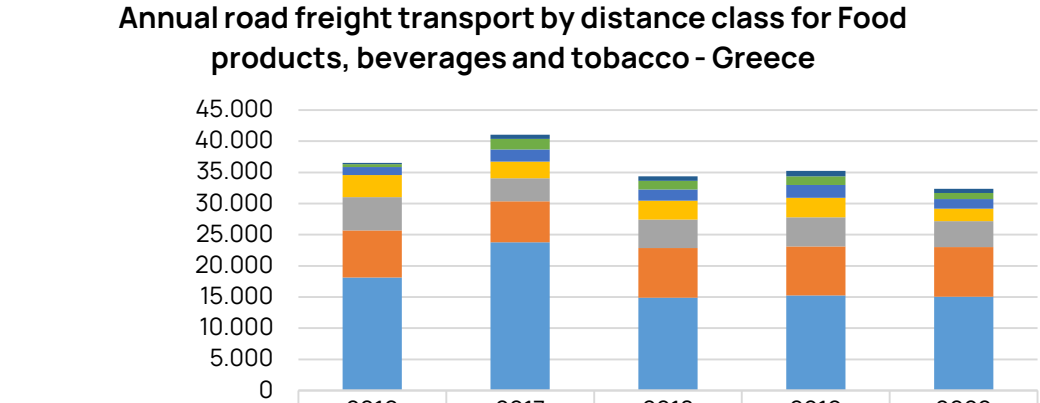
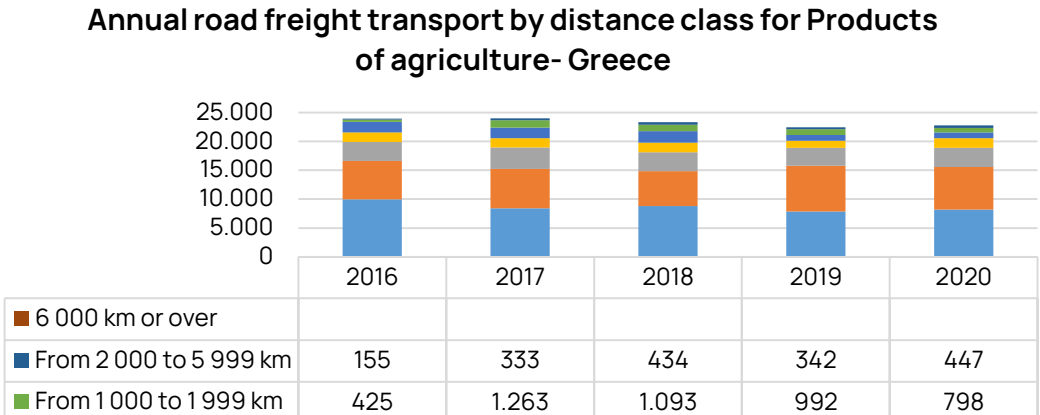



| | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| 6 000 km or over | | | | | |
| From 2 000 to 5 999 km | 233 | 647 | 712 | 834 | 665 |
| From 1 000 to 1 999 km | 466 | 1.697 | 1.430 | 1.398 | 987 |
| From 500 to 999 km | 1.290 | 1.943 | 1.759 | 2.033 | 1.536 |
| From 300 to 499 km | 3.499 | 2.713 | 3.063 | 3.144 | 2.029 |
| From 150 to 299 km | 5.371 | 3.673 | 4.548 | 4.709 | 4.132 |
| From 50 to 149 km | 7.561 | 6.588 | 7.977 | 7.860 | 7.952 |
| Less than 50 km | 18.111 | 23.770 | 14.882 | 15.230 | 15.070 |

*Figure 21: Annual road freight transport by distance class for Food products, beverages and tobacco- Greece*




| | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| 6 000 km or over | | | | | |
| From 2 000 to 5 999 km | 155 | 333 | 434 | 342 | 447 |
| From 1 000 to 1 999 km | 425 | 1.263 | 1.093 | 992 | 798 |
| From 500 to 999 km | 1.796 | 1.821 | 2.021 | 965 | 1.004 |
| From 300 to 499 km | 1.666 | 1.652 | 1.636 | 1.242 | 1.659 |
| From 150 to 299 km | 3.251 | 3.666 | 3.280 | 3.109 | 3.296 |
| From 50 to 149 km | 6.675 | 6.824 | 6.039 | 7.903 | 7.394 |
| Less than 50 km | 9.961 | 8.430 | 8.809 | 7.863 | 8.184 |

*Figure 22: Annual road freight transport by distance class for Products of agriculture, hunting, and forestry; fish and other fishing products- Greece*



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### 3.1.6.6. Transportation by Region

Regarding the annual road freight transport by regions of loading and for products of agriculture, hunting, and forestry; fish and other fishing products, only in 2018 was Thessaloniki not leading in ranking. In 2020 Evros, Serres, Kavala (and Thassos), Rodopi, Xanthi and Drama were 1st,11th,12th,13th,19th,24th and 33rd respectively according to Eurostat's regional data. In the case of food products, beverages and tobacco, Thessaloniki is still the leading region since 2018, while Kavala (including Thasos) is 8th, Serres is 30th, Evros is 34th, Drama is 39th and Xanthi ranks 41st. It is important to point out however, that some data for some years are unavailable, while Serres, Xanthi and Rodopi were 6th, 24th and 19th in 2019 in this category, which may indicate that there is missing/wrong data in the Eurostat database.

| | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| Voreios Tomeas Athinon | | | | | |
| Dytikos Tomeas Athinon | | | | | |
| Kentrikos Tomeas Athinon | 683 | 262 | 329 | 83 | 284 |
| Notios Tomeas Athinon | | | | | |
| Anatoliki Attiki | 199 | 624 | 149 | 432 | 433 |
| Dytiki Attiki | 375 | 814 | 163 | 196 | 473 |
| Peiraias, Nisoi | 915 | 1.399 | 745 | 1.088 | 651 |
| Lesvos, Limnos | 38 | 324 | | 950 | 76 |
| Ikaria, Samos | 6 | | | | |
| Chios | | | | | |
| Kalymnos, Karpathos, Kasos, Kos, Rodos | | | | | |
| Andros, Thira, Kea, Milos, Mykonos, Naxos, Paros, Syros, Tinos | 21 | | | | |
| Irakleio | 175 | 245 | 145 | 371 | 176 |
| Lasithi | 588 | 441 | 204 | 739 | |
| Rethymni | 60 | 221 | 297 | 338 | 108 |
| Chania | 185 | 335 | | 272 | |
| **Evros** | **262** | **193** | **272** | **227** | **637** |


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| | | | | | |
|---|---|---|---|---|---|
| **Xanthi** | **214** | **241** | **134** | **590** | **351** |
| **Rodopi** | **55** | | **161** | **174** | **505** |
| **Drama** | **537** | **550** | **429** | **364** | **170** |
| **Thasos, Kavala** | **187** | **123** | **342** | **152** | **619** |
| Imathia | 525 | 508 | 410 | 363 | 589 |
| **Thessaloniki** | **2.110** | **2.361** | **1.553** | **2.104** | **1.944** |
| Kilkis | 309 | 291 | 215 | 245 | 216 |
| Pella | 1.006 | 720 | 874 | 960 | 696 |
| Pieria | 156 | 230 | 553 | 280 | 275 |
| **Serres** | **1.160** | **1.091** | **457** | **349** | **619** |
| Chalkidiki | 344 | 411 | 129 | 264 | 400 |
| Grevena, Kozani | 679 | | 707 | 339 | 508 |
| Kastoria | | | | 51 | |
| Florina | 745 | | 730 | | 191 |
| Arta, Preveza | 666 | 533 | 544 | 698 | 944 |
| Thesprotia | | 94 | 80 | 120 | |
| Ioannina | 918 | 493 | 815 | 308 | 213 |
| Karditsa, Trikala | 940 | 1.402 | 1.279 | 706 | 1.228 |
| Larisa | 1.827 | 1.161 | 1.593 | 949 | 1.613 |
| Magnisia | 296 | 529 | | 300 | 347 |
| Zakynthos | | | | | |
| Kerkyra | | | | | |
| Ithaki, Kefallinia | | | | | |
| Lefkada | | | | | 28 |
| Aitoloakarnania | 753 | 1.086 | 1.154 | 621 | 461 |
| Achaia | 677 | 265 | 210 | 570 | 931 |
| Ileia | 1.074 | 727 | 877 | 458 | 681 |
| Voiotia | 1.504 | 1.002 | 1.566 | 920 | 567 |
| Evvoia | 744 | 270 | 285 | 980 | 527 |
| Evrytania | | | | | 84 |
| Fthiotida | 239 | 498 | 193 | 193 | 312 |
| Fokida | | | | | |
| Argolida, Arkadia | 651 | 699 | 1.212 | 1.064 | 736 |
| Korinthia | 278 | 505 | 405 | 892 | 539 |
| Lakonia, Messinia | 550 | 480 | 773 | 314 | 755 |

*Table 3: National annual road freight transport by regions of loading (NUTS 3) - Products of agriculture, hunting, and forestry; fish and other fishing products in Greece*

| | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| Voreios Tomeas Athinon | 945 | 347 | 311 | 395 | 205 |



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| | | | | | |
|---|---|---|---|---|---|
| Dytikos Tomeas Athinon | 190 | 231 | | | 367 |
| Kentrikos Tomeas Athinon | 1.464 | 638 | 1.025 | 938 | 608 |
| Notios Tomeas Athinon | | 251 | 196 | 241 | 463 |
| Anatoliki Attiki | 1.233 | 1.469 | 1.588 | 1.627 | 1.401 |
| Dytiki Attiki | 1.532 | 2.161 | 3.147 | 1.848 | 2.686 |
| Peiraias, Nisoi | 2.229 | 733 | 967 | 1.503 | 1.056 |
| Lesvos, Limnos | 215 | 67 | 158 | 595 | 419 |
| Ikaria, Samos | 174 | | | | 24 |
| Chios | | | | | |
| Kalymnos, Karpathos, Kasos, Kos, Rodos | 247 | | | | 179 |
| Andros, Thira, Kea, Milos, Mykonos, Naxos, Paros, Syros, Tinos | 410 | 887 | 1.014 | 169 | 244 |
| Irakleio | 764 | 713 | 880 | 1.100 | 1.661 |
| Lasithi | 153 | 282 | 144 | | 19 |
| Rethymni | 374 | 89 | 147 | 194 | 321 |
| Chania | 103 | 280 | 142 | 601 | 618 |
| **Evros** | | **166** | | **104** | **218** |
| **Xanthi** | | **241** | | **279** | **80** |
| **Rodopi** | | **207** | **251** | **352** | |
| **Drama** | **323** | **296** | | | **134** |
| **Thasos, Kavala** | **105** | | **43** | | **1.364** |
| Imathia | | 207 | 426 | 261 | 243 |
| **Thessaloniki** | **3.199** | **3.501** | **3.334** | **7.515** | **3.103** |
| Kilkis | 352 | | 173 | 257 | 157 |
| Pella | 380 | 148 | 263 | 96 | 1.024 |
| Pieria | 76 | 358 | 210 | 333 | 220 |
| **Serres** | **219** | **140** | **672** | **1.337** | **249** |
| Chalkidiki | 528 | 131 | 393 | 893 | 250 |
| Grevena, Kozani | 5.056 | 7.340 | 507 | 234 | 486 |
| Kastoria | | | | | |
| Florina | 107 | | 264 | 121 | |
| Arta, Preveza | 4.335 | 796 | 499 | 121 | 1.005 |
| Thesprotia | 25 | | 176 | 138 | |
| Ioannina | 1.666 | 2.407 | 1.650 | 1.430 | 2.238 |
| Karditsa, Trikala | 623 | 572 | 757 | 606 | 633 |
| Larisa | 444 | 319 | 385 | 1.102 | 615 |
| Magnisia | 428 | 206 | 883 | 521 | 287 |
| Zakynthos | | | 1.022 | 114 | 404 |
| Kerkyra | | | | 107 | 141 |
| Ithaki, Kefallinia | | | | | 68 |


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| | | | | | |
|---|---|---|---|---|---|
| Lefkada | | | | | |
| Aitoloakarnania | 570 | | 1.236 | 293 | 338 |
| Achaia | 1.697 | 2.227 | 1.392 | 1.274 | 1.411 |
| Ileia | 323 | 784 | 1.026 | 407 | |
| Voiotia | 1.585 | 2.340 | 1.999 | 2.239 | 1.586 |
| Evvoia | 1.657 | 350 | 829 | 607 | 677 |
| Evrytania | | | | | |
| Fthiotida | 245 | 4.326 | 1.285 | 313 | 360 |
| Fokida | | | | | 439 |
| Argolida, Arkadia | 136 | 189 | 708 | 472 | 655 |
| Korinthia | 596 | 1.657 | 532 | 326 | 542 |

*Table 4: National annual road freight transport by regions of loading (NUTS 3) - Food products, beverages and tobacco in Greece*

# 4. State of the Art Analysis

After the outbreak of the COVID-19 pandemic, the agri-food sector was supported by the European Commission by the issuance of guidelines to ensure an efficient food supply chain, the introduction of measures directly supporting farmers and rural areas, and the introduction of new measures to simplify and increase the flexibility of the Common Agricultural Policy (CAP). The pivotal role of the CB agri-food sector derives from the quality products, the strong presence of food manufacture, the connection of the CB area with the Mediterranean diet, the rich soil conditions and favorable climate characteristics, as well as the nutritional standards and food safety.

In Greece, Bulgaria and many other European countries, household expenditure on food and non-alcoholic beverages is the second largest expense after housing, water, electricity, gas and other fuels. However, in Greece this share in total expenditure is larger than the European average. Food prices have been on an upward trend in Greece and Bulgaria in recent years, affected by higher demand and global food prices amid a highly competitive international environment. Nevertheless, the coronavirus crisis negatively impacted global


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food prices from February 2020, an impact further enhanced by the aftereffects of the ongoing Russian invasion in Ukraine.

Agricultural production should be oriented and linked to market demand and surpass the problems of the relatively small size of land per farm, farmers' aging and unfavorable age structure of the rural population. The CAP, launched in 1962, ensures high standards of food security, safety and quality, focuses on the support of small and medium-sized family farms and on the greater use of innovation and prioritizes sustainability linking support to environment, climate and food safety legislation. Gross fixed capital formation in agriculture, forestry and fishing cumulatively shrank by 45% from 2009 to 2017, although the losses in terms of value added were much milder.

The basic CB area agricultural products include fruits and vegetables, industrial crops, cereals, forage plants, olive oil (with Greece being the third largest producer worldwide), potatoes and wine. Crop production has the highest share (73%). Food products have the highest share among the basic manufacture sectors in terms of persons employed (34%), value added (24%) and number of enterprises (26%) and the second highest after coke and refined petroleum products in terms of production value (22%). The GVA of the food, beverages and tobacco industry stands at 2.5% of total GVA, according to a report published from Alpha Bank of Greece. In addition, bakery and farinaceous products is the largest subsector of food manufacture in terms of value added, persons employed, enterprises and turnover. Manufacture of fruit and vegetables was one of the most resilient subsectors during the economic crisis in Greece.

Exports of food products surged substantially over the decade 2009-2019, far more than imports of the sector, indicating that although there is still export dependence, the sector exhibits a considerable exporting orientation, mostly evident in aquaculture products. Made in Greece branding", the Greek cuisine and the connection with the Mediterranean diet act as an international identity


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of Greek food products and mark a first step towards a broad acceptance of product specific brands abroad. Local, traditional products or products of protected designation of origin and geographical indication or products with a special registration, are a typical example of the effort to create a strong local identity. Up until 2020, Greece had 275 food and beverages products registered as PDO and PGI.

Sustainability awareness in environmental issues related to production and consumption in the agri-food sector has increased in recent years. The CB area agri-food sector's GHG emissions accounted for 3.3%, exhibiting the largest decrease (-9%) among EU member states in the period 2009-2018.

## 4.1. PESTLE Analysis

The PESTLE analysis in general can be presented as an analytical approach through which the environment external to an organization or sector can be studied, i.e. the environment in which the research subject develops and, in particular, the fundamental factors from the external environment that determine the development of the organization or sector. In this sense, the PESTLE analysis contains several main components:

- Analysis of the political environment (P);
- Analysis of the economic environment (E);
- Analysis of the social environment (S);
- Analysis of the technological environment (T);
- Analysis of the legislative environment (L);
- Environmental analysis (E).

The aim of the analysis of the political environment is to establish how the dynamics of the political situation is reflected over the object of analysis and what are the mechanisms of influence on the part of the institutions in relation to the researched object of research, including regulations, tax policy, etc.


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The analysis of the economic environment includes a review and understanding of the main economic factors that influence the development of the industry in relation to which the analysis is prepared. In turn, this invariably includes an analysis of inflationary processes, an analysis of average wage rates, an analysis of purchasing power, foreign direct investment, economic incentives, and other factors.

The third component of PESTLE concentrates on the social environment and more specifically on the main social, cultural and demographic processes on the one hand that are relevant to the industry under study. The analysis of the technological environment concentrates on the technological introductions, the implementation of innovations, the levels of exploitation of new assets, the development of research and development activities, etc. factors that are related to the research area.

The penultimate component of the PESTLE analysis includes the analysis of the regulatory framework that regulates the activity of economic entities. In this sense, the main focus of attention of this type of analysis is the current directives, regulations, laws, ordinances, regulations, etc.

Environmental analysis covers the aspects of the environment that appear as factors determining in this case the development of the Agro-Food Sector in the Cross-Border Region, i.e. the factors that are related to the conditions for the production of food and food products.

In conclusion, it can be stated that the PESTLE analysis is an analytical approach that aims to establish the prospects for a sector or organization, by means of performing multi-aspect analyzes with the external environment, on the basis of which it is possible to ascertain a number of prospects and risks for the economic actors from every sector of economic life.


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### 4.1.1. Greek Side

#### 4.1.1.1. Political Aspect

- EU quality policy provides measures to help producers build on the high-quality reputation of domestic products and promote their unique characteristics, in order to sustain competitiveness, profitability, diversity, development and growth in the rural areas where they are produced and protect local knowledge, skills and jobs.
- A supportive to the above policy tool is the register of protected food names, with products being classified as Protected Designation of Origin (PDO) for the area of production, Protected Geographical Indication (PGI), regarding the origin of raw materials and Traditional Specialties Guaranteed (TSG), which highlight traditional aspects of the production. Products registered under one of the three schemes can be marked with the logo that identifies them. The registration supports the reputation of these products, reduces unfair competition and guides consumers so that they are not misled to distinguish genuine from non-genuine products.
- In May 2020, in the context of the European Recovery Plan to battle economic downturn due to the coronavirus pandemic, the total CAP 2021- 2027 funding (Direct Payments and Rural Development Programmes) was reinforced to EUR 391.4 bn from EUR 365 bn in the 2018 proposal, lower than CAP 2014-2020, due to Brexit, emigration and refugee issues, internal and external security, demographics and climate change challenges.
- BREXIT led to financial market instability. Greece – UK partnerships will need to be reformulated.


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#### 4.1.1.2. Economic Aspect

- Food prices in Greece have been on an upward trend in recent years, affected by higher demand and global food prices amid a highly competitive international environment. Food prices are affected by fluctuations in demand - for example due to changes in income or population - but also by shifts in production and supply, derived from diverse climate conditions, natural disasters or floods, changing crop yields, trade barriers, oil price fluctuations and speculative pressures on commodity derivatives of raw materials.
- In Greece, the Harmonised Index of Consumer Prices (HICP) increased by 0.5% yoy in 2019, at a lower rate compared to 2018 (0.8%). The changes of the HICP during the last years have been affected by the prices of oils and fats, vegetables, coffee, tea and cocoa, beer and mineral waters, soft drinks, fruit and vegetable juices. In the period 2009-2019, the largest increase was registered in the prices of coffee, tea and cocoa, beer and spirits.
- The producer price index in Greece stands at the lowest level compared to other food price indices, raising from 95.8 units in 2008 to 98.7 units in 2019 and 99.4 units in the first 4 months of 2020. The agricultural commodity price index increased at a slower pace than producer prices.
- Global food prices, also affecting domestic prices, recorded a downward trend in the beginning of 2018 that lasted for a year, due to the trade war between China and USA, primarily evident in the prices of oils and sugar and secondarily in meat.
- In Greece, household expenditure for food and non-alcoholic beverages products accounted for 15.3% of total household expenditure (2017), the second largest after housing, water,


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electricity, gas and other fuels expenditure (23.1%), close to restaurants and hotels expenditure (14.6%).

- Food and non-alcoholic beverages expenditure increased by 1.4% on an annual basis in 2020, after a two-year fall, reaching EUR 20.8 bn (2010 prices). This increase was relatively lower compared to that of households' total expenditure (1.9%).
- Because of the small-scale and family status of farming, agricultural cooperatives and producers' groups can offer a competitive advantage to small agri-food businesses that employ less than 10 persons and represent 95% of the total number of businesses in the sector. They are autonomous voluntary associations of persons that seek the economic development and promotion of their members, through a co-owned agricultural cooperative enterprise. The National Register of Agricultural Cooperatives lists 600 cooperatives, operating in production, processing and manufacturing.
- Food and beverages are two separate sectors of manufacturing , although they are usually considered as one. The GVA of food, beverages and tobacco industry stands at 2.5% of the total Greek economy GVA (2020).
- Food manufacturing enterprises add up to c. 15 th, out of which 89% are very small (up to 9 persons), 6% are small (10-19 persons) and only 0.4% are large enterprises of over 250 persons (2020 figures). The largest enterprises also have the largest share of total production value (36%), gross value added (40%), turnover (34%) and the second largest share of persons employed (23%).
- In terms of employment, investment and value added, food and beverages manufacture showed signs of resilience during the


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previous economic crisis, managing to recover at a much quicker pace compared to other sectors.

- Meat manufacture employs 9% of all persons employed in food manufacture, has a 16% share of turnover, 3% of enterprises, 11% of value added at factor cost and 16% of total production value. Meat manufacture counted c. 442 enterprises in 2018, reduced from 510 in 2008. The sector recorded a strong upward trend in its turnover, which has been almost doubled in ten years (current prices, 2008-2018), with an average annual growth rate of 7.1%. It has also recovered the losses in terms of value added at factor cost since 2009, although at a slower pace. The annual average growth rate of its production value lies at a strong 6.9%.
- Exports of agri-food products have surged substantially (51%) over the decade 2009-2019, far more than the imports of the sector (12%), indicating that although there is still import dependence, the sector exhibits a considerable extroversion, mostly evident in aquaculture products. The exports of food and beverages manufacture, consisting the largest part of agri-food exports (94%, 2019), hiked by 70% during the period 2009-2019 and equally by 5.4% on average annually, significantly higher than those of agriculture, forestry and fishing (29% cumulatively).

#### 4.1.1.3. Social Aspect

- Since the outbreak of the COVID-19 pandemic, the agri-food sector of the EU-27 member states has shown resilience compared to other sectors largely hit by the crisis and was supported by the European Commission, in order to provide safe and high-quality food to the European citizens. The Greek farmers and food producers faced difficulties and rising pressure


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after the introduction of border controls and movement constraints within the EU in order to slow down the spread of COVID-19. The new pandemic crisis has unveiled the importance of a strong and flexible food system functioning in all circumstances and ensuring access to sufficient food supply, the importance of the restoration of the balance between nature and human activity as people's health, ecosystems, supply chains and consumption patterns are interrelated and the importance of the European Farm to Fork strategy which draws attention to the need for new and better-balanced food systems in order to protect people's well-being and health.

- UNESCO as a "Cultural Heritage of Humanity" has declared Mediterranean diet, a culinary culture of countries overlooking the basin, which counts an over, a century history. In 2013, Greece, together with Cyprus, Croatia, Spain, Italy, Morocco and Portugal were inscribed on the Representative List of the Intangible Cultural Heritage of Humanity. The Mediterranean diet is a nutritional dietic model that consists of a high intake of olive oil, cereals, fresh or dried fruit and vegetables, a medium intake of fish and dairy and a low intake of meat and saturated fat. It also contains condiments, spices, and a moderate intake of wine or infusions.
- The "Greek Breakfast" is an initiative of the Hellenic Chamber of Hotels, which aims at combining the Mediterranean cuisine, gastronomical culture, local products and viands with the Greek hotel guest experience. The Greek breakfast has a high nutritional value and varies from place to place, promoting the local traditional specialties, tastes and products. The basis of the Greek breakfast includes local bread and cheese, olive oil, rusks,


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traditional yoghurt, honey, tahini, eggs, local pies, fresh fruit, soups.

#### 4.1.1.4. Technological Aspect

- The food industry during the last years is characterised by innovations oriented towards specialised customer needs and nutritional diets, but also by more transparency and increasing technology usage. Innovations are the result of scientific research and reorganisation of production processes, new ideas and methods applied in order to boost competitiveness. In the food industry, innovation and technologies are focusing on increasing the safety, conservation methods, packaging and healthiness of food and beverages, largely determined by digital transformation, climate change and health-focused consumers, in order to meet the challenges it faces.
- Innovation in the food sector is applied in packaging, methods of eliminating harmful ingredients, non-thermal and in general mild food processing, detection methods for food risk and security management, bio-active food ingredients, functional food and nutrigenomics, reduction of energy use or CO2 footprint, increased material or water efficiency, recycle waste, improved/changed shape of goods/services.
- Innovations and new technological developments are also applied in farming, such as in new seed production, organic farming, pre-season farming using satellites and sensors for precision agriculture, e-commerce and food logistics and food waste management.



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#### 4.1.1.5. Legal Aspect

- Under the adverse conditions caused by the new pandemic, the European Commission supported the agri-food sector by the issuance of guidelines to ensure an efficient food supply chain, introducing green lanes to keep food flowing across Europe and qualifying seasonal workers as "critical'' to secure food sector support, as well as by the introduction of measures directly supporting farmers and rural areas. In particular by introducing flexible use of financial instruments under rural development with farmers and other beneficiaries from loans or guarantees to cover operational costs of up to EUR 200,000 at very low interest rates or favourable payment schedules, increased advances of direct payments from 50% to 70% and certain rural development payments from 75% to 85%, starting from midOctober, in order to increase the farmers' cash flow. And possible higher state aid with farmers able to benefit from a maximum aid of EUR 100,000 per farm and food processing and marketing companies from a maximum amount of EUR 800,000.
- An additional impact of the COVID-19 spread in Europe has been seen on the legislative process related to CAP reform for 2021-2027.
- Local, traditional products or products of designation of origin and geographical indication, i.e. products with a special registration, consist a typical case of the effort to create a strong local identity. EU quality policy provides measures to help producers build on the high quality reputation of domestic products and promote their unique characteristics, in order to sustain competitiveness, profitability, diversity, development and growth in the rural areas where they are produced and


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protect local knowledge, skills and jobs. A supportive to the above policy tool is the register of protected food names, with products being classified as Protected Designation of Origin (PDO) for the area of production, Protected Geographical Indication (PGI), regarding the origin of raw materials and Traditional Specialties Guaranteed (TSG), which highlight traditional aspects of the production.

- The CAP 2021-2027 objectives are in line with the European Green Deal and comprise the following: Ensure fair income to farmers, Increase competitiveness, rebalance power in food chain, climate change action, environmental care, preserve landscapes and biodiversity, support generational renewal, vibrant rural areas, protect food and health quality. In Greece, total funding will amount to EUR 18.3 bn.
- The Farm to Fork strategy is a cornerstone of the European Green Deal, which paves the way for Europe to become the first climate-neutral continent by 2050. The strategy is characterized by the key role it gives to food system Research and Innovation, enabling the necessary transitions so that food systems become sustainable along the whole food value chain. A neutral or positive impact to the environment and climate change, which will ensure food security and make healthy nutrition an easy choice for Europeans, is a requirement of the strategy. Farm to Fork strategy will be supported by regulatory and non-regulatory initiatives, with the key tools of Common Agricultural Policy and Common Fisheries Policy.

#### 4.1.1.6. Environmental Aspect

- The comparative advantages of Greek agriculture lie in the unique climate and soil conditions, the great biodiversity and the


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local varieties of quality products. Out of the total 32.2 mn ha cultivated area of Greece, 89% is crops and the remaining 11% is fallow land. The crops area consists of crops on arable land (53%), areas under trees (31%), vines (3%) and garden area (2%).

- The largest share of agricultural production, cultivated and fallow land (21%), is in the Periphery of Central Macedonia, which is the lead national producer of stone fruits (74%), fodder pulses (55%), cereals for grain (31%), pomes (31%), industrial plants (30%) and fodder plants for hay (20%). Thessaly follows, with a share of 14% and a similar production scheme at a smaller scale, leading however in the production of nuts (46%). Peloponnese and Western Greece are the third and fourth largest producers, covering 13% and 12% of agricultural production, respectively. The two regions exhibit a vastly different production structure, leading in the production of watermelons (46%) for Western Greece and citrus fruits (56%) and olive oil (36%) for Peloponnese. Attica, the Ionian islands and the Aegean islands cover only 1% each of total agricultural production.
- Organic farming comprises 9% of the total agricultural area – 6% being fully converted and 3% under conversion. In the EU, organic farming makes up 8% of the total agricultural area. 56% of this land pertains to permanent grasslands, 32% is arable land, used mostly for plants intended for animal feed production, forage or renewable energy production, 10% is olive groves and 2% fruit trees and vines. As with agricultural production, Central Macedonia has the largest share of organic areas (16%), followed by Western Macedonia (14%), Thessaly (13%), Eastern Macedonia (13%) and Crete (13%).


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- The energy used in 2018 in agriculture, forestry and food, beverages, tobacco industry was equal to 4.7% (1.7% and 3%, respectively) of total final energy consumption of the Greek economy, lower than 5.8% in EU-27.

### 4.1.2. Bulgarian Side

#### 4.1.2.1. Political Aspect

In general terms, through the analysis of the political environment, numerous risks and opportunities can be ascertained, which are revealed to economic entities from the agrarian-food sector, which arise as a result of the political dynamics in the country and on the international scene.

- In the last two years, the political situation in Bulgaria has been strongly determined by the COVID-19 pandemic. This, in turn, directed the efforts of the responsible institutions predominantly towards overcoming the negative consequences of the pandemic and invariably put in the background the attempts at reforms and optimization in sectors such as agrarian and food in order to improve the conditions in which business entities operate in this part of the economy life.
- Other significant problems that accompany and define the political situation are objectified in political instability and in particular in the frequent change of governments. In the period between March 2021 and December 2021, there was a change of 4 governments (two acting and two regular), and in addition, legislative activity was severely limited due to the absence of a functioning parliament. On the other hand, the complex configuration of the governing coalition also poses risks for the


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Agri-Food Sector, suggesting more points of disagreement, discussion and debate regarding the formulation of specific policies that address its development, as well as its slower reformation and optimization.

- As a key factor at the moment with a strong negative influence is the war in Ukraine, which reflects to a large extent on the Agro-Food Sector. On the one hand, because it again shifts priorities in Europe (this time to defense and security), and on the other hand, because the countries involved in the conflict are important producers and suppliers of raw materials and agricultural products globally. As a consequence of the conflict, a large-scale transformation of policies in the European Union is expected, as the priority of the institutions' attention will undoubtedly be the provision of raw material and energy independence, not only from Russia, as is the case, but also in general.

  In view of the fact that Russia and Ukraine are among the leading countries in terms of wheat and sunflower exports, as well as artificial fertilizers, as a result of the political dynamics internationally, an increase in the price of all products is expected (in view of the emerging supply reduction) that are produced from such crops. The uncertainty in the medium and long term period regarding the supply of natural gas leads to difficulties in the production of artificial fertilizers in Bulgaria.

  As industrial agriculture predominates in Bulgaria, the war in Ukraine and the complicating economic relations internationally have significant negative consequences, such as the increased prices of energy sources and raw materials, artificial fertilizers and chemicals used in the agroculture, feed and agricultural production, etc. In addition, logistical


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connections, already very stretched and troublesome since the beginning of the Pandemic, were further complicated, leading to difficulties throughout the Food Industry Chain.

This, in turn, will lead to economic difficulties for companies from the Agro-Food Sector in view of rising production costs, which would be critical, especially in relation to the increased prices of energy sources. In turn, this leads to acceleration of inflation and a rise in final prices for consumers, especially food. In this sense, there is no doubt that the ongoing war in Ukraine will have a negative impact on all stakeholders in terms of the business processes the Agri-Food Sector in terms of the business processes.

In addition to this, the acceleration of the inflation, which in turn will have negative impact on the purchasing power and demand, and as a result, the turnover of companies, increases the probability of falling into recession, not only in Bulgaria or Europe, but also the rest of the world.

We must note, however, that some branches of the Agro-Food Sector, such as grain production, or the production of technical crops such as sunflower, are very likely to turn out to be profitable, in view of the looming increase in demand and increased prices, mainly on the international markets and a reduction in supply due to the military conflict in Ukraine.

In the next part of the analysis of the political environment, the main policies that public institutions address to the Agro-Food Sector in Bulgaria will be presented as factors that define the situation in the agrarian-food sector and have a direct impact on its development and dynamics.


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- The common agricultural policy (CAP) is the basis of all policies in the member states of the European Union. It is based on the principles of free trade within the EU and on the basis of common prices on the one hand. On the other hand, it guarantees preferences for European production on the markets within the Community, and as the last pillar of the CAP, common financial responsibility is defined.

  The CAP is oriented towards the achievement of several main objectives. In terms of producers, it is aimed at ensuring an acceptable standard of living for farmers. In relation to consumers, the CAP addresses issues such as food quality and prices, and its role is to provide consumers with quality foods that are affordable. In terms of local communities, the CAP aims to preserve the European heritage in rural areas, and it is also committed to environmental protection.

  The most important instruments with which the CAP is implemented are direct payments and the provision of market support to agricultural producers, which represents the first pillar of the CAP, and the rural development policy, which embodies the second pillar of the CAP.

  Market support measures provided to economic actors in the agri-food sector include intervention and private storage; system of import and export licenses; export subsidies; quality policy (protected designations of origin, protected geographical indications and foods with traditionally specific character) aids to increase the consumption of certain products (milk); promotional programs; sectoral regimes, etc with the main source of funding for the mentioned measures being the European Agricultural Guarantee Fund (EAGF). At the national level, the states of the Union can also provide


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financial support for the implementation of the above measures.

The policy for the development of rural areas, which is addressed within the framework of the entire CAP, is aimed at achieving results in the field of increasing the competitiveness of the agricultural and forestry sectors; improving the environment and landscape and improving the quality of life in rural areas and promoting the diversification of their economy. The financing of the rural development policy is implemented through funds and instruments from the European Agricultural Fund for Rural Development (EAFRD), and payments are also made to the budgets of the member states of the Union. For each program period, each member country is obliged to submit its own plan for the development of the agricultural sector within the framework of the CAP for approval by the European Commission.

It is important to note that at the time of writing this analysis, the strategic plan for the development of the agricultural sector under the CAP for the current programme period presented by Bulgaria has not yet received approval from the EC.

As part of the future development of the agri-food sector is the policy of digitization of agriculture and rural areas. The key is that it emphasizes both the digitalization of the administration of processes by the public sector and the promotion of digitalization in the private sector. The expectations are that the digitization policy will generate results such as increasing the productivity of the business entities operating in the Agro-Food Sector, increasing the added value, achieving better quality and safety of


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production, as well as optimizing and increasing the economic results of economic entities from the agrarian and food sector.

- An important policy that addresses the development of the agrarian and food sector in Bulgaria is the promotion of organic production, which is defined by the "National Action Plan for the Development of Organic Production". A SWOT analysis was made in the plan, strengths and weaknesses were identified, categorized into several sections, and as a result, three strategic goals were derived:
  - Improving the efficiency of organic production and expanding the national and foreign market of organic products;
  - Maintaining an effective institutional-normative framework for the development of organic agriculture and an effective system of control and supervision;
  - Stimulation of practice-oriented scientific research, education, training and consultancy in the field of biological production;
- The country also has a policy of regulation regarding the import of agricultural products, which provides for the obtaining of licenses for economic actors suitable for the activity.
- Bulgaria also defines a general policy in the field of fisheries, but its impact is minimal due to the small market share of the sector.
- The Bulgarian institutions also have a policy regarding beekeeping, the main pillars of which are laid down in the current "National Beekeeping Program".


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- In Bulgaria, there is also a policy to prevent and reduce food losses. The state implements the National Program for the Prevention and Reduction of Food Losses", in which goals, measures and actions regarding the problem of food loss are defined, which define the country's policy in the area.

  Its implementation is vital to achieving a better quality of life in several aspects. Food waste is a problem that also has ethical dimensions in the context of the fact that in Bulgaria usually around 20% live below the threshold of poverty, and the group of persons living at risk of poverty is also significant against the background of other EU countries. On the other hand, the problem related to the disposal of food leads to an extremely high pressure on the environment, as far as different natural resources are used for their production, which are limited by their nature. On the other hand, food waste pollutes the environment and in particular its components, and food losses can also lead to a loss of biological diversity
- Apart from these policies, the program of the governing coalition in Bulgaria envisages policies aimed at "building a middle class of farmers, livestock breeders and processors ".

  Another significant policy that will be followed is oriented towards "encouraging the registration and promotion of products with protected geographical indications, which include protected designations of origin, protected geographical indications and foods of a traditionally-specific character, as well as products produced under a national system of voluntary standards guaranteeing quality, origin, fair remuneration, market access and health processors ".


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- Another priority policy is the stimulation of young farmers and livestock breeders and the overall development of family farms in the mountainous regions. In addition to financing, it is envisaged that they will be supported through easier access to municipal and state agricultural land and pastures, the access of young farmers to municipal and pastures.
- Fundamental is expected to be the change regarding direct payments and the setting of a ceiling of up to 100,000 euros per beneficiary with a focus on identifying the final beneficiaries so that more funds can be directed to micro, small and medium-sized farms.
- Policies to reduce the administrative burden and increase transparency in institutions related to the activity of the agri-food sector are also envisaged.
- The leading and foundational policies at the European level are defined within the framework of the European Green Deal (Green Deal). Within this corpus of policies, the following objectives are expected to be achieved :
    - by 2050, there will be no net emissions of greenhouse gases;
    - to separate economic growth from the use of resources;
    - no person or region should be left behind.

  The implementation of the defined goals should lead to benefits for the countries of the community, objectified in clean air, clean water, healthy soils and biological diversity; renovated energy efficient buildings; healthy food at affordable prices; more public transport; cleaner energy and cutting-edge cleantech innovation; more durable products


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that can be repaired, recycled and reused; future-oriented jobs and training to acquire the skills needed for the transition; sustainable and globally competitive industry.

The specific objectives of the pact in relation to agriculture address processes and issues related to ensuring food security in the face of climate change and biodiversity loss; reducing the environmental and climate footprint of the EU food system; strengthening the sustainability of the EU food system; leading the global transition to competitive farm-to-fork sustainability. The "Farm to Fork" strategy will play a key role in achieving some of the set goals.

In terms of environmental protection, the European Green Deal prioritizes topics dedicated to the protection of biological diversity and ecosystems; reducing air, water and soil pollution; the transition to a circular economy; improving waste management and ensuring sustainability of the blue economy and fisheries sectors.

- Regarding the tax policy in the Agro-Food Sector, it should be noted that the core of the taxation system consists of the following types:
  - Value Added Tax (VAT);
  - Corporate tax (profit tax);
  - Dividend tax.

Before the COVID-19 pandemic, the core of the tax system was simplified and stable over time, regardless of governments and the policies they pursued. The amount of VAT was fixed at 20%, that of profit tax at 10% of profit, and dividend tax was equal to 5% of the value of income generated by dividends.


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At the moment, the tax system is undergoing a transformation, as in 2020 the principle of fixed VAT levels was changed, and for baby food and food in restaurants the rate was changed to 9% . The rate remains in effect in 2022. The coalition program of the government does not provide a clear program, but gives scenarios such as a temporary reduction of VAT for primary production and a gradual return to the corresponding levels, or a reduction of VAT on goods from the "small basket"

At the time of writing this analysis, the possibility of reducing VAT on bread from 20 to 0% is also being discussed at the political level. On the other hand, it should be noted that with regard to corporate tax, there is a debate between the supporters of the flat system (with a flat tax of 10%) and those of the progressive taxation system, which sets a higher tax rate as the taxable income.

There are also ideas for a flat system of taxation of the profit of economic agents, but at an increased rate (15%). At the moment, there are no clear indications of a formed majority regarding this type of change, but the existence of a debate is an indication of a possible change that will lead to higher taxation in the Agro-Food Sector and a reduction in the profits of economic entities that use it. constitute.

In relation to the dividend tax, it should be noted that many economists and politicians with a pro-market understanding advocate the thesis that the tax should be abolished, but at the moment there are no clear indications of a change in the tax rate and/or its abolition.

In view of the above, it can be concluded that the state of the tax system in its part, including the main types of taxes that



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are related to the activity of economic entities from the agrarian-food sector, is in the process of transformation, which will lead to the formation of a new identity. The signals and calls for higher taxation of profit are clear, whether it is a flat system with a higher flat rate or a progressive system where larger market entities are taxed at a higher rate. Another important component of this system is the amount of insurance contributions. One of the specifics of the Agro-Food Sector is that many business entities from the sector operate as natural persons. This suggests that the policy regarding insurance income is a factor that directly affects the activity of economic entities in the Agro-Food Sector, as far as directly determines labor costs. Since by law the state has the right to regulate the levels of the minimum insurance income and the minimum wage, it should be noted that the amount of the minimum wage (MW) is in the process of constant growth. This reflects on the levels of insurance incomes for the various economic activities and the groups of positions characteristic of them, which increases the labor costs of subjects from the Agro-Food Sector. Across research, the minimum wage has increased by 141%, and the average increase is 9%, with the upward trend continuing.



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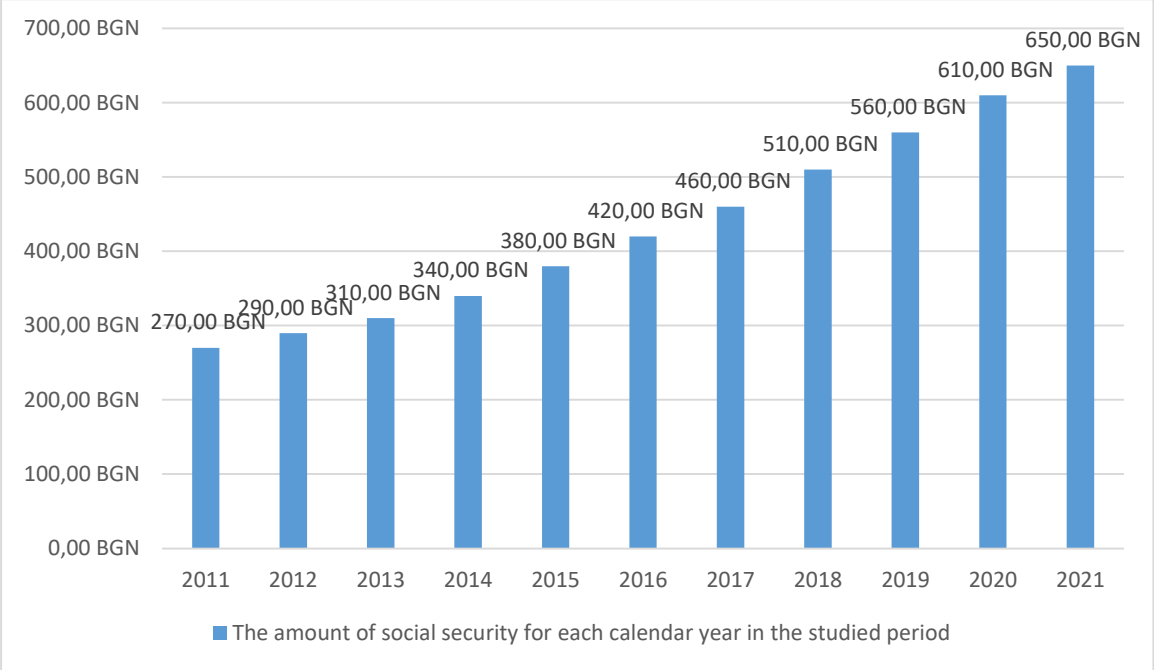


*Figure 1: Amount of the minimum wage for the period 2011-2021 Source: Infostat, National Statistics Institute*

It should be noted that from the point of view of the labor costs of companies from the Agro-Food Sector, this policy causes the most problems where labor costs represent a major component, as well as in small farms. In large enterprises and industries that are automated, it can reasonably be assumed that the policy of increasing the minimum insurance income does not arouse the same concern.

The changes regarding the sharply increasing insurance threshold for farmers from BGN 420 to BGN 710 (Around EUR 363), which is almost a double increase, may also prove problematic. To the greatest extent, this is a problem for the smallest farms, as it will increase their labor costs by about BGN 3,500 (approx. EUR 1790) in one year. In many cases, this can mean a reduction in profits of around 10%, which represents a significant share of economic performance.



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In conclusion, it can be noted that the analysis of the political environment cannot account for the presence of either an extremely favorable environment for the development of the Agro-Food Sector, or an extremely negative one. On the one hand, the war in Ukraine represents a powerful social and political cataclysm, which is capable of blocking social development in general. On the other hand, the efforts of the institutions in terms of neutralizing system defects are visible – the high administrative burden, lack of digitization, the provision of financing for micro, small and medium-sized farms and the promotion of competitiveness, reducing the pressure on the environment and strictly following the European policies and practices in the sector, as it is expected that with such steps the development of the Agro-Food Sector will be brought to a qualitatively different level

#### 4.1.2.2. Economic Aspect

The analysis of the economic environment must begin with the clarification that its condition is not an independent variable but is determined by political dynamics, social, demographic, natural and other processes. External environmental factors, such as the presence of the military conflict in Ukraine, the COVID-19 pandemic, etc. lead to stressing the economic life and generating many prerequisites and conditions for the deterioration of the economic environment.

The gross domestic product (GDP) is the main indicator of the economic development of a certain territory. Although problematic, this tool gives advantages in the study of an economic situation. On the one hand, through the study and interpretation of its values, the degree of economic development of a certain territory can be established, but at the same time, the trends related to GDP reflect


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what the prospects and prerequisites are for the development of economic life in the studied territory.

- From the data in Figure 2, it can be concluded that, in general, there is a positive economic trend in Bulgaria, which is characterized by a permanent and sustainable increase in the gross domestic product. The only two years over the 11-year period studied to show a year-over-year decline were 2013, where the decline was minimal, and 2020, when much of the economy was shut down due to restrictions imposed during the Pandemic.

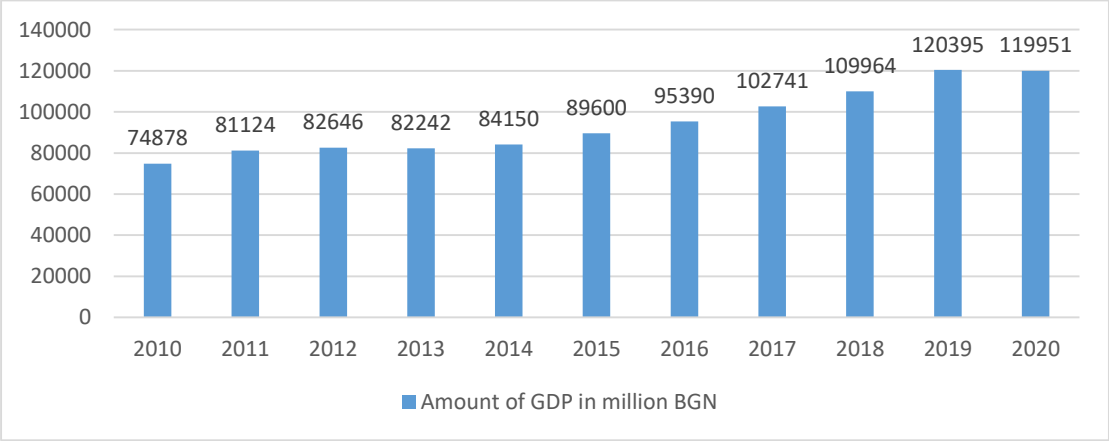


*Figure 2: Amount of GDP in million BGN for the period 2010 - 2020 for Bulgaria Source: Infostat, National Statistics Institute*

It should be noted that the GDP value of 2020 compared to that of 2010 equals as much as 60%. In view of the upcoming recovery of economies globally on the one hand, the start of the new program period, the implementation of the National Plan for Recovery and Sustainability, the country's gross domestic product is expected to grow significantly in the coming years. In this sense, it can be stated that there are positive prerequisites for economic development for economic entities from the agrarian-food sector.



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- Against this background, the analysis of GDP at the local level, respectively for the districts of the Cross-Border Region – Blagoevgrad, Kardzhali, Haskovo and Smolyan. The first finding that can be drawn is that, similar to the processes at the national level, the areas of the cross-border region also experienced a sustained growth in GDP values (clearly visible in Figure 3, below in the text). Each district experienced two declines over the entire 11-year data review period (similar to national trends), although the years of GDP declines differed for each district.

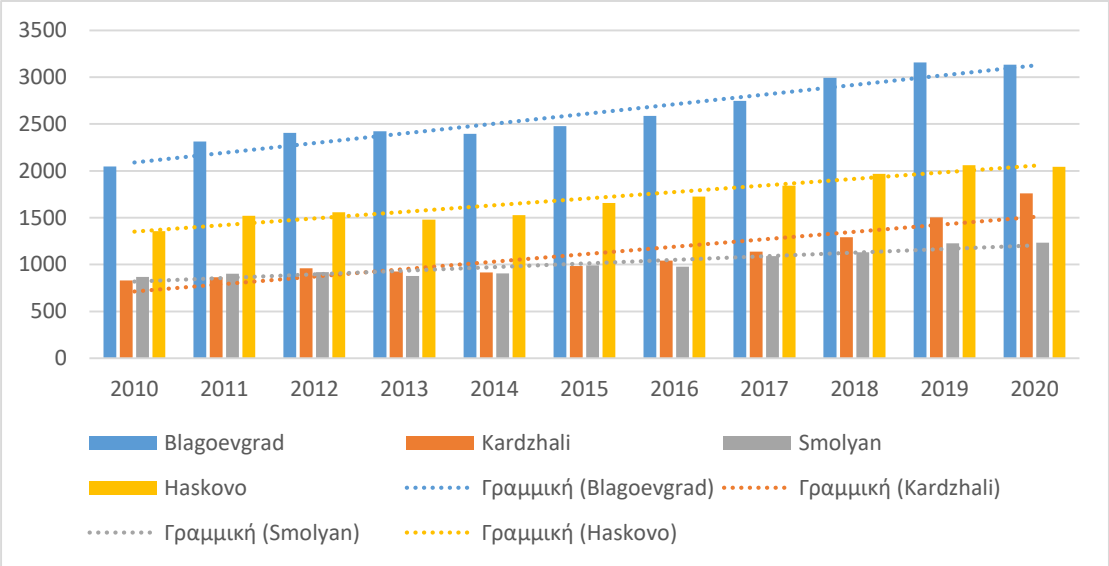


*Figure 3: Amount of GDP in million BGN for the period 2010 - 2020 for the districts of Blagoevgrad, Smolyan, Haskovo, Kardzhali Source: Infostat, National Statistics Institute*

The data at the local level, however, make it possible to understand the economic development of each of them, by means of a comparative analysis between the progress of the areas themselves and the progress that the country is marking. Such an approach gives reason to conclude that in 3 of the districts in the cross-border region, the increase in GDP is lower than that for the country. In Blagoevgrad and



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Haskovo, GDP growth from 2010 to 2020 equals 53% and 51%. In Blagoevgrad, the growth is from BGN 2,047 million to BGN 3,134 million, while in Haskovo, the growth is from BGN 1,355 million to BGN 2,043 million. GDP growth in the Smolyan region is the slowest compared to all regions of the cross-border region and equals at 42% compared to 2010 to. There, GDP increased from BGN 869 million in 2010 to BGN 1,235 million in 2020.

The only area in the cross-border region where a GDP increase higher than that of the country is noticed is the Kardzhali region, where the GDP growth is almost 112%, which is a growth that is almost twice that of the country and more than two times compared to the growth of other districts in the cross-border region.

In addition, it is necessary to state that if in 2010 the Kardzhali region had the third largest share of the economy in the cross-border region (16.3%), then in 2020 it is already over 5 percentage points more or 21.5%. Blagoevgrad District continues to have the largest economy in the region – 38.4% relative share, which decreased by almost 2 percentage points from 40.1% in 2010. Exactly a quarter of the economy of the cross-border region is determined by Haskovo district, which is a decrease of 1.6 percentage points compared to 2010. The economy of Smolyan district is now last in the district, marking a drop of almost two percentage points. In 2010, it represented 17% of the entire economy of the Cross-Border Region, while in 2020 it was only 15.1%.



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*Figure 4: Relative share of the economy of the cross-border region in the districts of Blagoevgrad, Smolyan, Haskovo, Kardzhali as of 2020. Source: Infostat, National Statistics Institute*

- The data interpreted in this way allow us to see that there is a positive economic trend, expressed in a permanent increase in GDP in the individual areas of the cross-border region. However, it cannot be ignored that, in general, this process is slower compared to the levels registered for the country. This, in turn, indicates problems in the economic development of the mentioned areas, which will lead to the impossibility of economic entities from the agrarian-food sector to compete successfully in the long-term perspective. And while this applies to the regions of Blagoevgrad, Haskovo and especially Smolyan, it must be said that the development of the economy in the Kardzhali region is a serious prerequisite for the development of the various sectors and industries in it, including and the Agro-Food Sector.
- Another important component of the analysis of the economic environment is aimed at studying trends in terms of GDP per capita. In this sense, interesting comparisons and conclusions can be made compared to the GDP analysis.



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Similar to the country data, it can be concluded that GDP per capita is increasing in every single area of the Cross-Border Region. The other similarity lies in the fact that only one district registered a higher growth compared to that of the country, and this is again Kardzhali district, where GDP per capita increased by 104% for the period under study. For the country, the increase is 74%. The regions of Smolyan and Haskovo remain relatively close, where the GDP per person of the population has increased by 71%, while here the region of Blagoevgrad is lagging behind, where the increase is 66%.

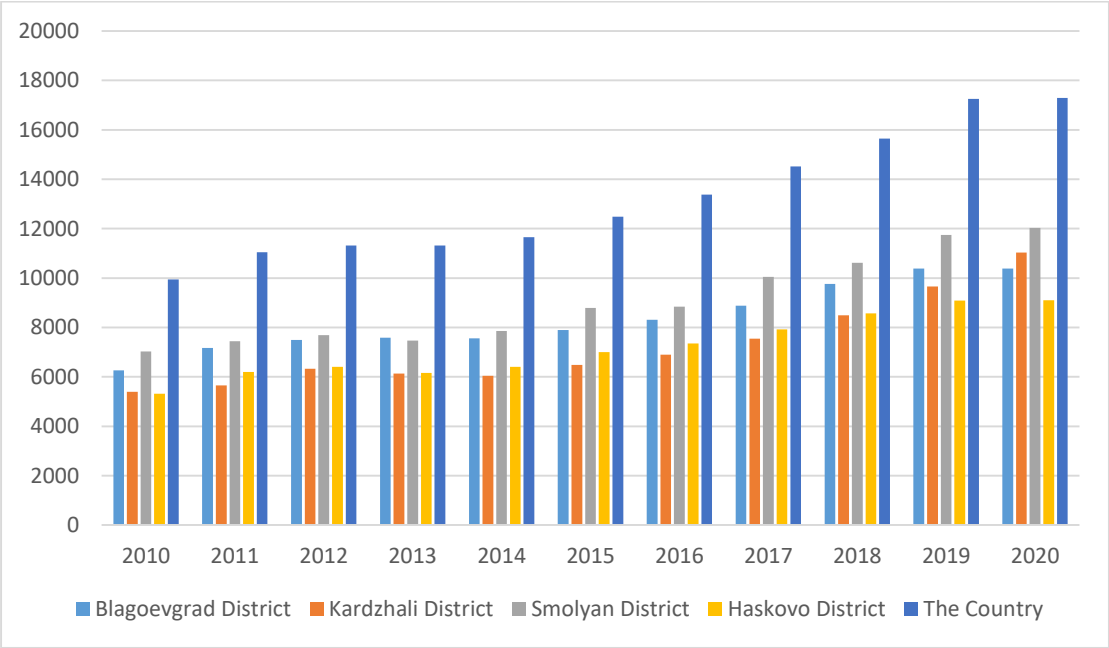


*Figure 5: Values of GDP per capita for the cross-border region in the districts of Blagoevgrad, Smolyan, Haskovo, Kardzhali and the country for the period 2010-2020 Source: Infostat, National Statistics Institute.*

— Apart from this, it should be noted that the amount of GDP per capita in the country is BGN 17,299, while that of the regions in the cross-border region is much lower. The highest values are for the Smolyan region, which exceeds BGN 12,000, in second place is the Kardzhali region, where the indicator is



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slightly higher than BGN 11,000. The Blagoevgrad region is third in GDP per capita with BGN 10,381, and Haskovo region ranks last with BGN 9,100.

- Against this background, the findings can again be made that, with the exception of the Kardzhali region, the other regions in the cross-border region lag behind the pace of the country, which simultaneously creates conditions and prerequisites for disrupting the dynamics of economic life. Of course, it should be noted here that the indicators in the three areas that emerge as the most problematic can be related to factors internal to business entities - such as weak optimization of work processes, outdated equipment and others, but it can also be associated with a greater share of the gray economy in these areas, which is why lower values should also be registered.
- The positive processes and benefits for society related to the growth of the gross domestic product are particularly visible in the analysis of the purchasing power of the country's population. It, in turn, gives reasons to conclude that at the national level, for the period 2011-2020, a serious increase in the purchasing power of Bulgarian citizens regarding food has been observed. National Statistical Institute (NSI) data shows that the purchasing power of households for the period under study in relation to white bread increased by 50%, while for products such as rice and potatoes by 77% and 55%. The largest increase in the purchasing power of Bulgarian households is in relation to sugar - 199% for the entire period, and in relation to pork and poultry the increase is within 59% and 60%. A serious increase in the purchasing power of dairy products is also noted - for fresh milk, the value


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of the increase in the purchasing power of households is 44% higher than in 2011, for sour cream by 48%, and for cheese with whole 57%. Only in the case of cheese, the upward trend is not so pronounced. There, the growth compared to 2011 is 19%.

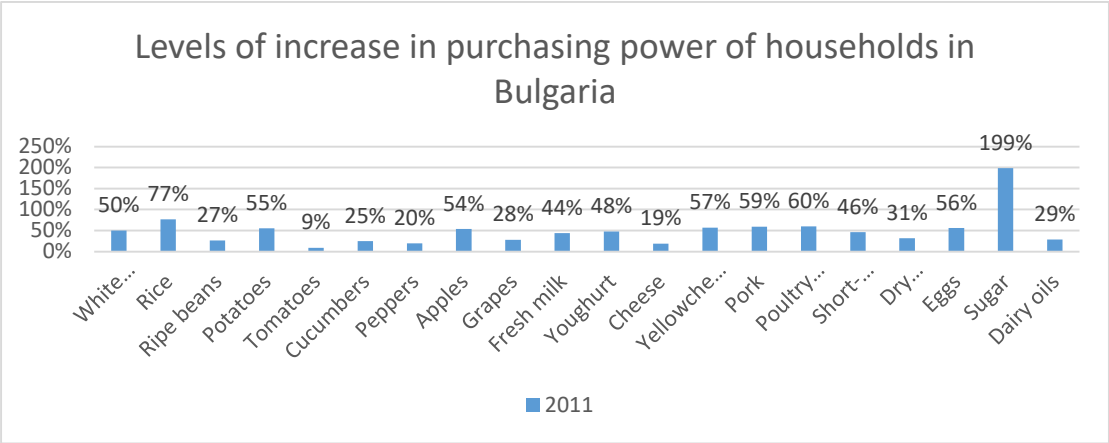


*Figure 6: Levels of increase in purchasing power of households in Bulgaria Source: Infostat, National Statistics Institute.*

- There is practically no food product that does not increase the purchasing power of Bulgarian households. The lowest reported increase in purchasing power was for tomatoes and was the only one below 10% at 9%.

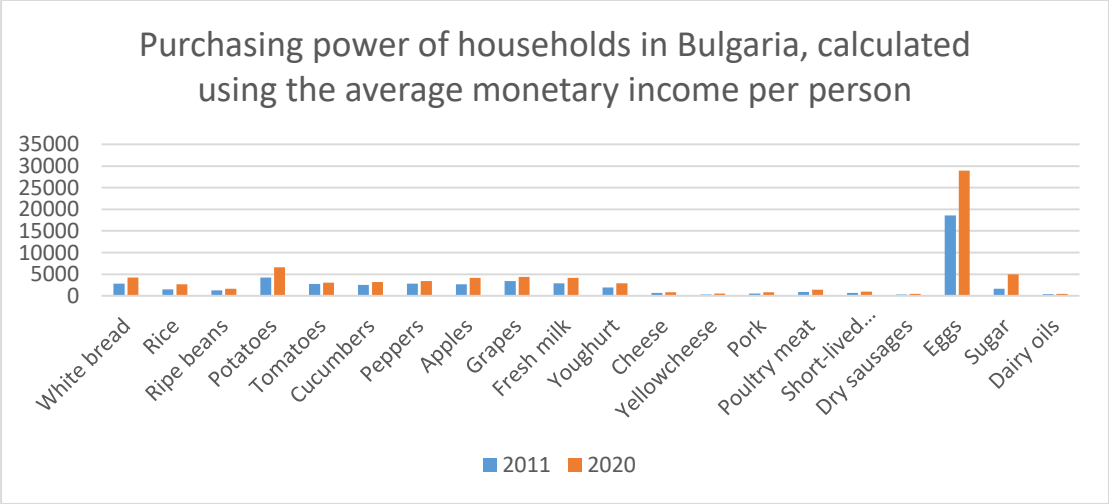




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*Figure 7: Purchasing power of households in Bulgaria, calculated using the average monetary income per person Source: Infostat, National Statistics Institute.*

- In view of the fact that the presented data are at the national level, methodological precision requires it to be noted that no direct conclusions can be drawn for the cross-border region based on them. On the other hand, it can reasonably be assumed that in view of the growth of the economy in all 4 areas of the cross-border region, the purchasing power of households there has also increased. The other reasonable assumption that can be made in the current analysis is that in the cross-border region the growth in purchasing power is likely not to follow the same pace and is slightly slower, as the GDP of individual districts and GDP per capita in the Cross-Border Region remain at lower than the national average. The increase in purchasing power is a fundamental factor that has a favorable influence on the development of the Agro-Food Sector. In practice, the increase in the purchasing power of Bulgarian households means that the scale of the market is increasing, which gives the companies from the Agro-Food Sector the opportunity to invest, to grow, to form new market niches, to expand, to generate larger profits and prosper.
- The analysis of the economic environment also examines the inflationary processes unfolding in the country. According to data from the National Statistical Institute (NSI) for the period 2011-2021, 3 years of deflation and 8 years of inflation are considered. Inflation in the researched period moved within moderate limits as the highest measured value was 4.22% in 2011, and the lowest was -1.42%. The average inflation for the period is equal to 1.7%, which indicates the sustainability of the economic system and processes in the country. In this


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sense, it can be stated once again that the inflation levels for the last 11 years have been stable. This finding is important in view of the historical processes in Bulgaria related to inflation, which know huge values of over 1000% average annual inflation. The introduction of a currency board in the country at the end of the 90s of the 20th century is among the policies that contributed to controlling the large-scale levels of inflation recorded in the past and is a guarantee that similar scenarios are excluded in the foreseeable future.

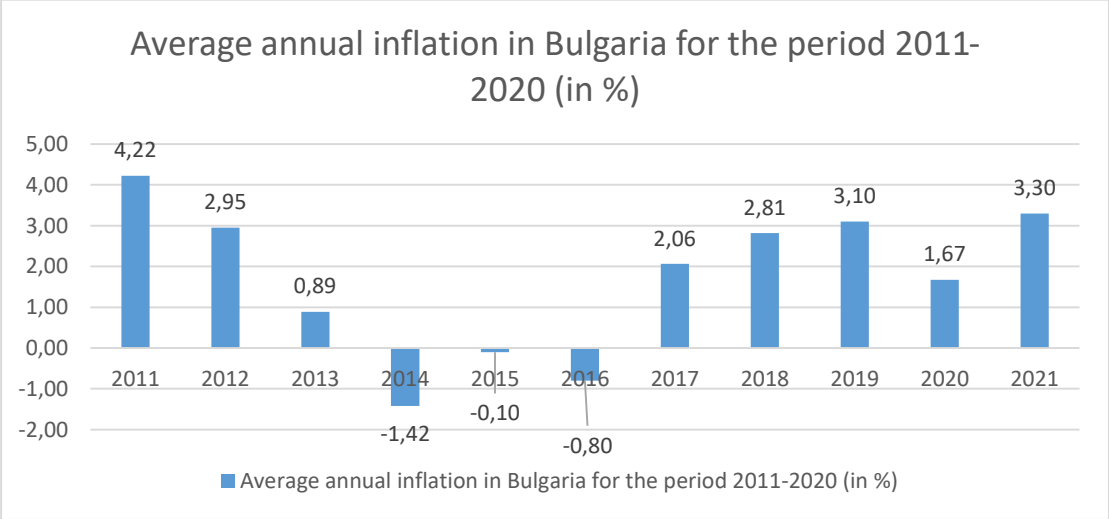


*Figure 8: Average annual inflation in Bulgaria for the period 2011-2020 (in %) Source: Infostat, National Statistics Institute*

— However, there is also a visible trend towards an increase in the prices of basic goods and services, both in Bulgaria and in Europe and the world. As a result of the pandemic and government policies to promote investments from country to country in various spheres of social and economic life on the one hand and the increase in fuel prices on the other, led to an increase in inflation, which is expected to continue this year as well. The current war in Ukraine is also a factor strongly affecting inflation,



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considering that both Russia and Ukraine are key producers of raw materials and agricultural products, among the leading producers of grain, and Russia in particular has a significant share in the production and export of energy resources , both for the EU and globally.

As can be seen from NSI data, the average annual inflation for 2021 is 3.3%, and the fact that the price of animal and vegetable oils and fats in 2021 increased by 21.3%, the price of bread and cereals makes a special impression food prices rose by 7.6%, and the price of gaseous fuels increased by 38.3%.

Rising inflation generates negative effects on the development of the Agro-Food Sector in several dimensions. On the one hand, the increase in the prices of goods directly affects the purchasing power of consumers, which is inevitably reflected in a drop in demand. In parallel with this, there are processes of increasing basic goods and services, which are directly related to an increase in production costs for economic entities from the agrarian-food sector in the cross-border region. This, in turn, creates conditions and prerequisites for slowing down the development and dynamics of economic life in the sector.

The penultimate element of the analysis of the economic environment is devoted to foreign direct investment in the Cross-Border Region. According to the data from the national statistics, an upward trend can be established, which is expressed in an increase in foreign direct investments in the cross-border region for the period 2014-2020.



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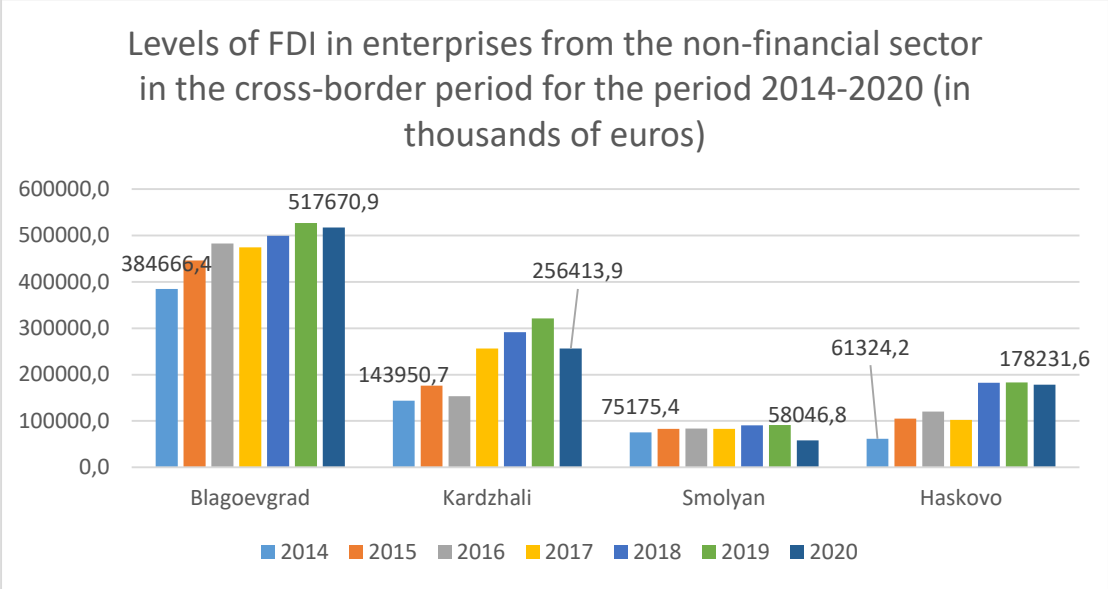


*Figure 9: Levels of FDI in non-financial sector enterprises in the Cross-Border Region for the period 2014-2020 (in thousands of euros) Source: Infostat, National Statistics Institute*

- An important stage of the analysis of the economic environment in which the agri-food sector operates consists in the analysis of the available economic incentives for the economic entities of the sector, with which the state leads a policy of promoting activity in this sphere of economic life. The first conclusions that can be drawn are that the share of Foreign Direct Investments (FDI) in the territory of the Cross-Border Region as of 2020 1) in general, FDI is directed mainly in the Blagoevgrad region, and least in the Haskovo region; 2) in general, the level of FDI in the Cross-Border Region is increasing compared to the beginning of the period (with the exception of the Smolyan region); 3) in 2020, on the territory of all regions, the share of FDI decreases.

  However, a more detailed analysis reveals the essence of the processes and trends taking place in terms of FDI levels. For example, it can be said that FDI by 2020 is



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growing in the cross-border region much faster than FDI in the country as a whole. (except Smolyan region). The data show that in 2014 the amount of FDI for the country was EUR 21,581,579.6 thousand, while in 2022 it increased to EUR 26,884,352.0 thousand, which is an increase of 25%. For the same period, FDI levels for Blagoevgrad region increased by 35%, for Kardzhali region by 78%, and for Haskovo region by as much as 191%.

Another interesting fact is that the total amount of FDI for the areas of the Cross-Border Region as of 2020 equals 1,010,363.2 thousand euros against 665,116.7 thousand euros in 2014. This means that the growth of FDI for the Cross-Border Region equals 52%.

As of 2019 (i.e. before the crisis caused by the COVID-19 pandemic), the data on FDI levels is even more positive. As of 2019, FDI levels in the country increased by 17% compared to 2014, while greater growth was observed everywhere in the Cross-Border Region - 37% in Blagoevgrad region, 123% in Kardzhali region, 21% in Smolyan region and 199 % in Haskovo region.

— The economic incentives that are presented to economic entities from the agrarian and food sector at the national level are implemented mainly through the "Program for the Development of Rural Areas" 2014-2020 (or Rural Development Programme – RDP), and the program will have its update for the period 2021-2027. Until now, the RDP has mainly concentrated on providing financing for the "livestock" and "plant breeding" sectors. The program is an instrument through which investments in agricultural holdings can be ensured for material assets,


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know-how, the increase of their competitiveness and their overall development. Another aspect of the support that is provided to economic entities from the agri-food sector consists in the restoration of the potential for agricultural production, which suffered damage as a result of natural disasters or catastrophic events, and the introduction of appropriate preventive measures. A fundamental part of the program are measures to promote organic farming, as well as those related to agro-ecological practices. The program also creates conditions for cooperation in the sector, through the measures to create groups and organizations of producers. The RDP also addresses the problems related to the humane treatment of animals by including measures to control the problem. In the period of its existence, the RDP became the main source of support for farmers in the conditions of the pandemic, when measures were implemented to support the economic entities most affected by the crisis. At present, the 2014-2020 RDP is still being implemented, while the 2021-2027 program is not yet in progress. It, for its part, is expected to continue and build on the efforts and results achieved in the previous two program periods.

- Another important instrument through which economic incentives are provided for the development of economic entities from the agrarian and food sector is the Operational Program "Innovations and Competitiveness" 2014-2020 (OPIC). It should be noted that through it, that part of the industries from the agrarian-food sector that does not carry out activities in the production and processing of food, etc., can receive financial support.


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Enterprises in the field of packaging and logistics industry, for example, can receive support under it. OPIC supports projects for the implementation of innovations (product, production, etc.), increasing energy efficiency, technological modernization and an overall increase in competitiveness.

- During the new programming period, the program will have a new name, namely "Competitiveness and Innovation in Enterprises" 2021-2027. The program is currently at the stage of public discussion, and from its working version it can be concluded that its profile will remain the same. The program will aim to achieve a more competitive and smarter Europe by promoting innovative and smart economic transformation and regional ICT connectivity, and will also, in line with EU policy, seek to achieve objectives that aim at a greener, low-carbon and sustainable Europe with a net-zero carbon transition economy by promoting a clean and fair energy transition, green and blue investments, circular economy, climate change mitigation and adaptation, prevention and risk management and sustainable urban mobility.
- The program for maritime affairs and fisheries, which is the main source of funding for the sector related to water and fisheries, has a minimal character for the development of the agro-food sector in the cross-border region, insofar as its main program is directed to the Black Sea region. Within the new programming period, it will be replaced by a new program – "Maritime, Fisheries and Aquaculture Programme", through which the already upgraded results are expected to be achieved.



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- In the short term, the state will also stimulate the sector through the tools and mechanisms of its "Recovery and Resilience Plan for Bulgaria". At this moment, it has not yet been approved, and its latest editions are being implemented in view of the recommendations of the EC. The plan includes a whole section dedicated to green policies and investments, and of particular importance for the Agro-Food Sector will be those related to the technological and ecological transformation of the agri-food sector and the overall improvement of the capacity of economic actors in the sector.
- Through the Fund for the Promotion of the Technological and Ecological Transition of Agriculture, investments will be made in several main areas. Supporting technological and environmental modernization and helping to strengthen the transition to a circular economy will be of key importance. Another aspect of the support is expected to be aimed at setting up centers for preparation for marketing and storage of fruits and vegetables. Through the possibilities provided by the Plan, activities for the construction/reconstruction and equipment of livestock facilities for breeding and evaluation of male breeding animals will be supported, including extraction of biological material from them and effective water management in agricultural holdings.

In conclusion, it can be noted that although there are crisis events and processes, the economic environment in which the agrarian-food sector operates favors the development of economic entities from the sector. The increasing trends in


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GDP and GDP per capita indicate the viability and upward trend of the economy both at the national level and in the cross-border region. It is established that inflation in the country is generally within moderate limits, but even if a certain increase occurs, the inflationary processes remain within controllable limits. Increasing purchasing power of a country's population is another factor that indicates the growth potential for companies in the sector. Although far from the country's record levels, FDI is increasing, which, apart from being a positive fact for the economy, gives reason to think that investors' faith in the country is growing. One cannot fail to note the fact that the state provides significant economic incentives for participation in economic life, which suggests the development of companies in the sector.

#### 4.1.2.3. Social Aspect

- A main group of factors that indicate the state of the social environment in a society are those related to demographic processes and trends. If the increase in purchasing power is a factor that gives reason to conclude that it is possible for the market for products that are produced within the Agro-Food Sector to increase, indicating the fact that consumers have more funds, then the analysis of the main demographic processes can give an answer to the question of how many people consume and will consume such products. It is necessary to specify that in both cases we are talking about the volume of the domestic market. In this sense, it can be stated that there are prerequisites for the internal market for the agrarian-food sector to shrink, insofar as the population of the country for the period 2010-2020 decreases by 8%, and


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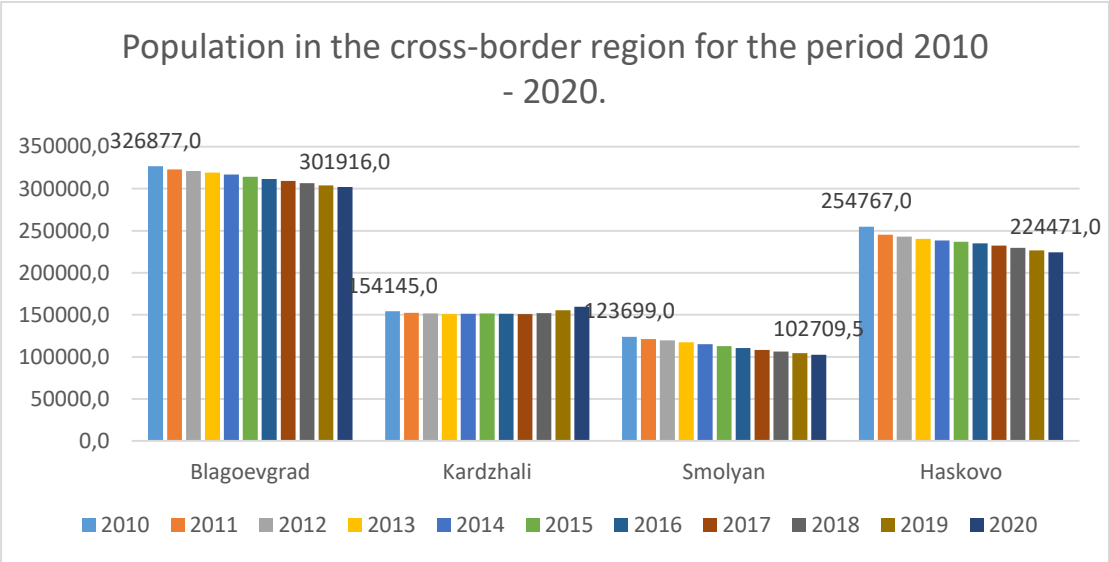
the population in the cross-border region decreases by 8.2% . In the Blagoevgrad region, the drop is 7.6%, while in the Haskovo and Smolyan regions, it exceeds 10% and equals 11.9% and 17%. For the researched period, only in the Kardzhali region, a population growth of 3.5% was observed.




*Source: Infostat, National Statistics Institute*

- The data for the population from the last NSI census, which are preliminary and referable to 2021, indicate that the population of the country as of 2021 is about 6.5 million people, which comes to show that the potential number of users is decreasing. In view of the increasing purchasing power of the population, on the other hand, no general conclusions can be drawn about the future development of the internal food market in terms of its volume.

  NSI data on birth rates (number of live births) at the national level also indicate negative demographic trends in the country, with the number of live births falling from 75,513 in 2010 to 59,086 in 2020 (a drop of almost 22%).



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- Another negative demographic process that is characteristic of the country is expressed in the number of Bulgarians emigrating abroad. In the period 2010-2020, there is only one year in which mechanical growth was positive. This shows that in only one of the eleven years under analysis was the number of people leaving the country less than the number of people entering it. As this year is 2020, this should in all probability be attributed to the COVID-19 Pandemic.
- The War in Ukraine is a factor that may contribute to the increase in the number of people living in the country, as a result of the arrival of many refugees, but this may be a temporary phenomenon, and at this point precise predictions in the medium and long term about how many of them will remain are not possible.
- In this sense, it can be stated that negative demographic trends have the potential to reduce the volume of the domestic market for the sector on the one hand, as far as it is absolutely realistic that over time the demand for some goods will decrease. This, in turn, can lead to a decrease in turnover and, in the last case, bankruptcies for some companies that are mainly oriented towards the domestic market. On the other hand, negative demographic trends can contribute to the so-called "hunger for personnel", which is one of the main problems facing many companies in the country. In this sense, these processes contribute to reducing the competitiveness of and impossibility to realize the full potential of companies from the agrarian-food sector.
- There are not many factors that attract the population within the districts in the cross-border region. For example, the NSI


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data for the average gross monthly salary (including annual premiums) for 2021 give reason to register the fact that in the areas of the cross-border region the average gross monthly salary is among the lowest in the country. Kardzhali District is the most advanced of all 4 regions - 20th place (out of 28 regions), while Haskov, Smolyan and Blagoevgrad regions occupy 24th, 25th and 26th place in the country. The values of the average gross monthly salary in the district of Haskovo, Smolyan and Blagoevgrad are extremely close to those of the district of Vidin, which is among the poorest districts not only in Bulgaria, but also in the entire EU, equaling BGN 1,158.00 for Haskovo District, BGN 1,144.00 for Smolyan District, BGN 1,139.00 for Blagoevgrad District. For comparison, the highest value of the average gross monthly salary was recorded in the Sofia region (the capital) and is equal to BGN 2,314.00. The value measured in Sofia is 45% higher than in the Kardzhali region, by 50 % higher than Haskovo district and 51% higher than Smolyan and Blagoevgrad Districts.

- Another aspect that can be a starting point for attracting population is the educational infrastructure and in particular the networks of prestigious higher education institutions in the cross-border region. The most recognizable ones are located in the city of Blagoevgrad and these are Southwestern University "Neofite Rilski" and "American University in Bulgaria". Apart from this, no other educational institutions of this scale can be distinguished (there are only some branches in Smolyan and Kardzhali), which comes to emphasize that the educational infrastructure within the Cross-Border Region is not sufficiently well developed. This fact combined with other accruals such as income level etc.


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suggests that future students should primarily choose to study in universities located in better economically developed settlements, including and in Europe.

- Apart from the analysis of demographic factors, the importance of some socio-cultural factors, which determine the state of the Agro-Food Sector to a certain extent, should be emphasized. The main such factor is objectified in the culturally distinct tradition of the Bulgarian population for the cultivation of certain agricultural plantations. The practices of growing agricultural crops are integrated into the life of the Bulgarian population, but the fact that they also have an economic nature should not be overlooked. In villages, small towns and underdeveloped regions, this phenomenon continues to exist to this day, as the main agricultural crops that are grown are potatoes, tomatoes, beans, cucumbers, peppers, etc. vegetables. Fruit growing is also popular, as the cultivation of cherries, peaches, apricots, and plums is particularly widespread in the country. From the perspective of the Agro-Food Sector, this is important because not the entire population is included in the market, as people who grow their own crops resort either rarely or not at all to market goods. To date, the presence of population concentration trends in large and developed economic centers in the country and the abandonment of villages as a preferred place to live expands the market of food products and gives reasons for the rise of the Agro-Food Sector, because on the one hand the size of production for own consumption decreases, and on the other hand, the purchasing power of the population, which is engaged in companies in the country's developed cities, increases.


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In conclusion, it can be noted that at the current level of purchasing power, demographic trends in the country create conditions for shrinking the grocery market in view of a declining population. With a more substantial increase in the purchasing power of the population, the market for foodstuffs and products is expected to expand significantly, especially for goods with a higher added value. In addition, the general economic and social development of the Cross-Border Region is not a prerequisite for increasing the population in its territory. On the other hand, the negative demographic processes also play a positive role in the development of the Agro-Food Sector, in a different sense, inasmuch as with the process of depopulation of the villages, the population grows agricultural crops to a lesser extent and becomes dependent on the production of the economic actors operating in the market.

#### 4.1.2.4. Technological Aspect

The analysis of the technological environment in which the Agro-Food Sector operates in the Cross-Border Region is simultaneously revealed as an analysis of the technological security and as possible prospects for the development of the sector.

- The first and most characteristic thing with which the technological environment in Bulgaria should be distinguished is in relation to the digitization of the economy. In this sense, it should be noted that the country is in the process of digitizing its economy, and this is one of the priorities of the current government. At the moment, no major successes can be reported in this direction, considering the fact that for 2020, Bulgaria is in last place in the EU in terms of digitalization of the economy, according to the index Digital


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Economy and Society Index (DESI) . In this sense, the technological environment is expected to be dominated by digitization processes, which will inevitably affect the Agro-Food Sector as well.

- On the other hand, technological progress allows technologies and processes to be implemented, as according to data from one of the largest portals for agriculture (agri.bg) among the most significant innovations in agriculture machine learning, IoT sensors, automation, electronic document flow and drones can be mentioned, and the information portal gives information about each of them, which is applied here.
- Promoting the use of drones in industrial agriculture to patrol especially within large agricultural areas has the potential to contribute to detecting problems in relation to arable land in relation to drought areas for example. Other advantages of this technology allow drones to irrigate self-grown crops and also assess plant health. The operation of drones also provides additional opportunities for analyzing areas where crops grow better or worse, which suggests optimizing their care and improving harvests in the long term.
- Autonomous tractors provide another technological opportunity to optimize the activity, especially for industrial farms. With them, agricultural land can be cultivated practically without human intervention. This type of tractor can sow and harvest by itself. In addition, they can take photos and other innovative activities compared to current technologies, such as conducting aerial survey of lands, creating 3D models, as well as thermal imaging and laser


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scanning. The human factor in the use of these technologies comes down to setting the tractor's work program.

- Within a brief conclusion, the main benefits of the use of unmanned devices can be drawn - they enable farmers to optimize the weak points, in the context of agricultural activity, such as the poor condition of individual participants from the lands, the deterioration of the condition of individual perimeters from the crops sown, maximizing crop yields and comprehensive screening of produce and resources for its production. The useful life of such assets is generally long, suggesting that they can be a long-term investment. Another positive aspect of the activity of these technologies consists in the fact that they can drastically reduce production costs, the automation of certain dimensions of the labor process will lead to a reduction in personnel, which is a negative fact from the point of view of employment.
- On the other hand, machine learning is another innovation that can be implemented in the activities of business entities from the Agro-Food Sector. By exploiting artificial intelligence that functions with the help of neural networks. to collect various data, carry out a process of analysis and synthesis based on them and create, findings, conclusions and recommendations about the production process, better economic results can be achieved in each farm.

  Such an approach is being used in Australia, where machine learning is being used to make coffee crop predictions. By collecting a lot of data for the artificial intelligence technology, it becomes possible to make analyzes of the mineral composition and temperature of the soil layers, as well as the climate.


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Machine learning also makes it possible to develop new varieties more quickly, and also to predict their performance levels in different conditions. This means that at an early stage it is possible to diagnose the various diseases that may affect certain crops and take measures to optimize the production process.

- An important technological point is the integration of IoT (Internet of Things) sensors into the activities of business entities from the Agro-Food Sector. They are a network of smart devices, the purpose of which is dedicated to the collection of various data (for example, on the weather, on the condition of the soil, etc.) and indicators that can be the basis for the preparation of analyzes and forecasts. Another of their functions can be revealed in greenhouses, where these smart device enclosures can independently regulate crop development factors such as temperature, humidity and irrigation.

  In addition, the sensors predict the production volume. This enables farmers to better plan product distribution. When they know exactly how much harvest to expect, I can make an effort to realize it completely without loss.

- Agricultural automation processes also play an important role in improving the potential of agricultural holdings. Automated machines can carry out weeding activities in the sown areas, and in addition they can harvest. A major advantage in this regard is that this also applies to delicate crops, for which human resources are usually used, an undertaking that is on the one hand more expensive and on the other takes more time.


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- Another positive of this type of technology is expressed in its ability to monitor quality factors of agricultural production such as temperature, humidity, etc., which may lead to deterioration of its quality and the consequences of this such as price reduction and/or destruction. In this sense, this type of technology is in favor of reducing economic losses.

  The leading trend is also the introduction of processes and systems for electronic document circulation in agricultural holdings, to replace the analog model of work expressed in the accumulation of countless folders and paper.
- Another important information portal in our country (agrohub.bg) also presents other innovative technologies in agriculture that have been implemented or are in the process of being integrated and that reveal prospects for the development of the sector. The technologies that can be implemented by business entities from the agro-food sector are not limited to production technologies, but also to the economic efficiency of business process management technologies.
- Digital data analytics systems for agribusiness development in Finland, for example, are aimed at achieving results that benefit "farmers having access to a smart data management service where they can download different types of fields data and get automated analytics and visualizations. Farmers will have access to information about soil and nutrient changes as a result of these analyses. "
- Another innovative solution to problems specific to the agri-food sector regarding viable pastures with optimized phosphate fertilization aims to "optimize fertilizer use in


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pastures by using sensor-based, remote sensing data to assess pasture nutrient needs and use of variable speed fertilizer spreading technology." As a result of the development of such technology, it is expected that a technological method will be available to farmers that will generate maps that will be of high resolution and will include specific prescriptions for phosphate fertilization. This will lead to positive effects in terms of pasture productivity and also reduce fertilizer costs and pressure on the environment, as they will address the fertilization process only to the places where it is needed.

- In Germany, there is a technological solution to provide precision irrigation as a measure to preserve the value of the land in Germany. In addition to being an effective tool, in the context of the development of the sector, the positive effect regarding the optimal use of water as a resource and the reduction of pressure on the environment is visible. With such a decision, the aim is to implement cost-effective approaches to take into account the actual water needs of crops. To the extent that such type of systems work automatically, optimization of labor costs is ensured.
- As can be seen, technological modernization and the introduction of technologies based on innovation strongly influence the development of the Agro-Food Sector, creating opportunities to increase yield and reduce production costs, which also affects the prices of the food that is produced. In this sense, the promotion of innovation activity of enterprises is a vital development for the sector. It is for this reason that the process of patenting innovations in Bulgaria needs to be made more accessible to economic agents,


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lighter and more productive, as at the moment there are certain difficulties in terms of administrative burden, speed, and also information deficits of the companies themselves regarding it.

In conclusion, it should be noted that although many technologies are available to help optimize the work of economic entities from the Agro-Food Sector, their presence is undoubtedly a plus if they are not purchased and put into operation. Insofar as the technologies available in the sector, based on innovations, can contribute to a qualitative change within the production process, neglecting them (i.e. the lack of exploitation of such technologies) can lead economic entities from the Agro-Food Sector to a state of lack of competitiveness. In this sense, the use of such technologies can lead to improved market positions of manufacturers. Here it should be kept in mind that the balance between the pursuit of sustainable development and the improvement of market positions through new technologies and innovations is quite delicate.

#### 4.1.2.5. Legal Aspect

The analysis of the legislative environment in which the Agro-Food Sector operates must invariably note that there is an extremely complex network of legal acts that regulate the activities of economic entities from the sector.

In this sense, it is necessary to make a basic distinction between the legal norms that influence the activity of the sector. On the one hand, they are internal to business entities and regulate the functioning of the business. In this sense, these norms can be described as general rules, values, ethical norms, corporate ideology ("green" policy, for example) and others, which, in formal and


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informal ways, regulate the activities of business entities from the sector. As the present analysis concentrates on the "sector" level, the individual practices in the enterprises of the agri-food sector are not a priority for it and will not be considered in detail.

On the other hand, there are the legal regulations external to the sector. The regulatory framework that defines the activity of the Agro-Food Sector is constructed on 3 levels.

- At the highest level is the legislative framework at the European level, which with all its regulatory complexity defines the conditions under which the Agro-Food Sector can function. Bulgaria, as a member of the EU, is subject to European legislation and is obliged to apply the general legal acts of the Union, including the current regulations, directives, etc.
- The second level of the normative framework is objectified mainly in the legislation at the national level and in particular in the national laws. The legal framework at the national level is supplemented mainly by decrees of the Council of Ministers, which derive from and are secondary to the laws in force in the country.
- The third main point in which the normative basis for economic actors from the agrarian-food sector is concentrated is the legislation at the local level. Municipalities on the territory of the Republic of Bulgaria create ordinances that regulate the activities of both natural and legal persons, including and representatives of the Agro-Food Sector.


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It is important to note that due to the specific administrative structure and the lack of administratively separated regions at the NUTS2 level of the country, there is no legal framework to regulate at the regional level.

The regional administrative structures in the country are the so-called "Regional Development Councils" whose functions have more of a consultative nature and as a guidance in the policy implementation.

#### 4.1.2.5.1 Legislation in force at EU level

The legislative basis that regulates the activity of the Agro-Food Sector at the European level is large-scale in nature, objectified in numerous normative acts - EU treaties, regulations, directives, decisions, recommendations, opinions, delegated and implementing acts, etc. The normative framework that is the subject of analysis can be divided into 2 main groups. The first group includes legal acts that are directly related to the activities of economic entities from the Agro-Food Sector on the territory of the Cross-Border Region, such as the legal acts aimed directly at the field of agriculture and food safety, as well as the field of fisheries and aquaculture . The second group includes the normative acts that regulate the rules in fields such as economics and finance, environmental protection and climate change, trade, employment, scientific research and innovation, etc.

In view of the scale of the entire Agro-Food Sector on the one hand and the multidimensionality of the regulatory framework at the European level on the other hand, the present analysis


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will present the main legal acts that are relevant to the activity of the Agro-Food Sector on the territory of the Cross-Border Region in Bulgaria. Each one of them represents a significant factor in the legislative environment, which has an impact on the activity of economic entities from the Agro-Food Sector and whose change can lead to both improving the conditions for the development of the sector and to the occurrence of less favorable ones.

The main document regarding the common organization of agricultural markets in the EU is Regulation (EU) No. 1308/2013 – common organization of the markets in agricultural products. The area of the agricultural and food supply chain – is regulated by Directive (EC) 2019/633 on unloyal trade practices (UTPs) in the agrifood supply chain. The future of the common agricultural policy in the Union is defined by the Communication (COM(2017) 713 final) — The future of food and agriculture; Article 39 of the Treaty on the Functioning of the European Union (TFEU) as well as Article 40 of the Treaty on the Functioning of the European Union (TFEU).

In view of the fact that agriculture is a part of the economy that is subsidized, it is reasonable for the regulatory framework at the European level to cover those aspects that are directly related to the activity of the agri-food sector. The main legal acts that can be inferred are presented as follows:

- Regulation (EU) No. 228/2013 on determining specific measures for agriculture in the outermost regions of the Union;


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- Regulation (EU) No. 1307/2013 — rules for direct payments to farmers under the EU's common agricultural policy;
- Regulation (EU) No. 1144/2014 — Information and promotion measures related to agricultural products;
- Regulation (EU) No. 1306/2013 on the financing, management and monitoring of the common agricultural policy;
- Regulation (EU) No. 1370/2013 establishing measures for the determination of certain aids and refunds related to the common organization of agricultural product markets;
- Strategy of the European Union for forests and the forestry sector;
- Regulation (EC) No. 1469/95 — measures to be taken against certain beneficiaries of operations financed by the "Guarantee" section of the European Agricultural Guidance and Guarantee Fund (EAGF);
- Regulation (EU) No. 2018/848 - rules on organic production and labeling of organic products.

The regulatory framework regarding agricultural products is objectified in the following specific points:

- Commission Communication — EU Best Practice Guidelines for Voluntary Certification Schemes for Agricultural Products and Food;
- Council Regulation (EC) No. 834/2007 on organic production and labeling of organic products;
- Regulation (EU) No. 1151/2012 on quality schemes for agricultural products and food;



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- Regulation (EC) No. 251/2014 — definition, description, presentation, labeling and legal protection of geographical indications of aromatized wine products;
- Directive 2008/90/EC — marketing of planting material from fruit plants and fruit plants intended for fruit production;
- Directive 2002/53/EC on the general catalog of varieties of agricultural plant species;
- Geneva Act of the Lisbon Agreement on Appellations of Origin and Geographical Indications;
- Regulation (EC) No. 889/2008 laying down detailed rules regarding organic production, labeling and control;
- Regulation (EU) No. 642/2010 on the rules for implementing Council Regulation (EC) No. 1234/2007 (import duties in the cereal sector);
- Regulation (EU) No. 589/2008 — standards for trade in eggs;
- Regulation (EEC) No. 2568/91 on the characteristics of olive oil and olive oil from residual material and the relevant methods of analysis;
- Message: A Farm to Fork Strategy for a Fair, Healthy and Sustainable Food System.

The development and exploitation of genetically modified organisms (GMOs) are also processes that have led to the creation of a regulatory framework to regulate relations in the field. In this sense, the main legal acts are presented as follows:

- Regulation (EU) No. 1946/2003 — transboundary movement of genetically modified organisms;


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- Regulation (EC) No. 1829/2003 on genetically modified food and feed;
- Directive 2009/41/EC concerning work with genetically modified microorganisms in controlled conditions;
- Communication (COM(2015) 176 final) — overview of the decision-making process on genetically modified organisms (GMOs);
- Regulation (EC) No. 1830/2003 on the tracing and labeling of genetically modified organisms (GMOs) and the tracing of food and feed from genetically modified products;
- Directive 2001/18/EC on the deliberate release of genetically modified organisms into the environment;
- Regulation (EC) No. 65/2004 of the Commission on uniform identifiers for genetically modified organisms;
- Implementing Decision 2011/884/EU — emergency measures in relation to unauthorized genetically modified rice in rice products originating in China;
- Directive (EU) 2015/412 — regarding the possibility for EU countries to restrict or prohibit the cultivation of genetically modified organisms on their territory.

Activities related to the use of pesticides and fertilizers are also regulated. In this regard, the main legal acts that are available can be presented as follows:

- Directive 86/278/EEC of the Council for the protection of the environment, and in particular of the soil, when using sewage sludge in agriculture;
- Regulation (EC) No. 396/2005 regarding the maximum permissible limits of pesticide residues in and on food or feed of plant or animal origin;


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- Regulation (EC) No. 1107/2009 — placing on the EU market of plant protection products;
- Directive 91/676/EEC on the protection of water from nitrate pollution from agricultural sources;
- Regulation (EC) No. 1610/96 — certificate for additional protection of plant protection products;
- Regulation (EC) No. 469/2009 — certificate for additional protection of medicinal products;
- Directive 2009/128/EC — EU action to achieve sustainable use of pesticides;
- Regulation (EU) No. 528/2012 on the placing on the market and use of biocides;
- Regulation (EU) 2019/1009 — setting rules for the supply of fertilizing products to the EU market;
- Regulation (EU) 2019/1021 on persistent organic pollutants;
- Regulation (EC) No. 2003/2003 on fertilizers

The food safety policy is regulated by a regulatory framework in several main areas - plant health, food, animal health. The key normative acts in these spheres overlap with those already mentioned (in particular, this includes the normative acts related to GMOs and those in the field of pesticides and fertilizers, as well as others). In addition to them, the following legal acts can be added:

- Regulation (EC) No. 1895/2005 — restriction of the use of certain epoxy derivatives used for the production of materials and articles intended for contact with food;
- Regulation (EC) No. 1935/2004 — materials and articles intended for contact with food;


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- Regulation (EU) 284/2011 — conditions and procedures for the import of plastic kitchen utensils and utensils from China and Hong Kong;
- Regulation (EC) 450/2009 — active and intelligent materials and articles intended for contact with food;
- Directive 2007/42/EC on materials and articles made of regenerated cellulose film intended to come into contact with food;
- Commission Regulation (EC) No. 2023/2006 — good manufacturing practice for materials and articles intended to come into contact with food;
- Regulation (EC) No. 282/2008 on recycled plastic materials and articles intended to come into contact with food;
- Regulation (EU) No. 10/2011 on plastic materials and articles intended to come into contact with food;
- Directive 2007/45/EC laying down rules for nominal quantities for prepackaged products;
- Stockholm Convention on Persistent Organic Pollutants;
- Decision 2006/507/EC — conclusion on behalf of the European Community of the Stockholm Convention;
- Directive 2009/32/EC of the European Parliament and of the Council of 23 April 2009 on the approximation of the laws of the Member States regarding extraction solvents used in the production of food and food ingredients;
- Regulation (EU) 2017/852 — protection of human health and the environment from exposure to mercury and mercury compounds;
- Regulation (EU) 2017/644 determining sampling and analysis methods for the purposes of controlling the


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content of dioxins, dioxin-like PCBs and non-dioxin-like PCBs in certain foods;

- Regulation (EU) 2015/705 laying down sampling methods and performance criteria for methods of analysis for the purposes of official control of the quantities of erucic acid in foodstuffs;
- Regulation (EC) No. 333/2007 on determining the methods of sampling and analysis for the control of the content of trace elements and pollutants in food processing;
- Regulation (EC) No. 401/2006 establishing sampling and analysis methods for the official control of mycotoxin levels in food;
- Regulation (EEC) No. 315/93 — EU procedures on contaminants in food;
- Regulation (EC) No. 1881/2006 on determining the maximum permissible amounts of certain contaminants in food;
- Regulation (EU) 2017/2158 — mitigation measures and reference levels to reduce the presence of acrylamide in food products;
- Regulation (Euratom) 2016/52 — maximum permissible levels of radioactive contamination of food and feed following a nuclear accident or other case of a radiation emergency;
- Council Decision 1999/879/EC — placing on the market and method of use of bovine somatotrophin (BST);
- Directive 96/22/EC — prohibition of the use of certain substances with hormonal or thyrostatic action and of beta-agonists in animal husbandry;



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- Communication (COM(2011 748 final) — Action plan against the growing dangers of antimicrobial resistance;
- Recommendation 2002/77/EC on the use of antimicrobial drugs in medicine;
- Communication (COM(2017) 339 final) — combating antimicrobial resistance;
- Regulation (EC) No. 2073/2005 on microbiological criteria for food;
- Regulation (EC) No. 852/2004 on food hygiene;
- Regulation (EC) No. 853/2004 on setting specific hygiene rules for food of animal origin;
- Directive 1999/2/EC on the irradiation of food and food ingredients;
- Implementing Decision (EU) 2019/300 establishing a common crisis management plan in the field of food and feed safety;
- Directive 2002/53/EC on the general catalog of varieties of agricultural plant species;
- Directive 66/401/EEC on trade in fodder seeds;
- Directive 66/402/EEC on trade in cereal seeds;
- Directive 2002/57/EC on trade in seeds of oil and fiber crops;
- Directive 2002/56/EC on trade in potato planting material;
- Directive 2002/54/EC on trade in beet seeds;
- Commission Recommendation 2013/99/EC of 19 February 2013 on a coordinated control plan to detect the spread of fraudulent practices in the trade of certain products;
- Directive 2001/82/EC — EU code for veterinary medicinal products;


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- Communication (COM(2000) 1 final) on the precautionary principle;
- Regulation (EU) 2021/690 establishing a program for the internal market, competitiveness, including small and medium-sized enterprises (SMEs), the field of plants, animals, food and feed, and European statistics (Single Market program);
- Directive 2002/55/EC on trade in seeds of vegetable crops;
- Regulation (EU) 2017/625 — official control within the agri-food chain;
- Regulation (EU) 2019/6 on veterinary medicinal products and repealing Directive 2001/82/EC;
- Council Directive 2001/110/EC of December 20, 2001 on honey.
- Regulation (EC) No. 66/2010 on the EU Ecolabel;
- Council Directive 2001/113/EC of 20 December 2001 on fruit jams, jellies and marmalades and sweetened chestnut puree intended for human consumption;
- Directive 2011/91/EC on indications or markings identifying the lot to which a food belongs;
- Directive 1999/4/EC of the European Parliament and of the Council of February 22, 1999 on coffee extracts and chicory extracts;
- Regulation (EC) No. 1169/2011 on the provision of food information to consumers;
- Regulation (EC) No. 1760/2000 — EU system for the identification and registration of bovine animals and on the labeling of beef and beef products;


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- Directive 89/108/EEC on deep-frozen foods for human consumption;
- Directive 2001/112/EC on fruit juices and certain similar products intended for human consumption;
- Regulation (EC) No. 1925/2006 — rules regarding the addition of vitamins, minerals and certain other substances to food;
- Directive 2002/46/EC — food additives;
- Directive 2009/54/EC — exploitation and marketing of natural mineral waters;
- Regulation (EU) No. 115/2010 — use of activated aluminum oxide to remove fluoride from mineral waters;
- Regulation (EU) 2016/127 supplementing Regulation (EU) No. 609/2013 with regard to specific requirements for the composition and provision of information on infant formula and follow-on formula and with regard to information requirements related to infant feeding and small children;
- Regulation (EU) 2016/127 supplementing Regulation (EU) No. 609/2013 with regard to specific requirements for the composition and provision of information on infant formula and follow-on formula and with regard to information requirements related to infant feeding and small children;
- Regulation (EU) No. 609/2013 on foods intended for infants and young children, foods for special medical purposes and substitutes for whole-day food intake for body weight regulation;
- Delegated Regulation (EU) 2016/128 to supplement Regulation (EU) No. 609/2013 — the specific requirements


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for the composition and provision of information on foods for special medical purposes;

- Regulation (EC) No. 1924/2006 on nutrition and health claims for foods;
- Regulation (EC) No. 1331/2008 establishing a common authorization procedure for food additives, food enzymes and food flavorings;
- Regulation (EU) 2019/1381 on the transparency and sustainability of EU risk assessment in the food chain;
- Regulation (EC) No. 1334/2008 on flavorings for use in or on food;
- Regulation (EC) No. 1332/2008 on enzymes in food;
- Regulation (EC) No. 1333/2008 — food additives;
- Regulation (EC) No. 2065/2003 — smoke flavorings for food;
- Regulation (EU) 2015/2283 on novel foods;
- Implementing Regulation (EU) 2019/1715 — rules for the functioning of the information management system regarding official control and its components (IMSOC Regulation);
- Regulation (EU) 2016/429 on infectious animal diseases;
- Directive 2003/99/EC on monitoring and animal diseases and infections;
- Regulation (EU) 2019/4 on the production, placing on the market and use of medicated feed;
- Regulation (EC) No. 999/2001 on defining rules for the prevention, control and eradication of certain transmissible spongiform encephalopathies;


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- Регламент (ЕО) № 2160/2003 regarding the control of Salmonella and other specific zoonotic agents present in the food chain;
- Directive 2008/120/EC — minimum standards for the protection of pigs;
- Directive 2007/43/EC — minimum rules for the protection of chickens reared for meat production;
- Directive 98/58/EC — the protection of animals kept for agricultural purposes;
- Directive 1999/74/EC — minimum requirements for the protection of laying hens;
- European Convention for the Protection of Animals Raised for Agricultural Purposes;
- Protocol to amend the European Convention for the Protection of Animals Raised for Agricultural Purposes;
- Decision 78/923/EEC on the conclusion of the European Convention for the Protection of Animals Raised for Agricultural Purposes;
- Decision 92/583/EEC concerning the conclusion of the Protocol amending the European Convention for the Protection of Animals kept for Agricultural Purposes;
- Decision (EU) 2017/436 — on signing the Agreement between the EU and Chile on trade in organic products;
- Decision (EU) 2017/2307 — conclusion of an Agreement between the EU and Chile on trade in organic products;
- Agreement between the EU and Chile on trade in organic products;
- Directive 2008/119/EC — minimum standards for the protection of calves;



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- Council Regulation (EC) No. 1255/97 on EU criteria for staging points and on the amendment of the route plan for the transport of animals;
- Regulation (EC) No. 1/2005 on the protection of animals during transport and related operations;
- Regulation (EC) No. 1099/2009 on the protection of animals during killing;
- Directive 1999/22/EC concerning the keeping of wild animals in zoos;
- Directive 2010/63/EU on the protection of animals used for scientific purposes;
- Regulation (EC) No. 1223/2009 on cosmetic products;
- Regulation (EU) 2016/1012 — zootechnical and genealogical conditions for breeding, trade and introduction into the EU of purebred breeding animals, hybrid breeding pigs and their germinal products;
- Directive 90/428/EEC on the trade in equine animals intended for competition and the determination of the conditions for participation in these competitions;
- Directive 89/384/EEC;
- Regulation (EC) No. 1069/2009 establishing health rules regarding animal by-products and derived products not intended for human consumption;
- Regulation (EC) No. 1007/2009 on trade in seal products;
- Directive 2002/32/EC on undesirable substances in animal feed;
- Regulation (EC) No. 183/2005 — feed hygiene requirements



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The main applicable regulations for the agri-food sector, which fall into the sphere of fisheries and aquaculture, are the following:

- Regulation (EC) No. 1005/2008 — EU system to prevent, deter and eliminate illegal, undeclared and unregulated fishing;
- Regulation (EU) No. 1379/2013 — organization of the markets of fishing and aquaculture products;
- Regulation (EU) No. 1380/2013 on the common fisheries policy;
- Regulation (EU) No. 508/2014 — European Maritime and Fisheries Fund;
- Regulation (EU) No 717/2014 on the application of Articles 107 and 108 of the Treaty on the Functioning of the European Union (TFEU) to De Minimis aid in the fisheries and aquaculture sector'
- Regulation (EU) No 702/2014 on declaring certain categories of aid in the agriculture and forestry sectors and in rural areas compatible with the internal market in application of Articles 107 and 108 of the TFEU'
- Regulation (EU) No 1388/2014 declaring certain categories of aid — for undertakings producing, processing and marketing fishery and aquaculture products — compatible with the internal market pursuant to Articles 107 and 108 of the TFEU'
- Regulation (EU) No. 1408/2013 on the application of Articles 107 and 108 of the TFEU to De Minimis aid in the agricultural sector;



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- Regulation (EC) No. 708/2007 — use in aquaculture of alien and non-local species;
- Regulation (EC) 2021/92 fixing for 2021 the fishing opportunities for certain fish stocks and groups of fish stocks applicable in Union waters and for Union fishing vessels in certain non-Union waters

In conclusion, it can be said that the regulatory framework that regulates the rules by which business entities from the agri-food sector can operate is extremely complex and comprehensive. The high level of regulation that is observed implies that the economic agents from the Agro-Food Sector in the Cross-Border Region must comply with numerous rules and requirements in the course of their economic activity. From the point of view of the analysis, this is important, because it emphasizes the importance of the legislative environment, insofar as the factors that can influence the economic process are numerous in nature and character, which comes to emphasize the importance of this sphere.

#### 4.1.2.5.2 Legislation in force at national level

In general, it can be noted that the legislation at the national level regulates 6 main aspects regarding the functioning of the Agro-Food Sector. In this sense, agro-food regulation is established in the spheres of the tax system and trade, environmental protection, the protection and exploitation of biological resources, the exploitation of land and other property, as well as in relation to labor rights. The 6 groups listed in the present analysis are conditionally grouped and defined, and the purpose of this analytical operation is to



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show where the agrarian-food sector is most strongly regulated by legislation.

- On the one hand, national legislation regulates the economic aspects regarding the functioning of the sector, which are related to taxes, trade, etc. In this group, the following normative acts can be cited most conditionally:
  - Law on personal income taxes;
  - Value Added Tax Law;
  - Electronic Commerce Law;
  - Law on corporate income taxation;
  - Law on interest on taxes, fees and other similar state receivables;
  - Law on local taxes and fees;
  - Duty Free Trade Law;
  - Commercial Law;
  - Consumer Protection Act;
  - Law on Patents and Registration of Utility Models;
  - Grain Storage and Trading Act.
- Another major group of laws is aimed at protecting the environment. In this sense, legislation regulates the economic process by defining specific obligations, including and of economic entities from the Agro-Food Sector for the protection of the environment. The following laws can be mentioned as the main normative acts in this:
  - Закон за отговорността за предотвратяване и отстраняване на екологични щети;
  - Environmental Protection Act;


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- Law on the purity of atmospheric air;
- Law on waste management;
- Law on protection against the harmful effects of chemical substances and preparations;
- Environmental noise protection law;
- Law on responsibility for the prevention and removal of environmental damage;

— Another aspect of the regulatory structure in which economic entities from the agri-food sector operate comes to show that the state has built a legislative framework regarding the main biological resources that are part of the economic cycle. The exploitation and protection of water, forests, animals, plants, etc. is regulated. In this sense, the fundamental normative acts at the national level in this direction are presented as follows:

- Biodiversity Act;
- Water Law;
- Law on Forests;
- Animal Husbandry Law;
- Animal Protection Act;
- Plant Protection Act;
- Law on Medicinal Plants;
- Oil Rose Law;
- Law on Genetically Modified Organisms;
- Law on the Protection of New Varieties of Plants and Animal Breeds;
- Law on soils;
- Law on seed and planting material;
- Law on fisheries and aquaculture;


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- Beekeeping Law;

- The exploitation of lands and the ownership of economic entities from the agrarian-food sector is also subject to regulation, by means of the following laws:
  - Law on municipal property;
  - Law on protection of agricultural lands;
  - Law on protection of agricultural property;
  - Law on lease in agriculture
  - Property Law;
  - Law on the ownership and use of agricultural lands.
- A fundamental part of the regulatory framework that defines the activity of the agri-food sector in our country in terms of the production that is generated by it. In this direction, the leading laws making up the regulatory framework are presented as follows:
  - Food Law;
  - Law on wine and spirits;
  - Law on tobacco and tobacco products;
  - Law on fodder;
  - Food Law;
  - Law on technical requirements for products
- An important part of the regulatory framework, which regulates the activity of business entities from the agrarian-food sector, is objectified in labor legislation through the Law on regulating certain labor and insurance rights of Bulgarian citizens; The Law on Protection from Discrimination, etc.


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- As another important law, although outside the scope of the classification defined above in the text, the Law on Assistance to Agricultural Producers can be mentioned, through which the forms, spheres, approaches, etc. are regulated. of the state, with which it provides assistance to farmers, including agricultural producers.

In conclusion, it is necessary at the national level to have a normative framework available that sets the parameters of economic life in the Agro-Food Sector, defining the basic legal norms of this process. Although the legislative framework at the national level is not as complex and extensive compared to that at the European level, it is necessary to say that it affects many aspects of the activity of the Agro-Food Sector in Bulgaria. The six main groups that were identified represent groups of factors, where each law is a factor that has a direct impact on the activity of economic actors from the Agro-Food Sector, which comes to show that the dynamics of the legislative process in the country directly reflects on the development of the agrarian and food sector. The multiple spheres covered by the regulatory framework create conditions for the changes that take place in it to create both risks for economic actors and opportunities for development. In this sense, it can be concluded that the regulatory framework, which determines the norms of economic life in the Agro-Food Sector, is not necessarily repressive in nature.



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#### 4.1.2.5.3 Legislation in force at local level

To the already mentioned normative acts at the European and national level can be attributed all the regulations that are legislatively established at the local level. Its establishment has a direct impact on the activity of the agrarian and food sector on the territory of the cross-border region in the context of the relations between economic actors and local communities, including and institutions at the local level.

The regulatory framework at the local level in the cross-border region is expressed in ordinances that regulate local taxes and fees; environmental protection, animal husbandry conditions and others. In addition to this, there are regulations that regulate the investment process on the one hand, and also regulations that define the use of municipal lands. In this sense, it can be said that the regulatory framework at the local level is a factor in the functioning of the Agro-Food Sector, insofar as it sets the rules of economic processes (in particular with regard to taxes, fees and investments), introduces obligations regarding the care of the environment and regulates the relations between the municipality and the economic agents.

- One of the largest municipalities on the territory of the Cross-Border Region - the Municipality of Blagoevgrad has created a regulatory framework at the local level, the core of which (regarding the agrarian-food sector) is objectified in regulations such as "Regulation on determining the volume of


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animal breeding activity and places for farming of farm animals on the territory of Blagoevgrad municipality"; "Ordinance for the construction and protection of the green system on the territory of the municipality of Blagoevgrad"; "Ordinance on the determination of local taxes in the municipality of Blagoevgrad"; "Ordinance on waste management on the territory of the municipality of Blagoevgrad", etc.

- Another key municipality - Kardzhali has also built a regulatory framework regulating the activities of economic actors from the Agro-Food Sector. In its basis, the Municipality has integrated the "Ordinance on the construction, management, control and protection of the green system on the territory of the municipality of Kardzhali", as well as the "Ordinance on the determination and administration of local fees and prices of services on the territory of the municipality of Kardzhali". as well as the "Ordinance on determining local taxes on the territory of the municipality of Kardzhali". Other important ordinances that operate on the territory of the Municipality of Kardzhali are those dedicated to environmental protection, and in particular the "Environmental Protection Ordinance" and "Ordinance on the Management of the waste on the territory of the municipality of Kardzhali". The municipality also defines the process of raising farm animals, by means of the "Ordinance on the rules and conditions for raising farm animals on the territory of the municipality of Kardzhali"


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- The municipality of Smolyan, like the other two large municipalities, has built a legal framework regarding local taxes. The municipality also has developed ordinances for waste management, environmental protection, the protection of the green system, and also an ordinance for determining the volume of animal breeding activity and places for raising farm animals.
- The Haskovo municipality registers the presence of the "Ordinance for determining the amount of local taxes on the territory of the Haskovo Municipality"; "Ordinance on the determination and administration of local fees and service prices on the territory of Haskovo Municipality", as well as "Ordinance on the fees to be paid when changing the purpose of agricultural land from the municipal land fund" as well as "Ordinance on management of the waste on the territory of Haskovo Municipality".
- With regard to the smaller municipalities in the Cross-Border Region, it can be concluded that they have also built a similar regulatory framework, with which they have determined the rules under which economic entities from the Agro-Food Sector operate. Although with slight variations, it can be concluded that, in general, the municipalities on the territory of the cross-border region regulate the activity of the Agro-Food Sector in terms of tax policy at the local level, care for the environment, as well as the conditions for farm animals. In this sense, a


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change to any one of the regulations can reflect on the activity of business entities from the sector.

#### 4.1.2.6. Environmental Aspect

The current analysis of the state of the environment unfolds in 4 main directions - analysis of the state of atmospheric air, water, soil and biological diversity. The methodological basis of the analysis corresponds to those defined in the national legislation and in particular Art. 4 of the Environmental Protection Act environmental components, with the analysis focusing on the environmental components most relevant to the Agro-Food Sector. The additional dimension in which the analysis unfolds is in relation to climate and climate change.

##### 4.1.2.6.1 Atmospheric air

The quality of the atmospheric air in the territory of the transboundary region is a major factor for the state of the biosystems and the organisms in them. For this reason, its condition can reflect both on the resources that are exploited for the production of food, and on the food itself that the producers of the agro-food sector produce and place on the market.

The main pollutant of atmospheric air is fine dust particles (PM). The data from the analyzes carried out in the "National program for improving the quality of atmospheric air 2018 – 2024" give reason to conclude that on the territory of the cross-border region in every single area there are problems related to exceeding the levels of FPH.



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For the period 2011 – 2016, the average annual number of exceedances of the average day-night norm was the highest for the municipality of Smolyan (Smolyan region), followed by the municipalities of Kardjali (Kardzhali District) and Blagoevgrad (Blagoevgrad District). The least number of norm violations were reported in Haskovo and Blagoevgrad Districts. The reported number of exceedances in the municipalities of Haskovo and Blagoevgrad is a little under 80 per year out of the permissible 35, while in the Municipality of Kardzhali the exceedances are over 80 per year. In the Municipality of Smolyan, the excesses almost reach 100 per year. It should be noted that in the Municipality of Blagoevgrad the share of excesses in the summer is negligible, which shows that the main factor for this is the heating model that dominates the municipality.

There are indications that the problem of air pollution from FPCH in the territory of the Cross-Border Region will continue, to the extent that in the Municipality of Smolyan more than 78% of households are heated with wood and coal. In the Municipality of Blagoevgrad, the values of this indicator exceed 43% of households, while for the municipalities of Haskovo and Kardzhali, the households that are heated with wood and coal are over 53% and over 60%. The data are valid for the municipal centers, where, as a rule, the inhabitants have a better standard of living, a higher environmental culture on the one hand, and also gasification systems, which gives reason to hypothesize that in smaller settlements the relative share of households using coal and wood for heating is more likely to be higher due to economic barriers to


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electricity use, weaker environmental culture and the lack of other alternative and affordable heating sources.

According to the data from the "National report on the state and protection of the environment in the Republic of Bulgaria" it can be noted that as of 2019, the situation has improved, but the presence of atmospheric air pollution still exists. The number of exceedances of the average daily norm in Smolyan gravitates to around 60, while in Haskovo and Blagoevgrad it gravitates to the maximum permissible value of 35. For Kardjali, no problematic situation is reported. Pollution from fine dust particles does not directly affect agricultural crops, but indirectly, and most directly affects human health, affecting many systems of the human body and mostly causing respiratory diseases of the respiratory system.

According to data from the Regional Development Strategy of Haskovo Region 2014-2020 in the district, the exceedances of the atmospheric air standards were also found in relation to the levels of sulfur dioxide, ozone, hydrogen sulfide, while for nitrogen dioxide, carbon monoxide and ammonia, no exceedances of the relevant standards were registered. In the last published Regional Strategy for the Development of the Kardzhali District, exceedances of the norms of the levels of sulfur dioxide and cadmium were registered. In the Regional Development Strategy 2014-2020 of the Smolyan District, there is no data on air pollution in the territory of the region, but this can be attributed to the lack of precision in its preparation, rather than the absence of pollution. For the Blagoevgrad District, it was found that "there is no specialized permanent monitoring point for atmospheric pollutants "


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The data from the National Report on the State and Protection of the Environment in the Republic of Bulgaria indicate that as of 2019 (the last year for which there is publicly available data on the quality of atmospheric air) the short-term target norm for the protection of human health in terms of of ozone were established in two stations, one of which is located within the Cross-Border Region (CFS "Rozhen"). In view of the fact that ozone has strong oxidizing properties, it can be concluded that this type of pollution affects agricultural crops in the direction of reducing yield. In view of the minimal detections of exceeding the norms, it can be concluded that there are no serious grounds for concern for the economic agents of the Agro-Food Sector regarding the oxidation of agricultural production as a result of ozone pollution.

Exceeding the average annual target norm of benzo(a)pyrene for the period 2017-2019, ng/m3 was registered in Haskovo and Kardzhali districts, and atmospheric air pollution above the permissible norms with cadmium, nickel, arsenic, carbon monoxide and benzene was not has been established in any territory within the Cross-Border Region.

In addition to this, it can be stated that the permissible number of exceedances of the average day-night norm for sulfur dioxide in 2019 was not exceeded within the Cross-Border Region, but in 2019, 4 exceedances were registered. exceeded the average hourly norm for sulfur dioxide in Haskovo District. Violations of the alert threshold for sulfur dioxide in 2019 were not detected within the transboundary region.



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Apart from this, several conclusions can be drawn at the national level, which are included in the "National Air Pollution Control Program, Bulgaria 2020-2030", which explain the following processes:

- Since 2005, reported emissions of nitrogen oxides have been steadily decreasing, mainly due to the transposition of EU-wide legislation affecting large combustion plants (LCPs) and the Road Transport Sector" ;
- The amount of emissions from non-methane volatile organic compounds decreases permanently;
- There is also a decrease in emissions of sulfur oxides;
- Ammonia emissions have fallen;
- "Reported total national ammonia emissions are below the 108-kiloton ceiling";
- "Since 2005, the registered emissions of FPC2.5 have shown a slight upward trend".

It can be concluded that although at the local and regional level, there is often a lack of publicly available (and indeed any) more detailed data on atmospheric air pollution, the problem of air pollution in the Cross-Border Region is encountered and known to public institutions and especially the municipal administrations. They, in turn, address the problems through their municipal programs for environmental protection and through the programs for improving the quality of atmospheric air (where applicable), the most serious being the problems related to pollution from FFP and exceeding the standards of ozone in the atmosphere, which has a negative impact on agricultural crops.


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#### 4.1.2.6.2 Leads

The hydrographic network of the territory of the transboundary region is made up of many sources such as rivers, lakes, dams, etc. Four main water arteries are located or pass through the Transboundary Region – the Struma River and the Mesta River, which are polluted to varying degrees in their different sections, and the Arda River, through which economic needs for the production of electricity and the Maritsa River, which runs through the territory of the Haskovo District, are mainly met. Tendencies to improve surface water quality are registered for Haskovo and Blagoevgrad districts.

Important for the economic development of the district are the following dams:

- Dam "Kardjali";
- Cold Well Dam;
- Ivaylovgrad Dam;
- Dospat Dam;
- Dam "Vacha";
- Trakiets Dam;
- Dam "Tsankov Kamak";
- Zlatograd Dam;
- Teshel Dam;
- Stoykovtsi Dam.

The main functions of the dams are aimed at generating electricity, developing fisheries, and also providing resources for irrigation processes in agriculture, etc. In this sense, it can be stated that the system of artificial water basins on the territory of the Cross-Border Region creates favorable



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conditions for the development of the Agro-Food Sector, insofar as it is able to generate important resources for the economic agents involved in it. Worth mentioning is that some of these dams are part of Pumped Hydroelectric Energy Storage (PHES) Systems, all of them located in Cross-Border Region: PHES "Chaira", PHES "Belmeken" and PHES "Orpheus", which generate over 1 GW of energy.

With regard to the physico-chemical state of surface waters, it should be noted that the data for Bulgaria are structured by catchment basins, which are administered by different institutions, which does not allow the analysis to be deployed in specific areas. There are 4 basin management regions in the country as follows: Danube basin management region; Black Sea Basin Management Area, East Aegean Sea Basin Management Area and West Aegean Sea Basin Management Area. The regions of the cross-border region are counted among the last two regions, as the Blagoevgrad District is located within the scope of the West Aegean Sea basin management region, and the remaining 3 regions on the territory of the Cross-Border Region are included in the East Aegean Sea basin management region.

Data from conducted studies show that both for the waters within the scope of the West Aegean Sea Basin Directorate and for those within the scope of the East Aegean Sea Basin Management Region, there is a deterioration of indicators. With regard to the West Aegean region in 2018, "a deterioration of some of the control indicators was observed. Dissolved oxygen O2 (54%) and nitrate nitrogen NO3-N (50%) indicators remain in excellent condition. Nitrogen


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ammonium NH4-N and BOD5 indicators are in good condition, while orthophosphates PO4 from moderate condition to predominantly excellent condition"

The analyzes show that on the territory of the Basin Directorate of the Eastern Aegean Sea Region, "only according to the dissolved oxygen O2 indicator, the predominant points are in excellent condition." According to the orthophosphates PO4-P indicator, points in moderate condition and in excellent condition prevail – equally, and all other points are in "predominantly good condition according to the other indicators"

With regard to the biological condition of surface waters, it should be noted that for the territory of the transboundary region positive facts can be conditionally established, insofar as in the Eastern Aegean Sea Region, where the districts of Kardzhali, Haskovo and Smolyan fall, "objects in good condition prevail - 44 %. Objects in very bad condition are next - 25%, the share of objects in very bad and moderate condition is almost the same, and the share of objects in excellent condition is insignificant - 3%"

The data on the lakes in the Western Aegean Sea Riverbasin give reason to conclude that there they are in the best condition, since "the sites in excellent condition prevail - 60%, in good condition 30% and in moderate condition 10%. Objects in poor and very poor condition are missing" .

Regarding the biological assessment of the river types, it was found that in the Eastern White Sea basin region in 2017, an increase to "32% of the points are in the interval of excellent-



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good condition compared to 27% in 2016. The points in moderate condition decreased to 50% and by 2%, the points in the interval bad-very bad condition have increased to 18%. In 2018, 9% were in excellent condition, and 21% were in good condition, which is 2% less than the previous year. Points in moderate condition increase to 56%, which is predominant for the area, and points in poor and very poor condition decrease to 12%" .

The situation in the Western White Sea basin region in 2017 is far better, as "points in the interval excellent-very good condition prevail - 58%, which is an increase of 8% compared to the previous year. 31% of the points are in moderate condition and only 12% of the points are in the bad-very bad condition interval. In 2018, the points in good condition were predominant - 62%, in excellent - 4%, and in moderate - 22%. The number of points compared to the previous year in bad and very bad condition is preserved."

The data on groundwater pollution indicate that on the territory of the Haskovo District in 2018, "increased total alpha activity (SC 0.5 Bq/dm3) continues to be measured in the Haskovo station, Borehole No. 1, PS-PBV "Haskovo - 1" from PVT Porovi vodi in Neogene - Quaternary - Haskovo." The data for the West Aegean Sea River Basin "shows exceedances of SC for total alpha activity" and for the territory of Blagoevgrad District.

In conclusion, the presence of water sources on the territory of the Cross-Border Region can be ascertained, which have many different functions, including and for commercial purposes. This, in turn, is a solid resource and positive from


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the point of view of the functioning of the Agro-Food Sector in the region. On the other hand, negative processes for the sector can be found, which are related to the deterioration of some water resources, which, although a natural process from the point of view of the industrialization of the economy and human impact, is undesirable and unfavorable for the development of the sector.

#### 4.1.2.6.3 Soils

The analysis of soils is of fundamental importance for the present text, insofar as soils as a basic resource are an important prerequisite for the favorable development of the Agro-Food Sector in the Cross-Border Region. In this sense, the present analysis prioritizes the problems related to soil degradation processes and their disturbance and pollution.

Soil erosion is a major problem that contributes to soil degradation. The data regarding the condition of the soils in Bulgaria indicate problems and threats regarding the protection of the soils, insofar as it is found that "about 85% of the soils in the country are affected by erosion processes, and about 30% of them are subjected to wind erosion."

According to the analyzes included in the National Program for Conservation, Sustainable Use and Restoration of Soil Functions (2020-2030), it should be noted that the problem of surface water erosion of soils is particularly relevant for the cross-border region, as the districts of Kardzhali and Smolyan are among the five areas in which the highest intensity of erosion processes is observed, and Kardzhali is among the areas that suffer soil losses as a result of water surface


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erosion. For the Blagoevgrad and Haskovo districts, no significant problems in this aspect were registered.

Regarding wind erosion, it is necessary to state that none of the areas situated on the territory of the transboundary region falls among the areas with the highest intensity of wind erosion. However, it is recorded that Haskovo region is among the regions with the greatest soil losses as a result of wind erosion.

Irrigation erosion, on the other hand, does not represent a factor that determines the development of the Agro-Food Sector in view of the ever-diminishing role and functions of irrigated agriculture and the almost completely destroyed reclamation system from the socialist period, which in turn contributes to this the scale of this type of erosion to remain low.

Another problem that characterizes the state of the environment, and in particular that of soil resources, is objectified in the process of soil acidification. The latest analyzes carried out at the national level and in connection with the development of the National Program for the Protection, Sustainable Use and Restoration of Soil Functions (2020-2030) indicate that the problem is characteristic of South-West Bulgaria, which also includes territories from the cross-border region. In another important strategic document – "National action program for sustainable land management and combating desertification in the Republic of Bulgaria (Update for program period 2014-2020)", South-West Bulgaria is also situated as a problem area in terms of soil acidification, but also noted is the


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Rhodope Region, which is also part of the transboundary region.

As a positive fact regarding the degradation processes related to soil salinization, it can be noted that no serious problems are found for the territory of the regions of the Cross-Border Region.

Due to the fact that in Bulgaria there are no monitoring data to take into account the degree of degradation processes related to soil compaction, the current analysis cannot account to what extent this problem is valid for the Cross-Border Region.

The next process, on which the analysis will stop, consists in the reduction of soil organic matter, or the so-called. dehumification of soils. "The general assessment of the humus condition of the soils in Bulgaria shows that the climatic, plant and other factors of soil formation in a large part of the country, especially in the flat and slightly hilly areas, where the arable land fund is concentrated, are favorable for the formation of quality humus, but the total amount of humus in Bulgarian soils is not high". The finding is of essential importance insofar as it gives reasons to consider that companies from the Agro-Food Sector can count on the fact that there are conditions to form productive soil resources on the one hand. On the other hand, as far as dehumification can occur as a consequence of other degradation processes (and in particular acidification and salinization) and not particularly high levels of humus in soils, it should be noted that economic entities from the sector, together with other interested parties who are directly



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involved in the protection and restoration of soils must neutralize the processes of acidification and salinization of soils to the maximum extent.

In connection with soil pollution processes, it should be noted that the analyzes from the "National Report on the State and Protection of the Environment in the Republic of Bulgaria" indicate that "during the period 2005 - 2017, the soils in the country are in good ecological condition regarding pollution with heavy metals, metalloids and persistent organic pollutants: Polyaromatic hydrocarbons (PAH), Polychlorinated biphenyls (PCB) and Organochlorine pesticides." As a result of numerous state interventions, including through legislation, specialized projects and programs, there is a tendency to reduce soil pollution with heavy metals on a national scale, taking into account the contribution and efforts of enterprises from the Cross-Border Region.

Soil pollution caused by persistent organic pollutants is not a problem for the areas of the transboundary region. "The data from the observations within the framework of the NSMOS show that the soils in the country are in a good ecological condition in terms of contamination with persistent organic pollutants (polyaromatic hydrocarbons, polychlorinated biphenyls and organochlorine PRPs)." There is also a lack of data and indications of significant soil contamination by oil products.

The main instrument for intervention to overcome the problem of soil pollution from domestic and construction is the developed National Waste Management Plan 2021-2028


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(NSMP). It registers problems and defines recommendations and measures to the interested parties in the process with the aim of effective and efficient waste management in the Republic of Bulgaria. It embodies the efforts to create maximum conditions for preventing the formation of waste. In this sense, it can be concluded that public institutions, both at the national and local level, work actively in the direction of preventing the generation of waste and minimizing its harmful impact on soil resources in the cross-border region.

The impact of the economic sectors on the condition of the soils in the Cross-Border Region remains significant. The analysis of agriculture and, in particular, of arable land in the country recorded that "the share of arable land is the lowest in the regions of Smolyan 3,653 ha and Kardzhali - 8,938 ha. Cultivable lands in the South-Western region are comparatively few, where they range from 26,043 ha to 41,473 ha." .

The activity of companies from various spheres of industry, mining and processing activities, metallurgy and machine building implies the creation of conditions for soil disturbance. As a result of the activities of important enterprises from the mining and metal mining sectors on the territory of the Kardzhali district, the presence of disturbed soils was found.

Transport as a major industry also has an impact on the condition of soils. Motor transport creates conditions for the pollution of the environment with many heavy metals that fall into the soil around the roads, the air, passing the entire chain and reaching the person. Important road arteries pass


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through the territory of the Cross-Border Region, such as the E-79 main road, the Struma highway, etc., which transport links connect Bulgaria with Greece. In recent years, a reduction in road pollution has been observed at the national level.

Rail transport can also have a negative impact on the state of the country's soils. A railway network has been built on the territory of the Cross-Border Region, although mainly as part of the main transport corridors number 4 and number 10, the operation of which may lead to disturbance of soil resources. On the other hand, in view of the intensity and dynamics of air transport, it should be noted that direct soil pollution caused by this type of transport is not significant.

In conclusion, it can be stated that there are many prerequisites for soil damage within the transboundary region. At the root of these problems are soil erosion processes, but anthropogenic impact also contributes to the increase in damage to soil resources. In this sense, it can be stated that the processes of disturbance of soil resources are a threat to the competitiveness of the economic actors that operate on the territory of the Cross-Border Region.

#### 4.1.2.6.4 Natural sites and biodiversity

Bulgaria is characterized by rich biological diversity, due to the different living conditions that exist on its territory. The National Strategy for the Protection of Biological Diversity states that "Bulgaria ranks among the countries with the greatest biological diversity in Europe." On the territory of the transboundary region are located some areas with the


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greatest species richness in terms of all taxonomic groups in the country. As such, the Rhodopes (mostly the eastern parts) and Pirin can be mentioned. There are 3 national parks on the territory of the country, two of which fall entirely into the Cross-Border Region. Together with other natural objects, they are the natural habitats for many ecosystems.

In the current Law on Protected Areas, protected areas are categorized into 6 main groups:

- Reserve - strictly protected territory, prohibited any human activity;
- National Park (NP) - highly protected, some activities allowed;
- Natural Landmark (PZ) - conservation of natural forms, activities allowed;
- Maintained reserve (PR) - permitted activities with a conservation purpose;
- Natural Park (PP) - sustainable interaction of people and nature;
- Protected area (PA) - protection of habitats and sustainable use of resources

According to data from RIOSV-Blagoevgrad, "34 protected areas with a total area of 17,882, 2,318 ha have been declared in Blagoevgrad District (excluding the area of the Pirin National Park and part of the Rila National Park)." .

- The data of Regional Inspectorate of Environment and Water-Blagoevgrad (RIEW) indicate that the number of reserves in Blagoevgrad district is 6, 1 is the maintained reserve, 16 no. are the protected areas, 17 nos. are the


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natural attractions. The national parks "Rila" (partially) and "Pirin" are located on the territory of the District, and the number of natural parks is also 2.

- The "Tisata" Reserve functions with the aim of protecting the country's largest juniper (Juniperus excelsa) deposit. According to data from RIEW-Blagoevgrad, a high species diversity is also observed from the point of view of the presence of birds. The presence of 109 species of birds has been established on the territory of the reserve, 62 of which are of European nature protection importance. The reserve has been declared as an important ornithological site.
- Another of the reserves on the territory of the district - the "Falcon" also enjoys a high species diversity, where you can meet animal species such as wild boar, wolf, fox, roe deer, rabbit, etc., as well as globally endangered species such as the pinniped (Testudo graeca) and the spiny-tailed turtle (Testudo hermanni).
- The herpetofauna on the territory of the reserve is also distinguished by its diversity. Of all the 16 species of snakes found in the country, 11 are found on the territory of the reserve.
- The "Kongura" Reserve is another of the 6 that are located within the Blagoevgrad District. Chestnut and beech forests are found, and the biological diversity in general is enormous. The presence of 429 species of plants has been registered, of which 11 are rare, and the number of endangered ones is 1. 5 of the plants seen on the territory of the reserve cannot be seen in any other part of the world.


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- "Ali botush" is another important reserve in Blagoevgrad District, which is right on the border with Greece. It has an extremely high diversity of grass vegetation, with more than 1,400 species registered. The animal world in the reserve is composed of species characteristic of the country such as Roe Deer (Capreolus capreolus), Wild Boar (Sus scrofa), Rabbit (Lepus europaeus), Fox (Vulpes vulpes), etc., and also the jackal (Canis aureus) ). Two species of turtles (Testudo greca, T. hermanni), Macedonian Lizard (Lacerta erhardi), and the rare cat snake (Telescopus fallax) can also be found on the territory of the reserve. It is important to note that over 1200 species of invertebrates, 134 species of birds, 21 species of which are listed in the Red Book of Bulgaria are found in the reserve.
- "Oreljak" Reserve is characterized by the presence of beech forests with an average age of over 160 years, as well as animal species, the Greek long-legged frog (Rana graeca), the Salamander (Salamandra salamandra), many species of Dormice (Glis glis), Squirrel (Sciurus vulgaris), Wild Boar (Sus scrofa), Wolf (Canis lupus), Bear (Ursus arcto), etc.
- On the territory of the "Dark Forest" Natural Reserve, the presence of forest massifs is registered, consisting mainly of Beech, Fir and Spruce, and the average age of the forests is between 180 and 200 years. There are 92 plant species, some of which are included in the Red Book of Bulgaria. 119 species are vertebrates, including 17 species listed in the Red Book of Bulgaria, and 8 of them are threatened with extinction on a global scale.


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- Natural Reserve "Konski Dol" is distinguished by the presence of ornithological diversity within its boundaries. 63 species of birds are registered as inhabiting the maintained reserve, among which is the Black Stork. An important element of its structure are the forest masses of Spruce, Beech and Fir.
- Natural landmark "Melnik Pyramids" is also an ornithologically significant place for the region. The presence of more than 113 species of birds, including 12 included in the Red Book of Bulgaria and 49 of all 113 species are of European importance.
- An important natural object on the territory of the district is the "Rupite" Nature Reserve, where species diversity in terms of birds, and in particular 141 species of birds, have also been recorded. 63 of these species are of European conservation importance, while 33 are listed in the Red Book of Bulgaria.
- Pirin National Park includes more than 1,300 species of higher plants. As a relative share, this represents over 30% of the entire flora in the country, many of which are included in the red book. 320 species of mosses and over 2,000 species and subspecies of invertebrates are found on the territory of the national park. Almost 250 species are vertebrates (247), which speaks of the existing enormous biological diversity on the territory of the Pirin National Park
- The biological diversity is also huge in the National Park "Rila", from which South Rila is part of the Cross-Border Region. Over 1,400 higher plants are found within the park, as many as 98 are listed in the red book. Some 282 species


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of mosses, 130 species of algae, 233 species of fungi and almost 200 species of vertebrates have been recorded on the territory of the national park. In Rila National Park, 38% of the plants, as many as 80% of the invertebrates and again 80% of the glacial lake flora and fauna can be found.

According to data of RIEW-Smolyan the following categories of natural objects are located on the territory of the Smolyan region:

- Reserve - 4 pcs.;
- Natural landmark – 26 pcs.;
- Maintained reserve - 4 pcs.;
- Protected area – 28 nos.

- The "Soskovcheto" reserve is located in the Smolyan region, and its main function is dedicated to a centuries-old spruce forest, which is the habitat of bear, roe deer and red deer species. Regarding plants, it should be noted that approximately 190 species are found in the reserve. 16 of them can be defined as "conservationally significant", and 4 species are included in the Red Book of Bulgaria under the "rare" category. There are 95 species of medicinal plants in the reserve. Birds that are found on the territory of the reserve are 43 species, of which 39 are protected species.On the other hand, mammals are 44 species, of which 23 are protected.
- The "Kazanite" reserve is another important natural site on the territory of the Smolyan region. There are 279 species of plants in it - 279, of which 16 species can be defined as "conservationally significant". 143 medicinal plants can be found within the reserve, as well as pine,


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beech and other forests. 83 species of birds and 49 species of mammals have been found within the park.

- The third reserve above which the current analysis stops is the "Kastraklii" Reserve. The average age of its century-old black pine forests exceeds 200 years. 314 species of plants are found in the reserve. Species diversity in terms of birds is objectified in 73 species, while mammals are 48 species, 26 of which are protected.
- Reserve "Red Wall" is the last separate reserve on the territory of Smolyan District, and it can be said that its nature is botanical. The reserve is distinguished by rich vegetation and animal diversity, and the presence of black pine and fir forest massifs is specific to it. The animal world is represented by species that are characteristic of the foothill and mid-mountain belt of the Rhodopes.
- Maintained reserve "Momchilovski dol" is located on the territory of Smolyan District, as the reason for its creation is the preservation of primary cherbor forest. To the east it borders a high-voltage line. Seventeen species of plants can be found in the reserve, of which 8 species are conservation significant, and 2 species of them are included in the Red Book of Bulgaria under the "rare" category. 81 species of medicinal plants are available on the territory of the reserve. regarding the animal species diversity, it should be noted that the presence of 21 species of birds was registered, of which 17 are protected species, while there are 25 species of mammals, and 4 are protected.
- Maintained reserve "Shabanitsa" is characterized by the presence of coniferous species, the average age of which


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is in the range of 250 - 300 years. Within the maintained reserve, the species diversity of the plant world is reduced to the presence of 76 types of plants. Regarding the animal world, the presence of 56 species of birds and 49 species of mammals should be noted.

- "Konski Dol" maintained reserve is the last significant maintained reserve for the Smolyan region. In addition to spruce and beech forests, more than 80 species of plants can be observed in it, 9 of which are protected, and 2 species fall under the "rare" category. The species diversity in terms of birds in the maintained reserve consists of 63 species, while the number of mammal species is 33.

On the territory of the Kardzhali region, natural objects are registered as follows:

- Reserve -1 pc. ;
- Natural landmark - 25 pcs.;
- Maintained reserve - 3 pcs.;
- Protected area – 13 nos.

- The natural objects of importance for the Kardzhali region are the "Valchi Dol" Reserve ; Maintained Reserve "Borovets" - Raven; Maintained reserve "Zhenda" (Kazal Cherpa); Maintained reserve "Chamlaka". The reserve is dominated by shrubby vegetation, but there are also forest areas. According to data from the Municipality of Krumovgrad, "the reserve is part of the ornithologically important place "Studen Kladenets", which is of worldwide importance" . There are 23 species of birds of prey within the reserve, and almost all of them (21) are



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included in the Red Book of Bulgaria. Among the species of birds inhabiting the reserve can be found such as Black and Bald Eagle, royal eagle and Egyptian Vulture and others. The number of reptiles and amphibian species found in the "Valchi Dol" reserve is 21 species.

- On the territory of the maintained reserves in the district, there are mainly forest massifs, with pine and oak plantations dominating, and the average age of the forests located there is centuries old and varies between 50 and 300 years.

The data of RIEW-Haskovo register the presence of the following natural objects on the territory of the district

- Reserve - 1 pc.;
- Natural landmark – 50 pcs. ;
- Maintained reserve - 4 pcs.;
- Protected area – 38 nos.

The data from the District Development Strategy 2014-2020 of Haskovo District states that within the district there are "1,950 species of plants from 122 families, 350 species of butterflies, 21 species of fish, 10 species of amphibians, 26 species of reptiles, 273 species of birds and 59 species of mammals" . There are over 600 species of higher plants, and 44 of them are included in the Red Book of Bulgaria. Almost 60% of the amphibian species found in the country can be found in the Haskovo region, and 7 of them are protected.

There are 273 species of birds found on the territory of the district, of which 241 species are protected. Mammals on the other hand are 59 species of which 23 species are listed in the



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World Red List of the International Union for Conservation of Nature.

These facts give reason to state the presence of great biological diversity in this area of the transboundary region as well

The main problems that threaten the existence of some species are mainly caused by anthropogenic impact. Air, soil and water pollution on the one hand, deforestation on the other are the main threats to some ecosystems. "In the Bulgarian landscape, literally all forms and sources of point and non-point pollution are found - domestic, agricultural, oil and petrochemical, industrial and radioactive, which threaten biological diversity to varying degrees."

In this sense, it can be stated that there are serious prerequisites for the development of the agro-food sector in the territory of the Cross-Border Region, in view of the high biological diversity. It is a basic prerequisite for economic development as it provides opportunities for the development of economic life in many directions and directions.

#### 4.1.2.6.5 Climate and climate change

In view of the data registered in "Socio-economic analysis of regions in the Republic of Bulgaria Fourth stage. Part Two", which show that the average "annual temperature of 12.6o C, 2018 is among the five warmest years for the period 1988-2018. In 2018, the annual air temperature for the high altitude areas (n.v .) up to 800 m is on average 1.5°C above the norm",



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which clearly shows that trends related to global climate warming also affect Bulgaria.

Although the Cross-Border Region is located in the southernmost parts of Bulgaria and as a rule should be considered to be among the most vulnerable in the country, the data show that for the period 2014-2020 in none of the regions the largest deviations from the average annual temperature were observed, and as of 2016, the lowest deviation from the average annual temperature for the country was found in the Smolyan District among all districts in the South Central Region. Regardless of this fact, it should be noted that the average annual air temperature (in the Celsius scale) in 2018 compared to the climatic norms of 1961-1990 in the cross-border region increased in the range between 1.4 and 2 degrees. This, in turn, would lead to negative processes for economic entities from the Agro-Food Sector, such as problems related to drainage, an increase in the eutrophication of stagnant waters, and possible fires, and periods of drought can lead to reduced production.

On the other hand, certain problems related to rainfall levels for the cross-border region can be identified. On the one hand, they are objectified in exceeding the monthly rate of precipitation. According to data of the Bulgarian Executive Agency for Environment the excess in Krumovgrad reached 522% in August, and in Zlatograd it equaled 318% in November. The problems that are related to the excessive level of precipitation give reasons to conclude that there are conditions and prerequisites for the destruction of


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production of producers from the Agro-Food Sector as a result of heavy precipitation and potential floods.

The problems regarding rainfall consist in the fact that Blagoevgrad district is among the districts with the least rainfall in the country. This suggests potential problems for agro-food business entities in relation to irrigation, which problems with a certain superimposition of other negative factors can lead to a loss of production.

In conclusion, it can be stated that the main threat arising from climate change for the producers in the Agro-Food Sector Consists in the frequent extreme phenomena, such as the extreme increase in temperatures, heavy rains, hail, etc., which hides multiple and different risks related to disruption of the work cycle, predictability in production and directly leads to a reduction or even destruction of production. This necessitates optimal utilization of water as a basic resource and building a culture to protect it from pollution. In view of the specificity of the relief in the cross-border region, it can be noted that the risk of flooding is lower, but in case of heavy rains, it is possible that some production will be destroyed.

## 4.2. SWOT Analysis

### 4.2.1. Greek Side

#### 4.2.1.1. Strengths

- Superior quality of foods, linked to authentic local products.
- Strong link of the Greek to the Mediterranean diet, an UNESCO Cultural Heritage of Humanity.


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- Diverse soil and good climate conditions, allowing for a variety of products.
- A multitude of university departments that offer quality education in the agrofood related sciences.
- High amount of CAP funding in the agriculture sector.
- Strong presence of food and beverages manufacturing, with a dynamic exporting character.
- High food security and food safety, with Greece ranking 31st worldwide and 17th in Europe.
- Large number of food and beverages PDOs and PGIs (275), rendering Greece one of the six EU-27 member states having circa 80% of PGIs and PDOs products.

#### 4.2.1.2. Weaknesses

- Aging farming population and limited entrepreneurial activity of farmers.
- Agriculture high production cost and low productivity and production.
- Small size and high fragmentation of land, with limited use of new technologies.
- Lack of substantial contract farming and connection of agriculture to manufacture.
- Limited innovation and technology integration and lack of strategic planning and investments towards R&D.
- Insufficient communication, coordination and collaboration between companies, universities and research institutions.
- Non-existing long-term agri-food policy and insufficient regulatory framework for promoting innovation and technology.


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#### 4.2.1.3. Opportunities

- Increase levels of self-sufficiency and exports of PDOs and PGIs.
- Establishment of a strong identity and brand name for Greek products in the global market, with links to the Mediterranean diet.
- Implementation of new technologies in the agri-food sector (such as in packaging, logistics biotechnology/DNA technology, security/safety).
- Development of strong connections between companies and institutions within the supply chain, through clusters' formation and the cooperation and synergies of farmers, manufacturers and trade companies.
- Connection of research with all stages of production.
- Further strengthening and support of export orientation via marketing and distribution channels.
- Extensive use of the Product Environmental Footprint in more companies and products in the whole supply chain.

#### 4.2.1.4. Threats

- Low prices of foreign agri-food products, which can drive up competition with domestic production.
- Fluctuation and higher prices of raw materials impede on low cost production.
- Crises that distract from long standing problems, the solution to which could prove beneficial in multiple disciplines.
- Environmental footprint and/or natural disasters due to climate change, pollution and the disruption of ecosystems that have severe effects on agricultural production.


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- COVID-19 pandemic, Russian invasion to Ukraine and their implications on demand and supply and the creation of potential supply shortages due to the subsequent economic recession.

### 4.2.2. Bulgarian Side

#### 4.2.2.1. Strengths

- Encouraging the creation of conditions for the formation of a middle class of agricultural producers;
- Created mechanisms for public financing of the agrarian-food sector;
- Promotion of digitization in the sector;
- Existence of environmental protection policies;
- Reducing the administrative burden;
- Encouraging competitiveness;
- Setting policies that are synchronized with the Green Pact;
- Existence of a positive economic trend, which is characterized by a permanent and sustainable increase of the gross domestic product in the country;
- There is a positive economic trend, expressed in a permanent increase of GDP in the individual areas of the cross-border region;
- GDP per capita is increasing in every single area of the cross-border region;
- There is a serious increase in the purchasing power of Bulgarian citizens regarding food products;
- Inflation levels for the last 11 years have been stable;


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- Existence of an upward trend, which is expressed in an increase in foreign direct investments in the cross-border region for the period 2014-2020;
- Availability of multiple economic incentives;
- Availability of technological solutions to optimize production and business processes in farms;
- Established regulatory framework governing the rights and obligations of business entities from the sector;
- There is no known pollution of the atmospheric air above the permissible norms with cadmium, nickel, arsenic, carbon monoxide and benzene;
- Existence of trends for overall improvement of atmospheric air quality;
- Good condition of surface waters;
- The indicators of dissolved oxygen O2 (54%) and nitrate nitrogen NO3-N (50%) remain in excellent condition;
- The nitrogen ammonium NH4-N and BOD5 indicators are in good condition;
- Orthophosphates PO4 indicators go from a moderate condition to a predominantly excellent condition;
- Good condition of river types (overall);
- Absence of soil problems due to irrigation erosion;
- No serious problems are found for the territory of the regions of the cross-border region, related to soil salinization;
- Soil pollution caused by persistent organic pollutants does not represent a problem for the areas of the territory of the transboundary region'


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- There is a lack of data and indications of significant contamination of the soil by oil products;
- High level of biological diversity.

#### 4.2.2.2. Weaknesses

- Low digitization niche in the sector;
- Lack of continuity and consistency in terms of policies that address the development of the sector;
- Rapid increase in the insurance burden for farmers;
- Increasing labor costs;
- The economic growth of GDP in the cross-border region is generally slower than the average for the country;
- GDP per capita in the cross-border region grows more slowly than the average for the country;
- Lower values of GDP per capita compared to the average for the country;
- Negative demographic trends;
- Lack of attractive living conditions within the cross-border region;
- Reduction of the population in the country and in the cross-border region;
- Availability of prerequisites for the contraction of the market, due to the decreasing number of the population;
- Availability of multiple regulations;
- Atmospheric air pollution in the transboundary region with FFP
- Established contamination of groundwater in the region. Haskovo;


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- Presence of processes related to water and wind erosion of soils;
- Existence of problems related to soil acidification in the cross-border region;
- Presence of soil contamination with radioactive elements;
- Low share of arable land
- As a result of the activities of important enterprises from the mining and metal mining sectors on the territory of the Kardzhali district, the presence of disturbed soils was found

#### 4.2.2.3. Opportunities

- Digitization of business processes in the sector;
- Reducing pressure on the environment;
- Reduction of pollution occurring as a result of the formation of food waste;
- Reduction of greenhouse gases;
- Optimization of holdings;
- Technological modernization;
- Creation of know-how;
- Export of cereals and food;
- Optimizing economic results in farms, as a consequence of the introduction of innovative technologies;

#### 4.2.2.4. Threats

- Dramatic increase in energy costs;
- Neglecting sector policies at the expense of the Defense sector
- Increase in inflation;
- Loss of soil resources as a result of degradation processes;


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# 5. Methodological Research

The purpose of this research is to investigate the current situation of the agro-food industry and collect primary data from small and micro enterprises regarding the Circular Economy and the Environmental Impacts. The survey was conducted in the GREECE-BULGARIA cross border region. A thorough investigation and analysis of the data resulting from this investigation will allow project partners to understand the level of existing circular economy applications with a focus on the agri-food industry of the sampled companies, to identify and assess the potential benefits of circular design, circular production processes and circular business models.

Research is a methodical search that aims to add additional elements to pre-existing knowledge by discovering new findings or visions. H Scientific research is a systematic, controlled, empirical and critical process that involves the review of theories - previous findings, the formulation of hypotheses, tests, checks and confirmations of hypotheses using special methods and tools and deductive reasoning. On the other hand, survey methods refer to the techniques and procedures used in the data collection process. The Methodology is the description and analysis of methods. The methodology of the research therefore refers to the parameters of the research effort, which relate to the general methodological approaches, methods, techniques, means, materials and procedures that it will choose to carry out the research.

The course of a survey shall be specified methodologically in relation to the theoretical framework, the previous findings, the empirical data, the means of collection (methodological tools), and the analysis of the results. This specification does not exclude the uniform structure and rules that characterize each investigation procedure. The research process is prompted by a reflection and seeks to answer how many businesses and consumers are aware of the environmental impact of the products they use. The methodology



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was designed in relation to the reflection and in relation to the field under consideration.

A survey is classified by:

1. The field of research, in other words, what is the subject matter and what scientific site is being investigated?
2. The nature of the research where it records, describes the problem, the phenomenon or tries to solve it.
3. The question of whether or not the investigator will intervene?
4. The form of the approach, as regards the subjects, the type of data (qualitative - quantitative) and the way the data are collected.

The method is therefore, the course - the ways that the student follows in order to obtain information about his research and to explore to approach and examine the "subject" of his research. In our case the object of the research is to investigate the current situation of the agri-food sector. Through the process of research, we have the opportunity to contribute to a better understanding of the phenomenon and to transmit this new knowledge to others. The data and procedures recorded allow in the future to plan other investigations, based on its findings and from other researchers. One important distinction in the survey is that obtained based on the format of the data used. The two main methodological options in research utilize different philosophical approaches, methods, techniques and tools. The two types are quantitative and qualitative research and a combination of both.

**Qualitative Research**

Through qualitative research, data is collected that describes problems and concepts from the life of individuals. Data can come from interviews, observations, participatory observations, stories, interactions, case studies, personal experiences, life stories, file analyzes, visual material and introspection.


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Qualitative research has two basically unique characteristics. The first is that the researcher is the medium by which the research is conducted, and the second is that its main purpose is to investigate some aspects of the social system that it is studying. Both of these characteristics are integral parts of the process and regard the researcher as the person who builds the knowledge and not as a simple receiver of it. The researcher collects the data, which he converts and interprets, through analysis, into information. This information, when applied and used repeatedly in practice in various social situations, becomes knowledge. Collecting data using qualitative methods is a multifaceted process with four specific characteristics: (a) the purpose is as rich a description as possible of the factual context of the investigation, (b) it is not a priori explicitly stated what data will be collected, (c) multiple data collection methods are used, (d) the data are not objective. It should be re-emphasized at this point that the methods described below are not independent of the investigator. It is the researcher who constantly shapes the way these methods are used, and the process and outcome depend on the attitude he takes and how he handles the research. The difference with quantitative research methods is obvious where theoretically if different researchers study the same phenomenon using the same method and procedure should reach the same conclusions. Below are some data collection techniques used in qualitative methodology surveys.

Data collection methods in qualitative research:

**Interview:** It is the most widely used method of collecting data in qualitative surveys and therefore additional basic data are given. Interviewing is the process in which one person asks questions and another responds. The interview has a variety of uses and genres. It is mainly used: (a) to collect - record experience or behavior, (b) to collect opinions - opinion: The questions ask them to understand how they perceive or interpret e.g. "what do you think" or "what do you think" or "what would you like" or "what do you think". (c) to


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record emotions: The questions are aimed at recording emotional reactions e.g. "What feelings did he cause you...?", (d) to record knowledge: e.g. "what do you know about the services provided by...", (e) for collecting demographic data or historical material: questions are aimed at obtaining information such as age, education, profession, etc., or background information on an issue. All the above uses of questions may refer to the past, present or future. Also, very often you need the researcher to ask additional information from the participants for the answer they gave immediately before. This is done with a kind of question called 'clarifying questions' and it is these questions that ask why in an answer given. It uses questions of the form how, who what, why, when, why, why, etc. The types of interview are standard interviews and non-standard interviews. Standard interviews include: (a) the structured interview: It's very relevant to the questionnaire; it just collects some more details. The researcher asks a series of strictly predefined questions, and the answers he requests are also on very specific topics. This means that all participants are asked exactly the same questions, in exactly the same words, in the same order by a researcher trained to treat each participant in the same way (usually neutral), (b) the semi-structured interview: It's a more flexible interview format. It allows you to go deeper. Clarification questions and/or the order of the questions may change. It is very commonly used in pilot studies, (c) group interview (structured or semi-structured): It is used when the researcher is interested in collecting information about the interaction and how it affects how participants' views are formed or changed. It helps a lot when sensitive issues such as antisocial behavior (violence, drugs, etc.) are investigated. Non-standard interviews are intended to gather as much information as possible from the participant. There's always a primal structure, it's just more flexible. It is the interaction of two or more people that determines the course of the interview. It gives the participant the feeling of just having a conversation. But the researcher has certain things he wants to know or control. Non-standard interviews include group (unstructured), ethnographic (without structure), life


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stories, informal interview, discussion, or "self-hearing". Although the interview as a data collection tool has been used in surveys with "quantitative" logic, its use by researchers using qualitative methodology has completely different purposes. In this case the aim is to encourage the participants in the survey to express and describe their own view on the subject of the survey. This, however simple it may seem, is in fact complicated because it must include a description of: (a) how the interviewee structures and understands his social surroundings in his various forms; (b) how he understands his role in this environment; (c) how he understands that his activity is influenced by various phenomena in these spaces. For example, if we want to examine whether and how businesses and the circular economy, using interviews, we should get answers on how their work was before the new analytical programs, what their role was in the school both in the classroom and in their relationships with the other teachers, what their treatment by the directors, whether they have been adapted to the new programs, whether programs have been promoted locally by the directorates, etc.

**Single case analysis (Case study):** The researcher focuses on a single case and tries to understand and describe it as best he can. This case may be a survey participant such as. a cross-border business. In this case, the researcher is not interested and cannot make comparisons or conclusions by studying multiple cases. Instead, the focus is on the most detailed description and understanding of one case. It is obvious that this method encompasses and is based on many of the other methods. For example, someone who wants to study a business in a particular region, can use interviews with the company's management and with the people who work, can observe him or her function.

**Remark:** The observer approaching the phenomenon under study using observation tries to record the phenomenon as he perceives it as an external observer but at the same time tries not to affect its evolution. To this end, it is trying to be as discreet as possible. In this case, the researcher keeps extensive


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notes before observing (what I intend to observe), during (what happens), and after (what were the main points of my observation) the event under observation. These notes are usually not structured at all, but they give an overview of what is being examined. This is in stark contrast to quantitative observation, where the behavior to be recorded is determined beforehand and is then counted against the frequency.

**Participant observation:** This method involves the participation of the researcher or researcher in the phenomena he or she wishes to observe. In this way it gains a better sense of being done, which is close to that of the participants in the survey. At the same time, in this way, the investigator is more acceptable to the participants and observation does not disrupt the evolution of the phenomena. In this case the aim of the researcher was to study the process of change. For a long time, the researcher was actively involved in councils and meetings.

**Parsing Files:** Texts relating to the subject of research are analyzed to identify and identify trends in various social phenomena.

**Life stories (Life history):** In this case, research is considered in the context of the life of one or more individuals. The central idea of this method is that the subjects to be investigated cannot be detached from the social experiences of the individual, of which they are an integral part. It is also argued that the individual's attitude and actions in the matter under consideration are better understood by taking into account his origins and his general action.

The term qualitative does not refer to the value or quality of an investigation, but indicates the axioms upon which it is based. Other terms used to describe these two different research approaches are for quantitative the term positivist, while for qualitative the terms explanatory-interpretive and/or naturalistic, i.e. research in physical contexts.


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**Quantitative Method**

Quantitative research systematically explores phenomena with numerical data and statistical methods and aims to discover the causes of change in social phenomena, leading to generalizations through research hypotheses. The investigator should focus on collecting a representative sample of the population being studied and formulating a questionnaire in order to obtain valid and scientific results. That's why we chose this method to present the findings of the survey conducted in small and micro enterprises of the agri-food sector based in the Greek side of the common cross-border area GREECE-BULGARIA. Questionnaires are usually used in quantitative research. The population of the sample in this survey is large. The questionnaire used in the quantitative survey is structured, i.e. each question in the structured questionnaire indicates a series of possible responses that the respondent is requested to answer.

The researcher in a quantitative survey is initially invited to study the research already carried out in the field of interest to him. Then, it must be created and formulate the hypothesis that will be checked in the course and then, it needs to plan the investigation to test the hypothesis, usually by creating the questionnaires. It will then conduct the study and perform a statistical analysis of the results, looking at alternative explanations for the findings. Based on the findings it will be able to answer the questions of the investigation and indicate whether the case is supported or not. In the end, they will consider whether the findings can be generalized. In summary, qualitative research differs in several respects from quantitative research. However, several times, one survey complements the other in order to draw safer conclusions about a social phenomenon. Therefore, it is not a few times that the two methods are combined to properly analyze the results. The purpose we use quantitative research understanding and familiarization with the participants of quantitative analysis as well as sampling method. Also, understanding and


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familiarity with what exactly should be observed and measured. That is, what are and what are the sample types that are used in a quantitative survey. Quantitative research uses quantitative methods and statistical inference to extrapolate the results from a sample to a population. Quantitative research, as opposed to quality, analyzes a large amount of data. In addition, it studies quantitative variables, i.e. numerical ones. These acquire all meaning when related to others through correlations, regression or case tests. Quantitative research is the only one that can draw conclusions that can be extended to a larger group than the one investigated. Therefore, its importance is, above all, because it allows generalization. In fact, hypothesis tests or regressions are aimed at obtaining results from a sample serving the population. But this does not mean that the quality occupies a lower hierarchical state. In fact, this is usually the first step before quantitative, through exploratory press surveys. However, when we want to carry out a convincing study, we must use figures. Furthermore, we need to take large samples, because only then can they be concluded. The aim of the research was to investigate the current situation of the agro-food industry and to collect primary data from small and micro enterprises regarding the Circular Economy and the Environmental Impacts. Greek research includes the U.S. Thessaloniki, Serres, Drama, Kavala, Xanthi, Rodopi, and Evros. The steps for carrying out quantitative research are very similar to those carried out on others, as described. However, they differ from the latter in that they go a step further and are not satisfied with the simple description.

**Types of Quantitative Methods**

1. Experimental: The researcher checks conditions (X, groups, measurement).
2. Sampling: Data collection via closed (mainly) questionnaires


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3. Secondary research: H Derivation of information through existing data collected from statistical services/ government departments/ research centers/ historical sources/ universities, etc.
4. Content analysis - text/document analysis - content is quantified and placed into specific categories in a systematic way - Application to many forms of communication.

In a research approach, the choice of the methodology to be followed should not be based solely on technical criteria or dogmatic considerations in favor of the qualitative or quantitative method, but rather on whether each of them is appropriate to answer the questions raised. Given the strengths and weaknesses of both approaches, the researcher can make a combination of both. In this way, it is easy to draw comprehensive conclusions based on choices that will be able to document. Quantitative research can be considered as a research strategy that emphasizes quantification of data collection and analysis. The result is a productive approach in which the control of theories is emphasized and practices and rules are incorporated. Finally, the view of social reality is expressed as an external, objective reality. The basis for quantitative research is reliable, numerical and statistical measurements of the total population. Its difference with qualitative research can be traced to the large number involved in such research. In most cases, 100 people are sufficient to answer Yes/No questions during the survey to ensure 95% reliability of the results. To get even more reliable 97% or 99% scores you need 400 to 2000 people. The use of a structured questionnaire for large samples of the population helps to make quantitative research effective and successful. The statistical conclusions drawn should reflect the behavior of the whole target population. Qualitative research several times uses quantitative research as a means to document and verify its findings. In quantitative research it is necessary to include the following elements: A fairly large crowd, representative of the total population, a randomly selected sample,


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representative of the crowd, and a designed questionnaire. In order to design a questionnaire, it is necessary to define the objectives of the survey and the information contained therein. To perform a statistical measurement, the questionnaires ask for much information and the data collected from them can be analyzed numerically.

Typical objectives and questions

All questions should be understood because in this way the respondent is encouraged and gives the answers needed by the researcher. General, difficult and pointless questions should be avoided. Initially, the sample of people who will be involved in answering a questionnaire is selected; this sample may be "likely" or "unlikely". It is possible that in which the probability of choosing one person is equal to each other. The result of this is that the results of one survey are representative of the whole sample. The exact opposite sample is the unlikely one, so such investigations may not be unbiased. The accuracy and reliability of the survey results depends on the sample size.

Methods of Quantitative Market Research in the Way They Are Carried Out

- Face-to-face interviews with respondents (face to face)
- Personal interviews on the street (face to face on streets)
- Personal interviews at central points (face to face to central locations)
- Personal interviews at work (face to face on desk)
- Postal surveys
- Phone interviews
- Internet Interviews

Once the investigator arrives at the sample he will use he must decide which method he will use to collect his data. Each method has its own advantages and disadvantages.


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**Personal interviews**

The interview during which the researcher is face-to-face with the respondent is called "personal" and takes place at central points, on the street etc.

Benefits: The interviewee can see the investigator. It is easy to locate the target population. Direct contact helps the interviewee to speak more time with the investigator than with someone unknown by telephone.

Disadvantages: There are more costs than other research methods, in particular when interviews are held in offices and workplaces, as time for travel is an important economic factor. Each center chosen to conduct the survey has its own characteristics. Respondents may have characteristics that differ from those of the target population, so the final sample is not fully representative.

**Surveys**

Benefits: It's one of the most economical methods. Only in this type of research are the names and addresses of the target population necessary. Images may be included in the questionnaire, which can only be found in this method. In postal surveys, unlike in personal interviews, the respondent has a lot of time to answer. For this reason, the surveys are not as "penetrating" compared to the other types of interviews.

Disadvantages: The time: Postal inquiries are quite time consuming. The researcher has to wait several weeks until he or she obtains the questionnaires and makes sure he or she has the highest number of replies. Response: The response rate to postal surveys is often too low to be considered useful, especially in populations where the level of education is low. Even if they don't, the percentages are between 3 and 90 percent. As a general rule, a better level of responsiveness is achieved when individuals are highly educated and have a particular interest in the subject of the research.


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In order to improve the participation rates of postal surveys, it is advisable to send a letter earlier, informing the sample that it will receive a questionnaire within the next two weeks. Two weeks after the questionnaire has been sent, it is still possible to send a letter to the respondent requesting the return of the completed and containing a written response. For example, a sample of 1,000 people estimates a 10% response rate, so 10,000 questionnaires need to be sent.

**Email Searches**

Research of this kind is economical and very fast. In this era, although many people do not have excellent knowledge of the internet, most of them have email, and these surveys are a better choice than electronic ones. On the other hand, email surveys include simple questionnaires as opposed to surveys through Websites that follow a different and more complex logic.

Benefits: Images and audio files can be attached. The cost is zero since the electronic facilities already exist. The speed. Many thousands of responses can gather within one or two days. Innovation: A high percentage of the population is stimulated by e-mail surveys compared to the usual 'slow-moving' postal surveys.

Disadvantages: A directory of e-mail addresses must be available. Getting arbitrary e-mail displeases many recipients, who want to be notified before they receive anything. Several times people beyond their own answer to the questionnaires will want to give them to their friends to reply and they will want to send their own answers and other times. Therefore, it is easy to note an alteration of the result as many programs are not controllable so that they can exclude people participating in the survey multiple times. The researcher can use a software program in which the email-module module of the research system receives a single answer from each respondent (IP test). e-mail investigations are not the most appropriate to generalize the results to the


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whole population, because people without e-mail differ from those they have even if their demographic characteristics such as age and gender are consistent.

Many e-mail programs appear in plain Word text and are unable to display images and audio files. e-mail is growing rapidly. But that doesn't happen in every country, as well as in Europe, Canada and the United States. However, in the rest it remains very limited; such surveys usually do not represent the entire population, because many of the "average" citizens, especially groups of the elderly and those with low education and low income, do not have e-mail. Thus, it may be better to restrict this method to members of the target population who have e-mail or in a corporate environment whose use is known and necessary.

**Internet/ (Websurveys) surveys**

Online surveys are becoming more and more common nowadays. They are characterized by many advantages, such as low cost and flexibility, high speed, but also significant sampling constraints. These restrictions make it necessary to select software programs correctly, while on the other hand they restrict the groups concerned.

Benefits: The cost is nil since the equipment and facilities already exist. Small samples do not cost less than larger ones (unless they are burdened at some cost). The photos are obvious because the software is capable of playing audio and video. Online surveys are extremely quick. For example, if a questionnaire is published on a well-known Website, it can gather thousands of responses in a very short time. Most people invited to participate in this form of survey will reply on the first day. The electronic questionnaires can use color and different kinds of fonts, as well as other formatting options that are not possible in most surveys via e-mail. Question bypassing, random ordering and other characteristics not performed in other investigations may be used. These


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features can provide much better data. On average, people tend to give more answers to open-ended questions than other kinds of research. There is sincerity in the answers of questions concerning sensitive issues, e.g. political views and others, in relation to the face to face answer, since the respondent answers a computer.

Disadvantages: People can easily give up. The chances of filling out a large questionnaire on the Internet are not the same as when faced with a researcher. Surveys are not an expression of the population as a whole. If the survey appears on one Website it is very difficult to check the people who give answers, because on this Website people from Greece to China may enter. The software available does not allow for further control over who answers the same questionnaire multiple times. The results of the investigation are therefore not objective.

**Scan Questionnaires**

Questionnaire scans are presented as a way of collecting data, which can be applied in paper form (paper questionnaires), which were either given during personal interviews or during postal surveys. Paper questionnaires can be created by a research system and can also be scanned using Remark Office OMR. Scanning can also be done by other software creating ASCII-like files, which can then be mounted on a suitable software.

Benefits: Scanning can be the fastest method of entering data in paper questionnaires. Scanning is a much more accurate way of reading correctly filled questionnaires than someone else does.

Disadvantages: When referring to surveys and Bar Code, the scan is the most appropriate. The programs responsible for the scan have several ways to manage the responses to text, but all require the additional factor of time entry. Scanning is less "forgiving" than a person, especially reading poorly written questionnaires. In this case, the scan requires purchase of additional hardware.


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**Key differences between quantitative and qualitative research**

The difference between quantitative and qualitative research lies not in the different techniques and methods they use, but in the different theoretical 'logic' with which research is approached. The easiest way to highlight the specificity of the qualitative method is to compare it with the quantitative method. It is generally considered, from the perspective of W. Dilthey, that the quantitative method, which is mainly used by the sciences, is the explanation of the phenomena, while the qualitative method, on which the social sciences and humanities are based, is intended to understand the phenomena. As the explanation, which, generally speaking, is based on the discovery of the objective, independent causes of a phenomenon presupposes the formulation of general laws about the phenomenon being studied, so understanding, which, generally speaking, recommends its description, the interpretation of its role, its position or function within a wider totality, is a form of individualized research. The quantitative method therefore belongs to the cause-and-effect model, whereas the qualitative method is linked to the cause-and-effect' 'example'. Quantitative methods are often called explanatory or empirical or legislative (so called because they involve the discovery and adoption of general laws or rules related to a more general context), while qualitative methods are defined as descriptive, comprehensible, idiographic (so called because they refer to the description, interpretation and understanding of situations and processes concerning the individual) or hermeneutical.

## 5.1. Research Tools Used – Greek Side

In our own study we chose to use field research. We focused on small and micro enterprises in the agro food sector based in the Greek side of the common cross-border region GREECE-BULGARIA and was conducted online using an appropriate questionnaire. The investigation took place between 18 February and 15 March 2022. The areas of the Greek side in the common


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cross-border area between Greece and Bulgaria include Thessaloniki, Serres, Drama, Kavala, Xanthi, Rhodope, and Evros. The aim of the research was to investigate the current situation of the agro-food industry and to collect primary data from small and micro enterprises regarding the Circular Economy and the Environmental Impacts.

Raw data is collected as part of a search with objects:

i. the mapping of existing uses of circular economy principles and related environmental impacts,
ii. recording existing circular economy applications with a focus on the agro - food sector, and
iii. the submission of proposals for the implementation of the principles of the Circular Economy in the agri-food businesses of the common cross-border area GREECE - BULGARIA.

Primary Research

Primary research was chosen because it is based on the collection of original data needed to solve a specific problem or phenomenon. It is a classic research method which displays a particularly wide range of applications in market research. In any case, the primary research gives us data that a business needs that we cannot only derive from a secondary must be collected directly from the market. These data are original and are collected specifically to solve a specific problem. Of the 4 ways we collect primary data we chose the method using a questionnaire. The use of the questionnaire is the most common and popular for the collection of primary data. The information is collected based on the answers from the respondents who have been asked specific questions. Questions are the raw material of the questionnaires and therefore the quality of the survey results depends to a great extent on them. The content of the questionnaire was developed and created, guided by the objectives of the


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Circular Economy and Environmental Impact Survey. In this way the questions used are aimed at providing answers to the issues of the current situation of the agri-food sector. A general approach of the questionnaire to gather from the market information of three categories, the characteristics of the enterprises, activities and finally behavior and incentives.

Depending on the nature of the questions and the objectives of the survey, the questionnaires can be divided into:

- Fact questionnaires which are the most popular, and are intended to receive answers about specific events of the past. The data collected in this case are quantitative.
- Questionnaires of views asking the respondent to express an opinion, preference, opinion or assessment. The data collected in this case are qualitative.
- Explanatory questionnaires asking the respondent to interpret his/her previous actions, preferences and options. The data collected in this case are mainly quantitative.

It is the most important job to write the questions and turn them into the questionnaire. This is because, if the questionnaire is a method of collecting data on a variety of subjects, it can hardly be considered a scientific tool with absolute criteria. However, there are some general principles that can be valuable in the design of questionnaires. The European Parliament's Committee on Legal Affairs and Citizens' Rights, which has been asked for its opinion, has been asked for its opinion. Secondly, they should be able to provide information that is requested of them, that is to say, to know it. And finally, they want to give the information, otherwise they will not answer at all or they will not answer real.

<u>The types of questions</u>


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The types of questions that can be used in a questionnaire, regardless of how it is filled in, are two: open questions and closed questions.

Open-ended questions are answered by the respondent using his own words. Precisely because they do not limit the range of questions they help to collect more data. They are especially useful at the research stage; in which it is more important to discover in general what some people think rather than how many people think in particular. In this way it is possible to uncover a number of issues which are likely to have to be considered in more depth in the course of the investigation. Open questions are particularly interesting because of the spontaneous nature of the answers which is "colored" from the personal point of view of each individual. For this reason, they are often used in qualitative research or in relatively small exploration projects. This advantage, however, implies difficulties in codification, in quantitative analysis and in assessing the answers. For this reason, it is possible to increase the cost and duration of the research or to require the services of specialized analysts.

In the case of questions of a closed type, the range of answers is strictly limited. The respondent is given the option to select his answer from a list of predefined alternative answers. The answers should be completely different from each other, so as not to confuse the subject. Closed questions are very popular in quantitative research cases because all answers can be encoded. Consequently, it is relatively easy to analyze and process the results (especially with the use of appropriate software), even when the sample size is very large. Closed questions are considered to be more easily answered than open questions. They require much less writing information and allow a much larger amount of data to be collected in a shorter time. However, they limit the spontaneity of the respondent, as they oblige the respondent to choose between some specific answers without further elaboration or providing additional information. For this reason, it is


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more likely that non-honest answers will be received, since the respondent is not asked for the reasons for his answers. In addition to drafting the questionnaires, there are two other important issues that are directly related to this research tool: how to contact the sample of the survey and maximize the response to the survey.

Survey Build Steps

The questionnaire was set up on the basis of specific data characterizing a successful and correct survey, including:

- Completeness in the coverage of all aspects of the issue investigated, to ensure that the consideration of a significant factor affecting and affecting the subject matter of the investigation is not omitted
- Clarity of question content
- Consistency between the individual questions. Related questions appear in the questionnaire grouped together and are asked together, in order to make the thinking and memory of the respondent easier to direct your correct answers
- Appropriate structure of the questionnaire, i.e. the order in which the question groups will be set, as this directly affects the respondents' degree of responsiveness.

In view of the above, the questionnaire was requested to have the following characteristics:

- Include audit queries that are asked precisely to check the correctness of responses to key questions by identifying any discrepancies
- To be as short as possible and not to extend to a large number of queries, so as not to tire the respondent or create a feeling of losing too much time and therefore not completing his completion


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- Include basic completion instructions and conceptual explanations

The survey has the following types of questions:

- Open Questions: Respondents answer the same question without being given a choice of answers
- Closed Questions: These are divided into the following categories:
- Bisection questions: Respondent selects one of the 2 available responses
- Ranking Questions: Respondent ranks available options in order of priority
- Scaled Questions: The respondent selects through a scale of classified responses
- Multiple Choice Questions: Respondent selects one or more available answers

Structure of the questionnaire

The structure of the questionnaire was designed so that the flow of questions follows a logical and temporal follow-up by first exploring the perception and attitude of respondents towards the mapping of existing uses of the principles of the circular economy and related environmental impacts and continuing with the recording of existing applications of circular economy with emphasis on the agro-food industry to come up with some questions that generally relate to the submission of proposals for the implementation of the principles of the Circular Economy to the agri-food businesses of the common cross-border area GREECE-BULGARIA.

**How to contact the sample survey?**

Internet questionnaires have become very popular in recent years as they are very easy to use, offer the possibility of access to very large sample sizes and at the same time are very economical. However, they also have the significant disadvantage of a sufficiently low response from the selected


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sample. Questionnaires on the Internet contain simple and easily understandable questions so that the respondent does not mind their interpretation.

Their advantages:

1. Rapid contact with very large samples is possible.
2. The total cost is lower than all other methods.
3. People aren't used for interviews. Avoids the mistakes of people interviewing.
4. Respondents can complete the questionnaire without time pressure.

For all these reasons we have chosen and sent the questionnaires electronically via google form and for data analysis to use qualitative field research as through this method the data are suitable for quantitative (statistical) analysis.

**Secondary Research**

Secondary data was also used in this survey. There are cases where data from one survey is reused in another with completely different orientation, purpose and goals. They entail second-hand information already collected and recorded by any person other than the user for a purpose not related to the current research problem. It is the easily available form of data collected from various sources, such as censuses, government publications, internal organization files, reports, books, magazine articles, websites, and so on. Secondary data offers many advantages as it is easily available, saving researcher time and cost. However, there are some drawbacks associated with this, as data is collected for purposes other than the problem, so that the usefulness of data can be reduced in many ways, such as relevance and accuracy. There are cases where data from one survey is reused in another


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with completely different orientation, purpose and goals. Therefore, before using secondary data, these factors should be taken into account.

Benefits of secondary quantitative data analysis

The sources of quantitative social data are multiple and enable social scientists to choose data suitable to their research interests. These sources include data from population censuses, special sampling studies, state surveys, cross-sectional and longitudinal studies, as well as data from administrative and public archives. With access to the above data sources, benefits that can be distinguished in practical and social terms, as well as benefits related to the development of theory and the evolution of essential knowledge, were secured. The most practical advantage of the method is based on the possibilities of high data quality analysis with the minimum financial cost, time and staff required to organize and conduct a quantitative survey. The data used in secondary analysis are often the result of large-scale research primarily collected by agencies and organizations with significant experience in quantitative research. In particular, data are collected by qualified personnel using sophisticated and reliable sampling methods, ensuring the highest possible quality and reliability. In addition to its practical advantages, secondary analysis is also distinguished for its particularly important social benefits. Research issues can be explored using the method without requiring additional data collection. This is particularly important, firstly, in those cases where investigative objects are particularly sensitive research topics (such as abuse, alcoholism, etc.) and the investigator, using data already generated, avoids indiscriminate collection of data from 'vulnerable' and 'vulnerable' social groups. It is also important in surveys where issues for which it is difficult to find information are studied. In addition to the wider social benefits of secondary analysis, however, the method provides a specific benefit for research. More specifically, the method by providing high quality


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data at a particularly low cost achieves, and ensure that "all researchers have the possibility of empirical research. Secondary analysis enables researchers to collect primary data, explore research issues of interest. Beyond the practical and social benefits of the method, secondary analysis is distinguished for its multiple scientific benefits. The method offers unlimited application possibilities for different quantitative data research designs, which allow social researchers to investigate social phenomena over time and across time, thus contributing to the development of theory and to the foundation of meaningful knowledge. In particular, secondary analysis of longitudinal data such as trend studies, panel studies, cohort studies, survival data analysis, field investigations, and time series allow a deeper understanding of the events of the past and their possible effects in the formation of specific social conditions and phenomena of the present. In addition, the method allows comparisons between different national and cultural systems to be made, applying it to cross-national studies and cross-cultural studies, contributing decisively to a deeper understanding of how policies should be adopted to promote the transition to the circular economy. To this end, we initially examined specific issues of the primary investigation that served to record the economic cycle of production of a wide range of products, from their production process to their consumption, including the sound management of waste as well as the production, movement and use of secondary raw materials. The sources we used were academic financial articles, bank studies, data from published articles in the European Union, as well as data published in official statistical databases.


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## 5.2. Research Tools Used – Bulgarian Side

**Methodological framework of the research**

The subject of the study is the establishment of the state of the agro-food sector and related systems, as the focus of attention of, among others, major issues, barriers to development, capacity, etc. The object of the research is the Enterprises and farms from the agro-food sector (including the personnel who are located in them). The purpose of the study is to provide information on the state of the agri-food sector in the cross-border region. Tasks before the research: Task 1: To elicit information on key social, demographic, economic and other characteristics for respondents and businesses from the agri-food sector in the cross-border region. Task 2: To establish the degree of implementation of strategic and marketing plans and strategies. Task 3: To ascertain the readiness for synergy among the respondents. Task 4: To establish the degree of implementation of green practices/technologies as well as those that are characteristic of the circular economy. Task 5: To find out what are the most significant problems and barriers for enterprises and farms from the agri-food sector in the cross-border region. Task 6: To establish the burden of different production costs for enterprises and farms from the agri-food sector in the cross-border region. Task 7: To establish the extent of use of consulting services Task 8: To establish the extent of membership in trade organizations and the effects that are achieved within this membership. Task 9: To establish the extent of implementation of procedures, policies and codes in relation to different areas of organizational development. Task 10: To explain reliable statistically significant relationships, in the context of the research strategy.



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**Approaches to research implementation**

The research is based on the inductive approach, which is the stepping on the empirical facts collected in the course of its implementation, the analysis of which provides a factual basis for the description of the state of the Agri-Food Sector in the Cross-Border Region. Another approach that is taken is the sociological approach, which is based on identifying, understanding and analyzing the various relationships between variables, potential impact factors, etc. A third important approach is the collective one, which allows in this case to examine persons over 18 years old from the Bulgarian side of the Cross-Border Region of Greece-Bulgaria Cooperation Programme, including the districts of Blagoevgrad, Smolyan, Haskovo and Kardzhali. The typological approach is also applied, through which the specific criteria for participation in the research is defined.

**Data registration methods**

The method used is a survey that was conducted electronically. Responses were collected by two of the project partners – Regional Chamber of Commerce and Industry (Project Beneficiary 4) and Renewable Energy Sources Cluster (Project Beneficiary 5). The analysis is realized on the basis of the collected answers from both partners, as a comprehensive database of collected data. The sample was implemented on the basis of the respondents. Since there are no publicly available statistics (or very limited) in Bulgaria regarding the number of enterprises and farms from the Agri-Food Sector specifically in the Cross-Border Region, as well as their distribution by regions, size, etc., it cannot be concluded unambiguously that the data from the conducted research can be extrapolated 1:1 for the general population.

The realized volume of the sample from the Bulgarian side is 115 persons.


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**Data processing**

Specialized software was used in the data processing process (SPSS), which finds application in sociological, marketing, psychological and other fields of research. Both univariate distributions and statistically significant relationships were analyzed by applying Chi-square (x2) Analysis, as well as the strength of relationships and bivariate distributions that corresponded to them.

In the process of establishing the presence of statistically significant relationships between the various questions in the study, due to the size of the sample and the large number of possible answers to most questions, as well as the specificity of the answers themselves, very often statistically significant relationships cannot be validated as reliable, insofar as do not meet the conditions for correct interpretation of the values from the Chi-square Analysis.

This is a typical problem for smaller samples where more complex tables (with more than 2 columns and 2 rows) are crossed and prevents the detected relationship from being considered credible. In order to extract greater informativeness from the available data, a routine approach was taken in their analysis of grouping the answers to some questions into homogeneous meaning cores of questions important to the study, but in different variables, through the possibility that the processing software offers - (Transform›Recode into Different Variables). In this sense, it becomes possible to analyze the data both in the original form in which they were obtained, and in the aggregation, which aims to group the responses into fewer categories and help to conduct the Chi-square Analysis. In this way, the answers to the education questions were grouped, where: College/University graduates and those with a Master's Degree fall into one category of persons with a Bachelor's Degree and higher, while all others fall into another category - less than a Bachelor's Degree ; where the position in


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the company is divided into two groups - the first group of owners, where only they fall, and the second group - staff, where the technical, administrative, etc. fall. personnel (i.e. all possible answers except "owner"); those who declared that they implement a strategic development plan/marketing plan fall into one group – implement a Strategic Development Plan/Marketing Plan, and those who did not declare that they implement (in one form or another) – do not implement a Strategic/Marketing Plan; enterprises and companies open to synergy fall into one category – open to synergy; while those who answered "no" and "don't know" fall into another category - "it cannot be confirmed that they are open to synergy" Regarding the questions dedicated to the introduced practices in the field of the Circular Economy, a recoding was carried out in 2 instead of 4 categories , and in the first are the enterprises and farms that have introduced such practices and technologies, and in the second those for which this cannot be said, i.e. those who develop but have not yet introduced and those who have introduced but do not apply them and those who do not recognize the essence of the practices characteristic of the Circular Economy. Similar is the case related to the questions related to the procedures, rules and codes applied/not applied by the research participants, where instead of 4 categories, the answers are grouped into 2 – the first are the enterprises and farms that have introduced such practices and technologies, and in the second are those, who have not i.e. those who develop but have not yet introduced and those who have introduced but do not apply them and those who do not recognize the essence of the practices typical of the circular economy.

Similar is the case related to the questions related to the procedures, rules and codes applied/not applied by the participants, where instead of 4 categories, the answers are grouped into 2 - the first is that of the companies that apply such procedures, policies and codes (all answered


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that they have applied and those that do not apply (have developed but do not apply them, are currently developing but have not yet applied them and those that have not developed at all and accordingly do not apply).

The approach to grouping the significance of the various problems experienced proved to be extremely productive, and instead of 8 categories they are divided into two – more serious issues/problems and problems/issues that are not as serious. The first group includes all respondents who defined the importance of the various problems being investigated with a score of 1, 2, 3 or 4, while the second group includes those who answered with 5, 6, 7 or 8. The same approach was taken regarding of costs, where instead of 7 categories they are grouped into 3 – "large production cost" (answers 1 to 3), "medium production cost" (answer 4) and "small production cost" (answers 5, 6 and 7). These operations allowed for some of the deficiencies of the sample to be neutralized and to generate more information on the topic of the study.

It should be noted that as far as the analyzed information was obtained as a result of the translation of a survey from English to Bulgarian language, slight stylistic/technical discrepancies were observed between the translation of the two organizations that collected the data in the definition of the answers, which in the subsequent analysis were coded and interpreted in homogeneous meaning kernels without changing their meaning in any way.


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# 6. Findings

## 6.1. Regarding the Greek Side

### 6.1.1 Primary Data Analysis

#### 6.1.1.1 Research Sample

The examined sample in this survey is composed of stakeholders in the agri-food sector. As depicted in the following pie chart, the majority of the respondents, 222 totally, are men.

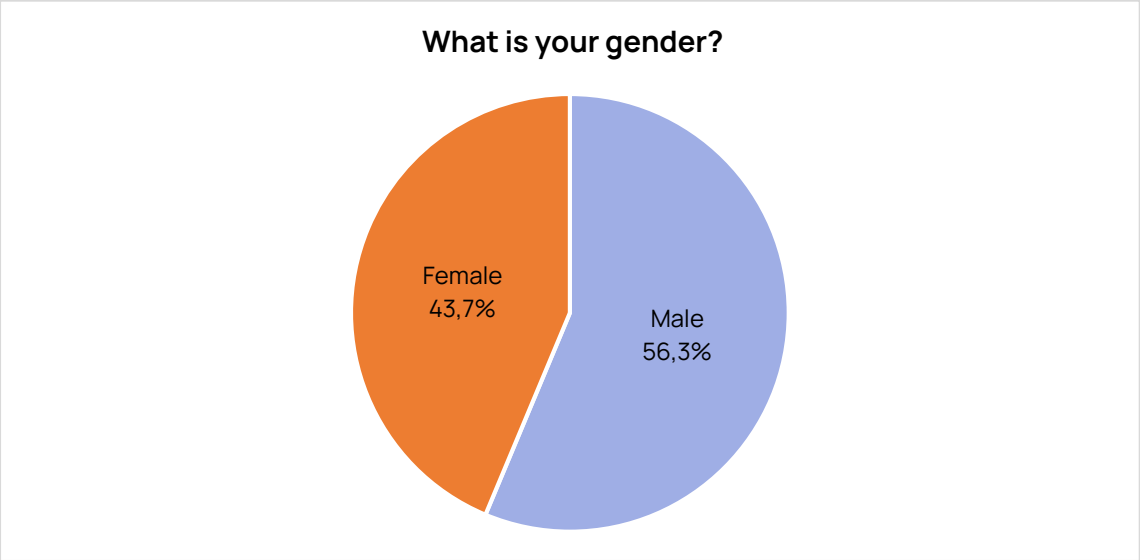


*Figure 23: Respondents' Gender*

At the same time, almost 60% of the questionnaires were answered by people between 35 and 54 years old, as the next graph presents:



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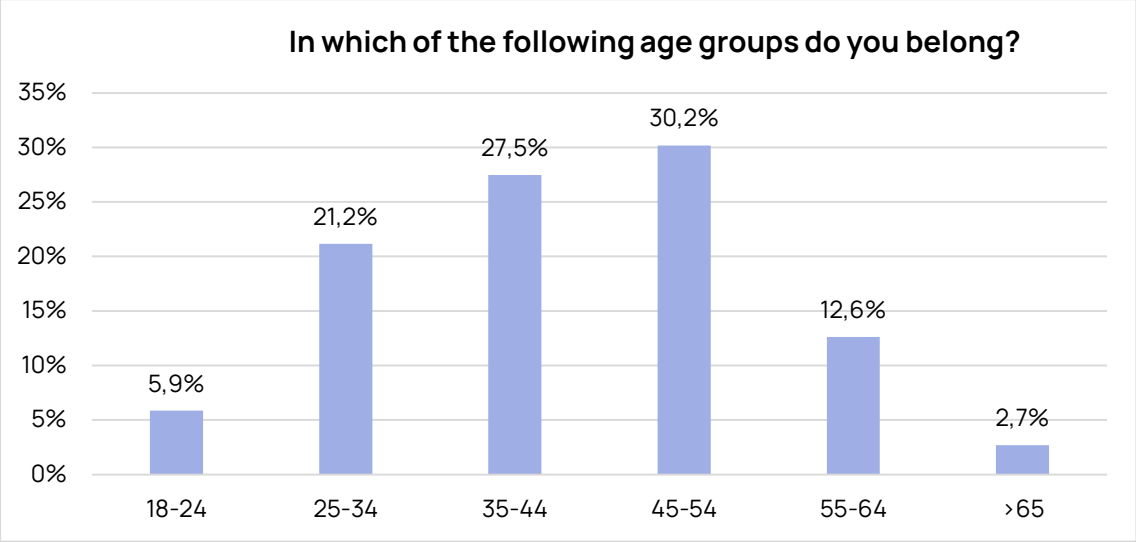


*Figure 24: Respondents' Age Groups*

Moreover, taking into account the next figure, 64% of the respondents hold a bachelor's degree and half of them are alumnies of a postgraduate program. It is also crucial to mention that only 4.5% of the respondents have a maximum level of education equal to high school.

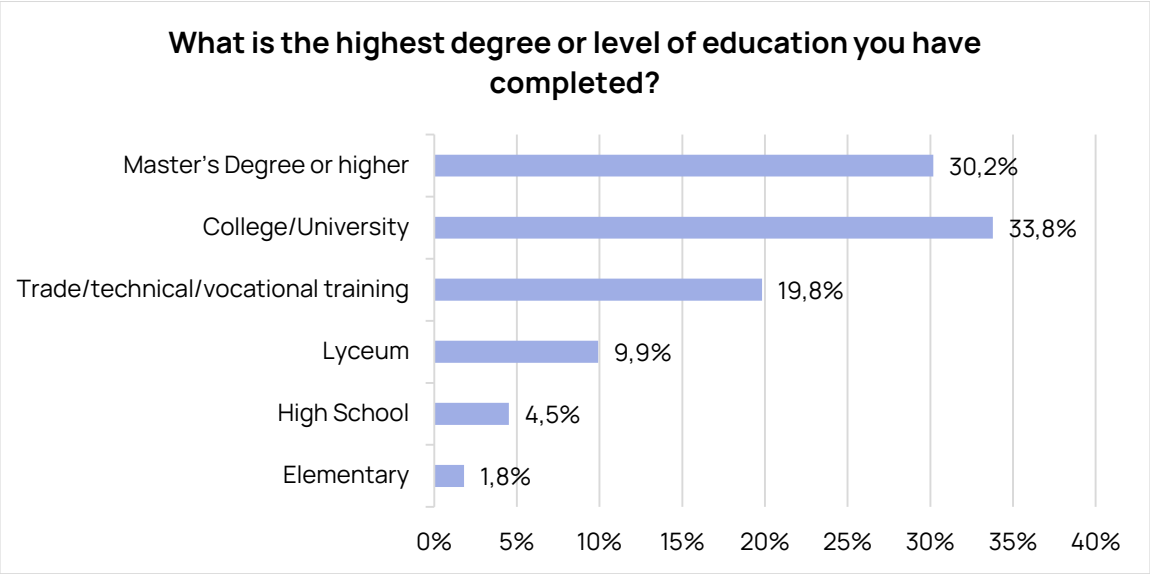


*Figure 25: Respondents' Highest Level of Education*

The respondents are both entrepreneurs and laborers as well as top executives, low-middle managers, and technical staff in the agri-food



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industry. They are based in the Regional Units of Drama, Evros, Kavala, Rodopi, Serres, Thessaloniki, Xanthi, and Rodopi.

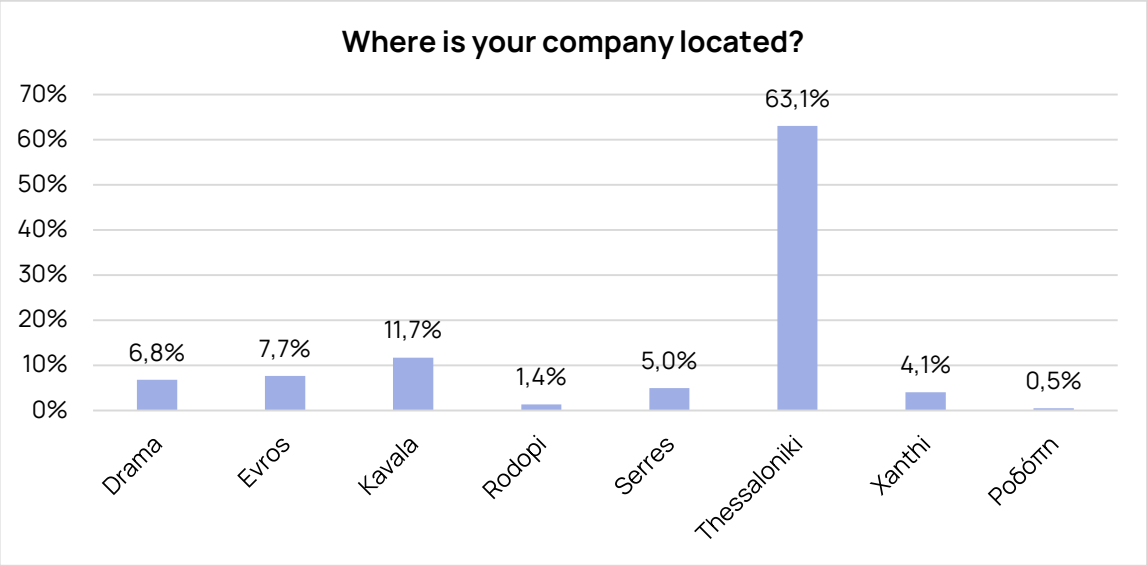


*Figure 26: Location of Respondents' Companies*

According to the above figure the vast majority of the people who answered the questionnaires are located in the Regional Unit of Thessaloniki something which is absolutely normal taking into consideration its population compared to the other examined areas. In general terms, it is able to be said that the distribution of the answers is analogical to the population and the business activity of each examined Regional Unit.

It is also important that questionnaire respondents hold different positions in the agri-food sector. In this way, the current survey will conclude with more accurate and undoubtful results around the agri-food industry having analyzed any possible view over the most significant issues.



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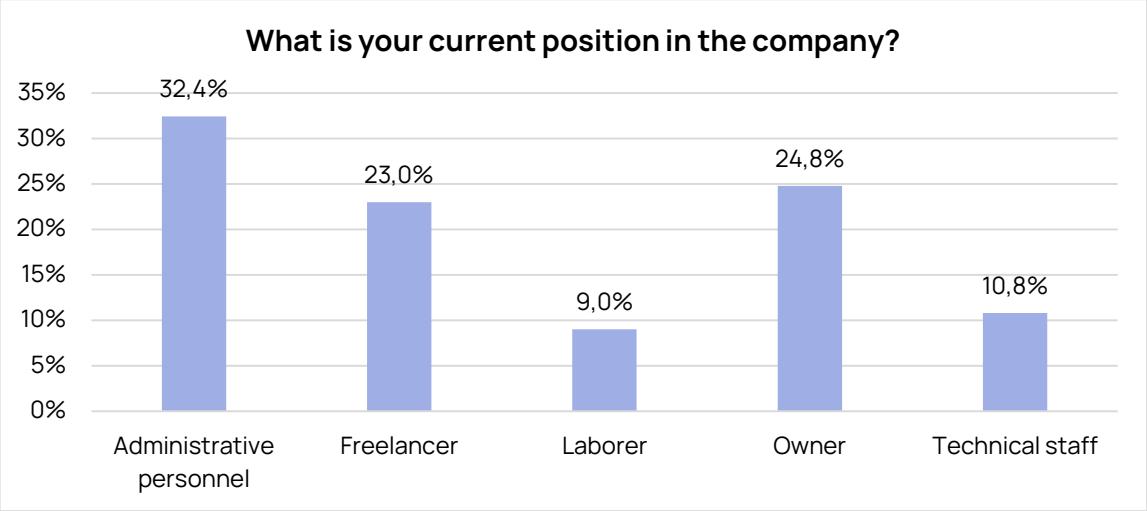


*Figure 27: Respondents' Current Position in their Companies*

More specifically, Figure 27 reveals that slightly over 30% of the respondents are administrative employees, while almost half of them are freelancers or owners of agri-food firms. Laborers and technical staff represent each approximately 10% of the sample.

The majority of them seem that are related to local firms that operate for more than 5 years, while only 10% of the examined companies were established in the last 3 years (Figure 28). This could be a piece of evidence for some serious barriers that perhaps make significantly difficult the introduction of new firms in the agri-food sector.

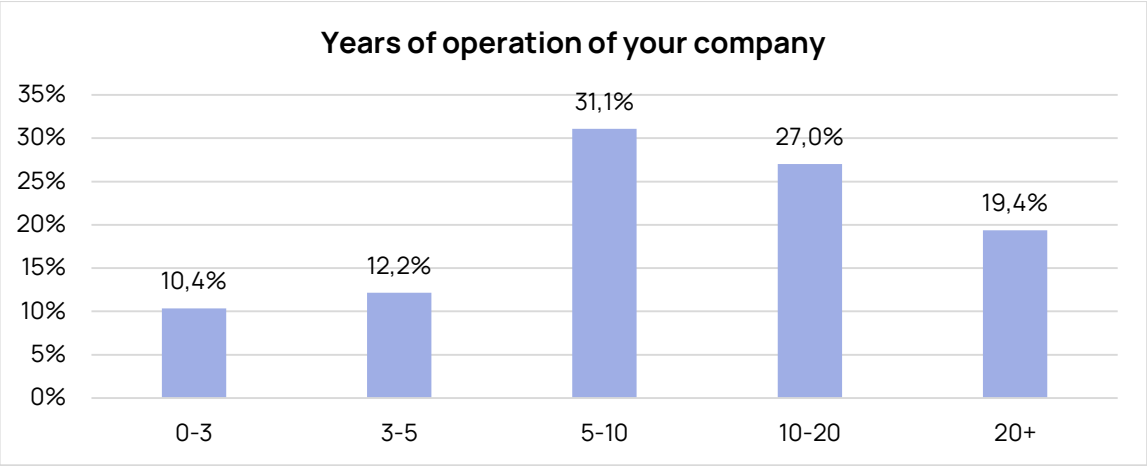


*Figure 28: Years of operation of Respondents' Companies*



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A quite good distribution regarding the analyzed companies exists in the parameter of the field of the agri-food sector each company operates in. Taking into consideration the following figure, most of them are productive companies reaching 32.9% of the whole sample. Service-providing firms and processing companies come after holding 22.1% and 18.1% respectively, while both logistics and trading firms have 10% of the sample each. The rest of the examined companies operate in the field of packaging in the agri-food industry.

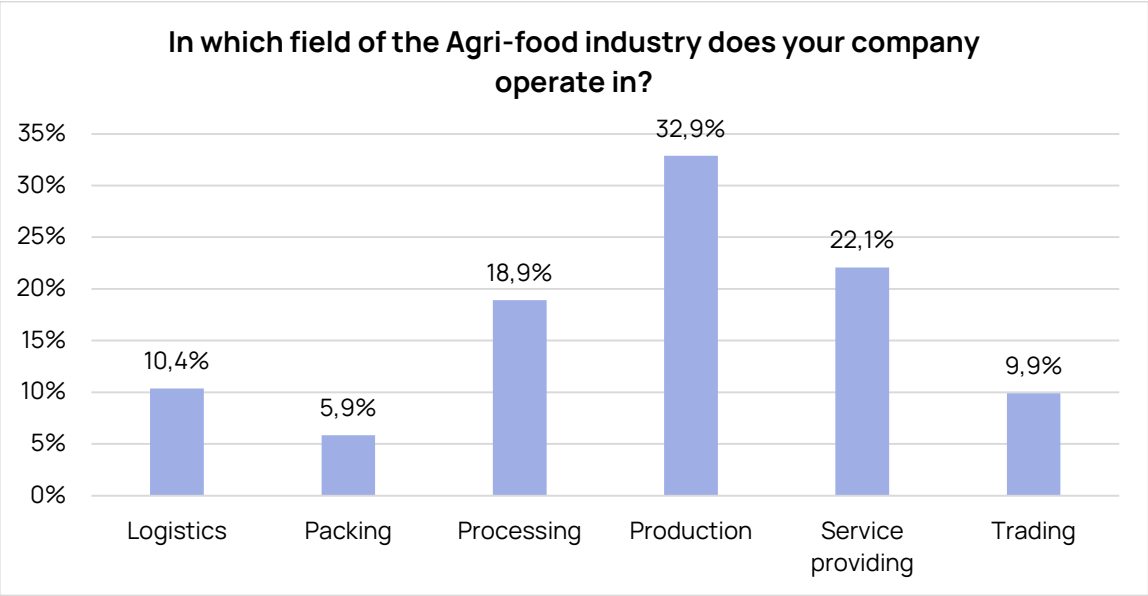


*Figure 29: Respondents' Companies' Operation Field in the Agri-food industry*

As for the size of the analyzed firms, according to the next two graphs, the vast majority of them are small or very small enterprises since almost 85% of them have simultaneously less than 50 employees and record annually lower than €10 mil. revenue on average.



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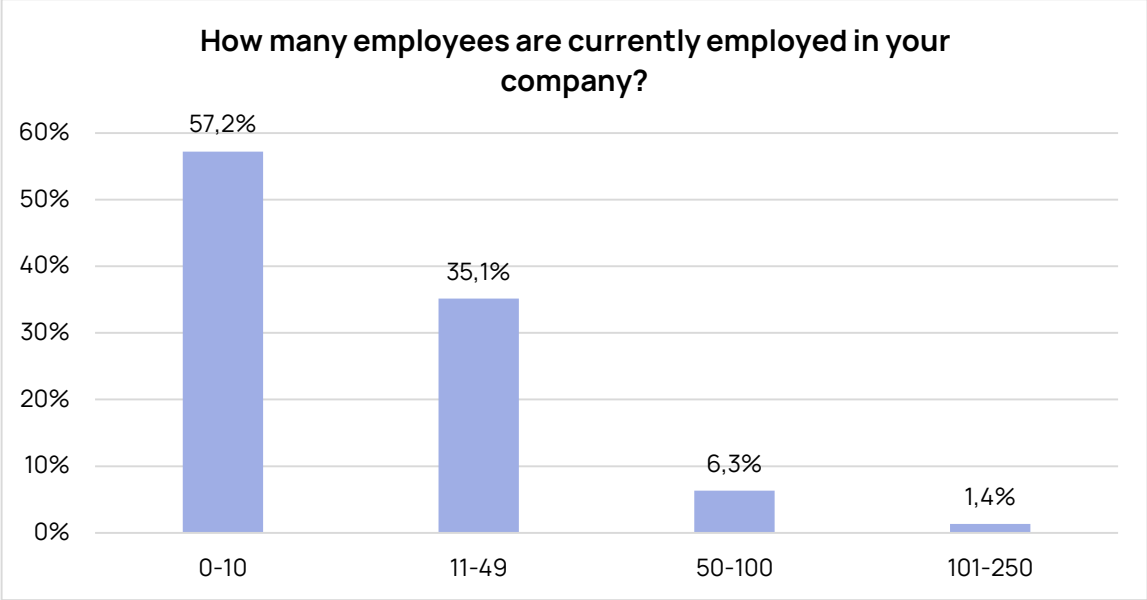


*Figure 30: Number of Employees of the Respondents' Companies*

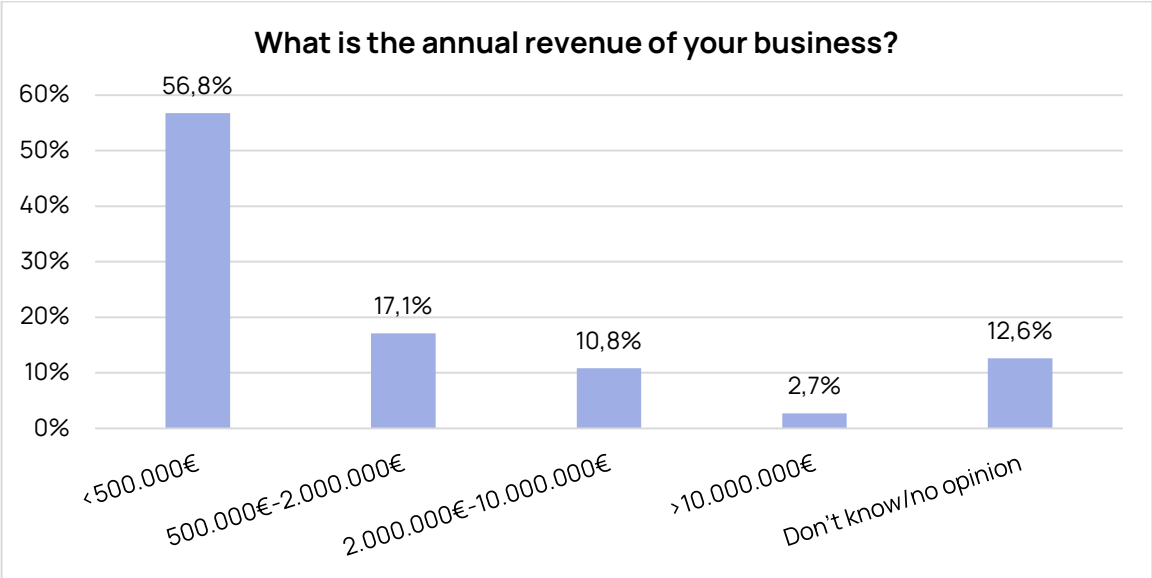


*Figure 31: Annual Revenue of the Respondents' Companies*

### 6.1.1.2 Results Presentation

The following figures present the main results of the current survey around the conditions and the changes that are met in the agrifood sector. To begin with, 47.7% of the respondents' state that are related to agri-food companies that have a specific strategic plan. This



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percentage becomes higher if we add these companies which are developing at the moment their strategy (13.5%) and those which have a specific strategy, but are not following their plan (11.3%). On the other hand, it seems that almost a third of the analyzed companies operate without a strategic plan.

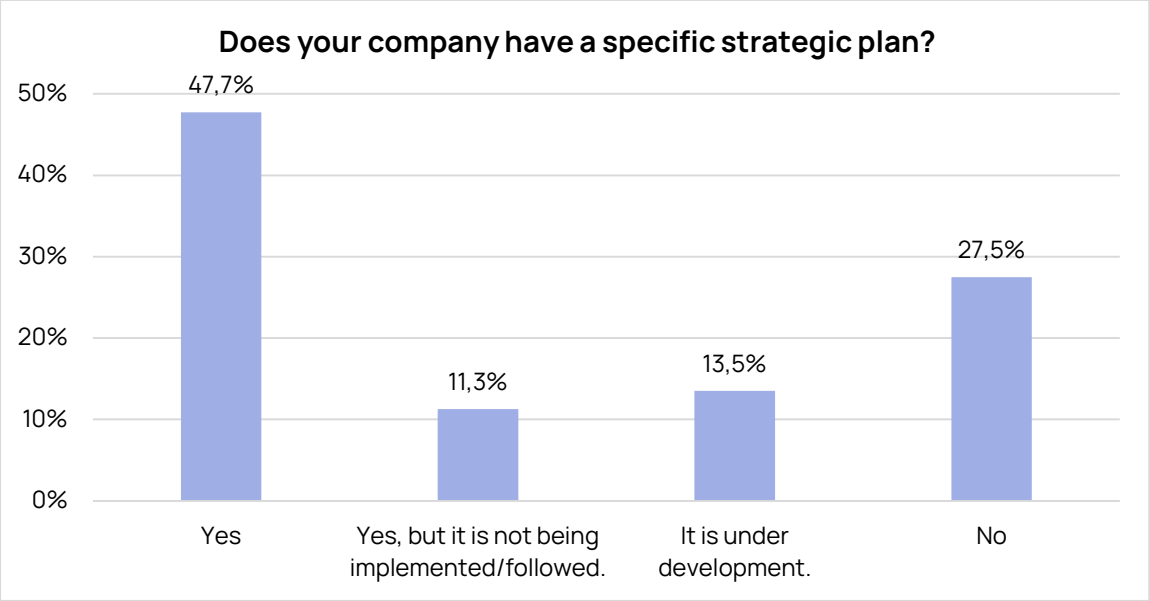


*Figure 32: Strategic Plan*

Taking into consideration the graph below, it is observed that the results are quite similar regarding the existence of a specific marketing plan in the agri-food firms that are located in the area of interest. More specifically, 47.3% of the examined companies adopt a specific marketing plan, 7.2% of them has a specific strategy in the marketing field but they are not following or implementing it, while 13.5% of the firms have started to develop their own marketing plan. Those firms which have no marketing plan are estimated to be 27.5% of the sample.



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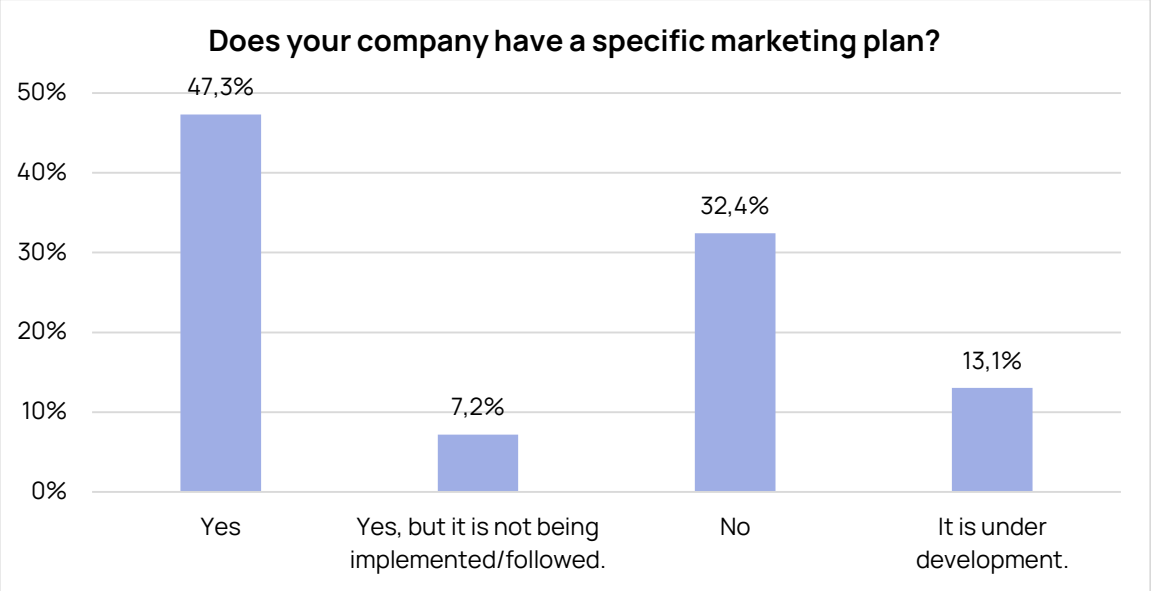


*Figure 33: Marketing Plan*

A strategic or a marketing plan sometimes in order to be accomplished may lead agri-food companies to cooperate to achieve their goals. This perhaps is the explanation for the huge percentage (74.3%) that is recorded by those companies which are willing to take part in synergies with other agri-food stakeholders. It is also really impressive and quite optimistic about the development and the sustainability of the agri-food sector that only 9.0% of the respondents believe that their companies are against synergies.

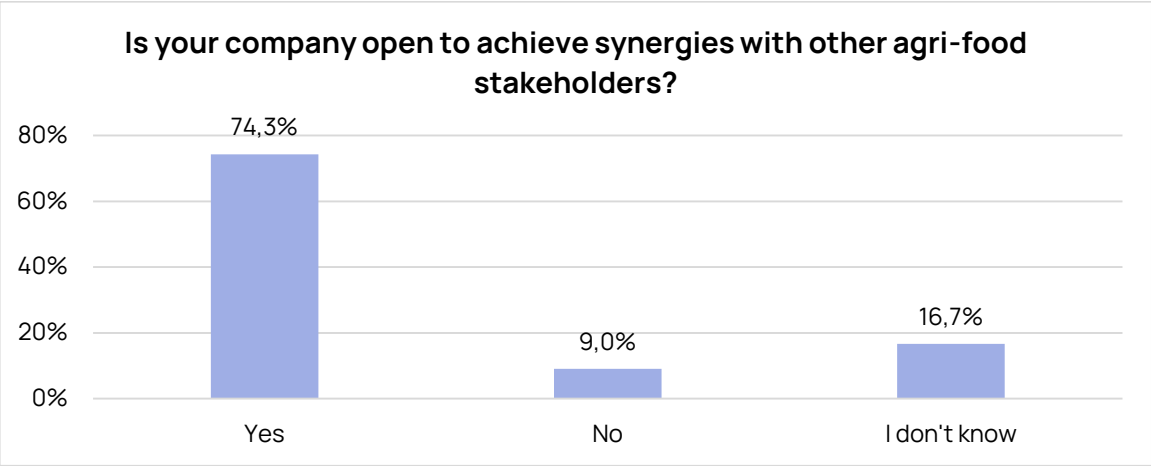


*Figure 34: Synergies*



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Analyzing if the agri-food companies have introduced in their daily operation green practices or technologies, it is not observed a tendency in the agri-food sector to become its companies environmentally more sustainable. According to Figure 35, the companies that have integrated green practices hold 35.1% of the sample, while it is quite optimistic for the nearby future that another 20% have started to adopt green technologies. Companies that are not familiar with green practices record 23%. Finally, something which is a matter of warning is that almost 20% accumulatively of the respondents do not know if their companies follow a green policy and even worse in some cases they cannot define when technology is considered as "green".

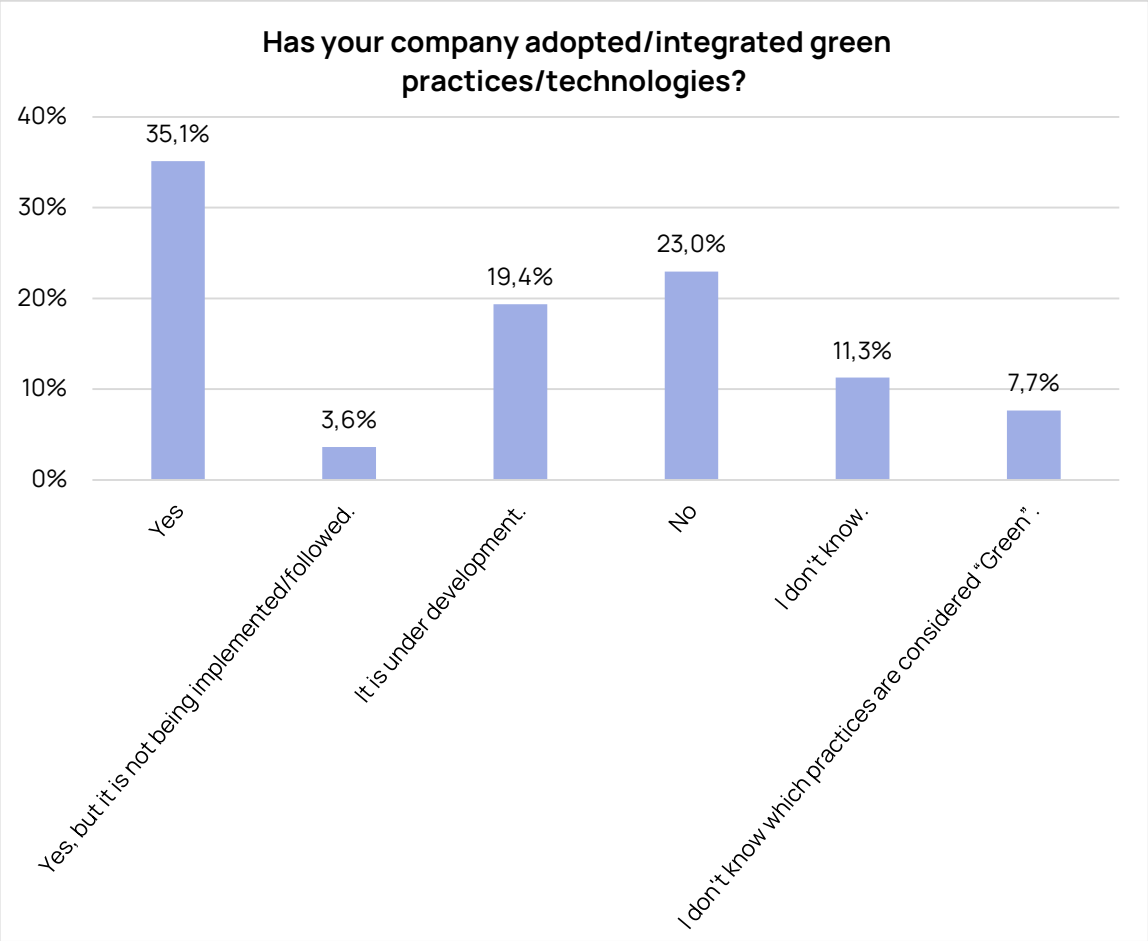


*Figure 35: Integration of Green Practices/Technologies*



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Following the above question, the current research examines how many of the respondents' companies have also integrated circular economy practices. Taking into account the graph below, it is concluded that less than half of companies in the agri-food sector adopt a circular economy approach. On the other hand, 26.1% of the companies have not still invested in the circular economy. Moreover, it is crucial to highlight again that there are a significant number of people related to the agri-food sector, just like the respondents of this survey, who do not know if their companies adopt circular economy practices or when some practices are a part of a circular economy model. In this case, the first ones are 17.6% of the sample and the second ones are 14.4%.

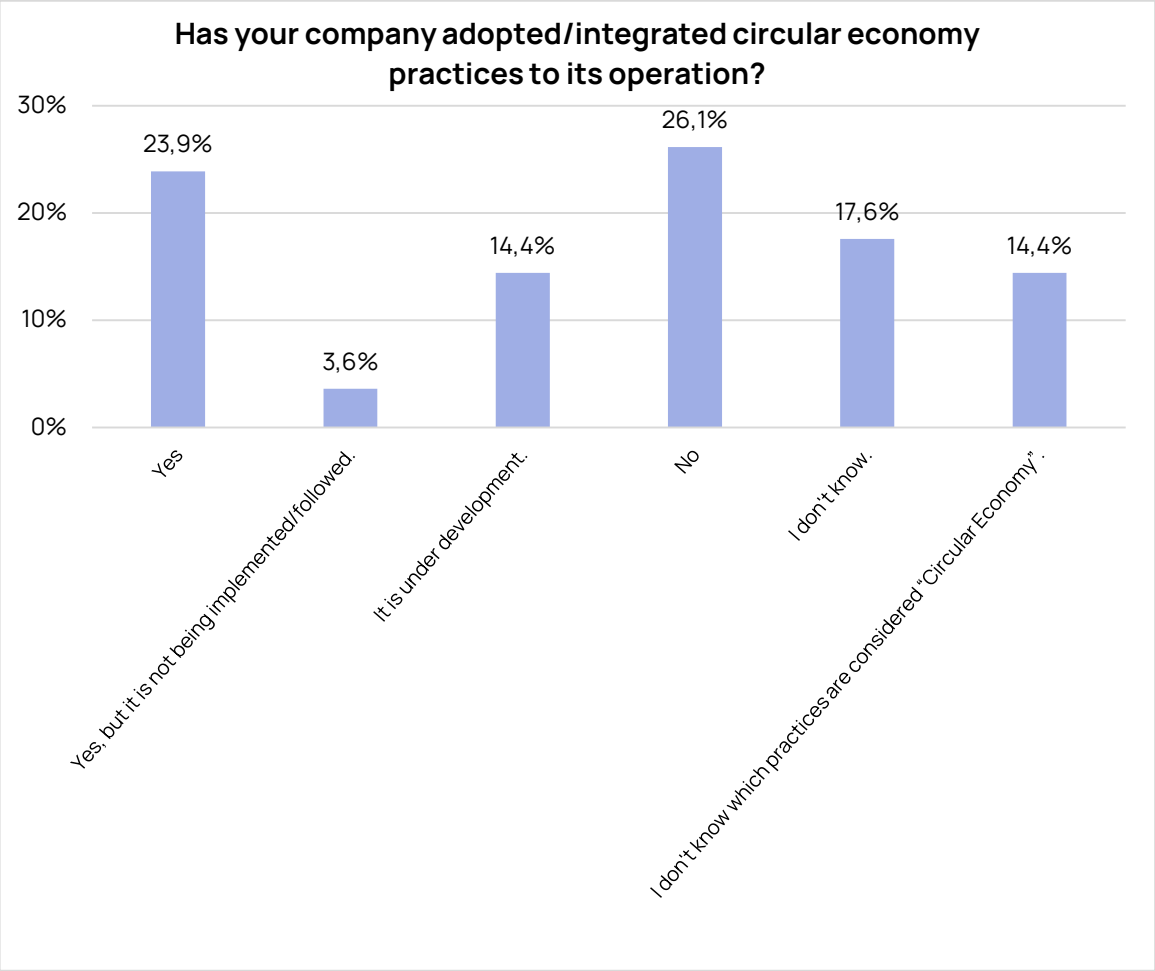


*Figure 36: Integration of Circular Economy Practices*



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Nevertheless, it is quite positive in the long-term that a large number of the respondents are open to using new and innovative business tools, something which could lead to better results regarding also the previous two questions. This is evidenced via the next figure which depicts how many of the respondents consider as beneficial the usage of operational business tools, like customer support systems, process automation systems, etc. More specifically, 82.9% of the respondents believe that their companies could benefit from using operational business tools, while only 6.8% disagree with them. Almost 10% of the respondents do not have a clear opinion about this issue, too.

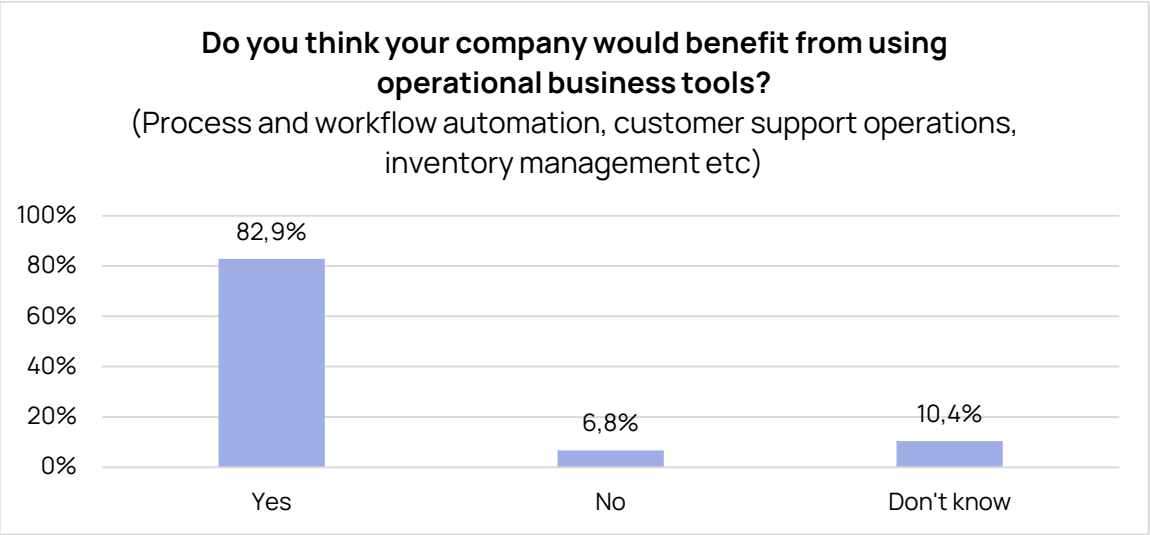


*Figure 36: Do you think your company would benefit from using operational business tools?*

However, what are the main issues that an agri-food company could face and perhaps the above operational tools could solve or limit them? The respondents hierarchized from 1 most to 8 less serious the following issues:

- Financial Management
- Marketing
- Business Management / Operations



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- Education and Training
- Access to Foreign Market
- Human Resources/Recruitment challenges
- Environmental issues
- Difficulty in accessing ICT technology

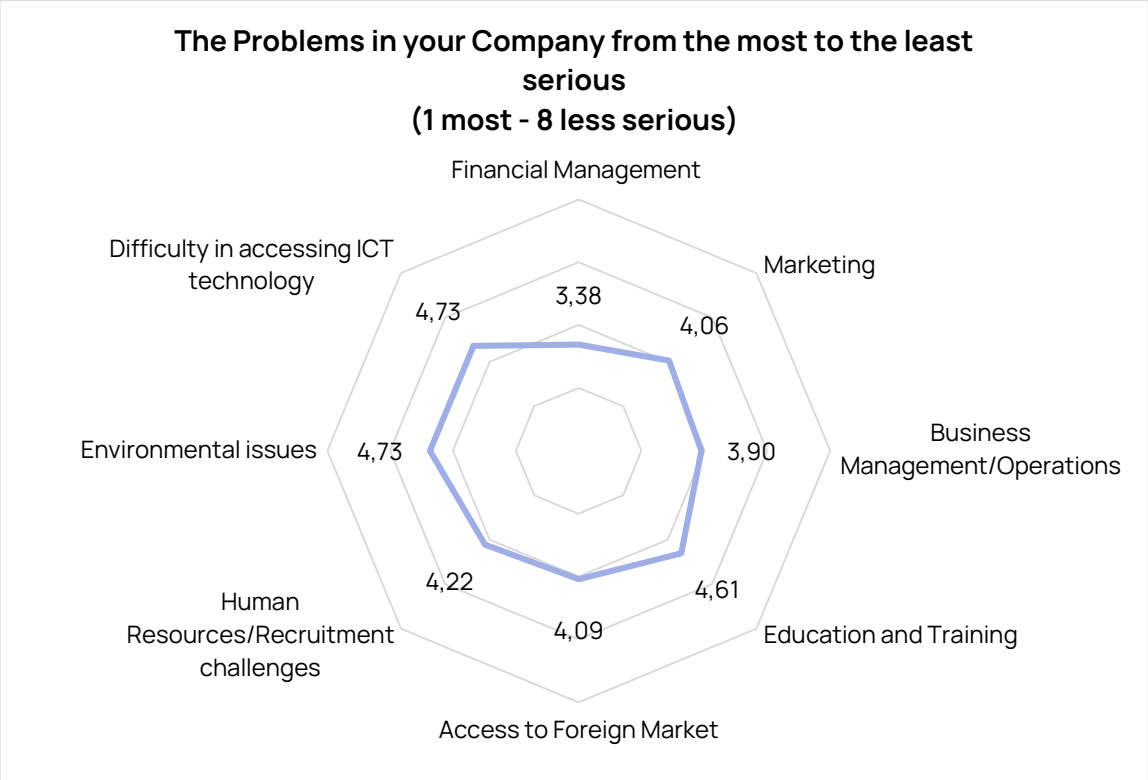


*Figure 37: The Problems in the Companies from the most to the least serious (1 most - 8 less serious)*

According to the above figure, it seems that there is a moderate impact of each previously-mentioned problem on the agri-food companies' performance. The moderate price that receives each problem is normal since every firm has different characteristics and business operations. The biggest problem for the majority of the respondents is the financial management receiving a price of 3.38 on average. The following graphs depict analytically the answers of the respondents for every problem's category:



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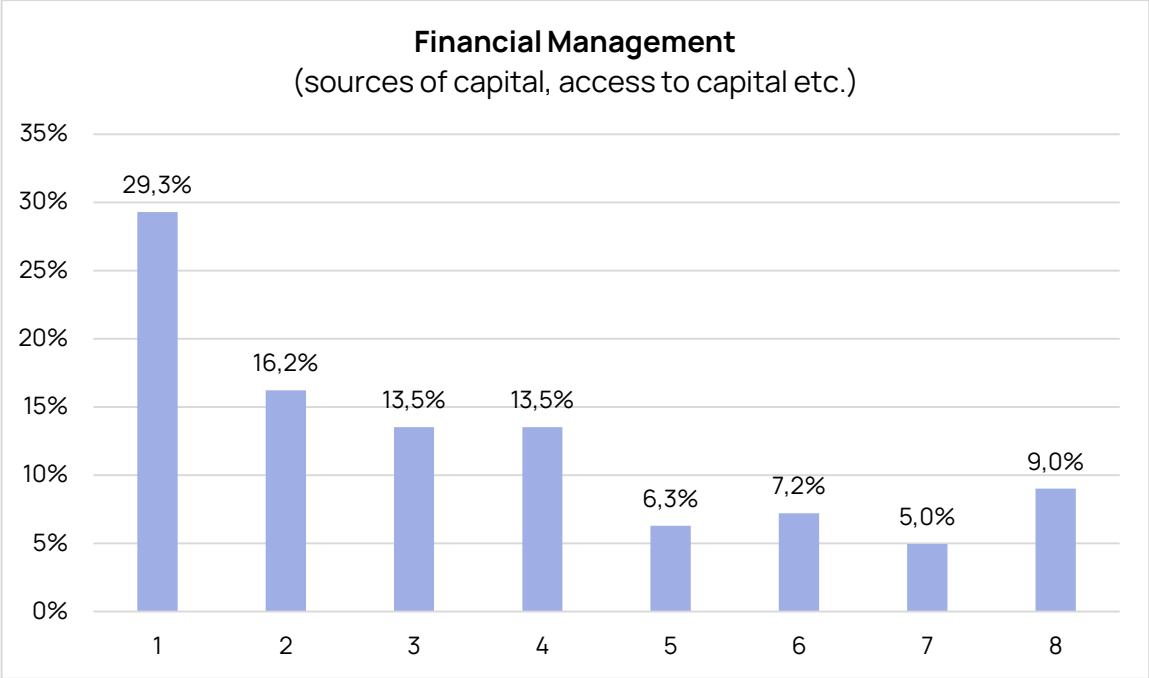


*Figure 37: Financial Management*

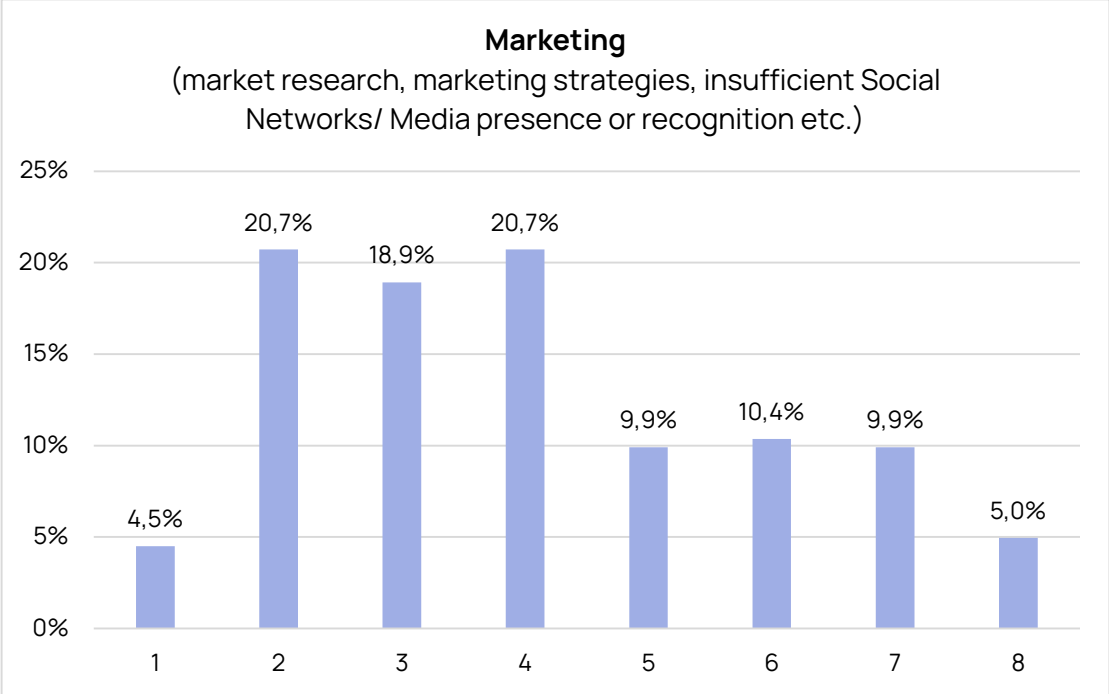


*Figure 38: Marketing*



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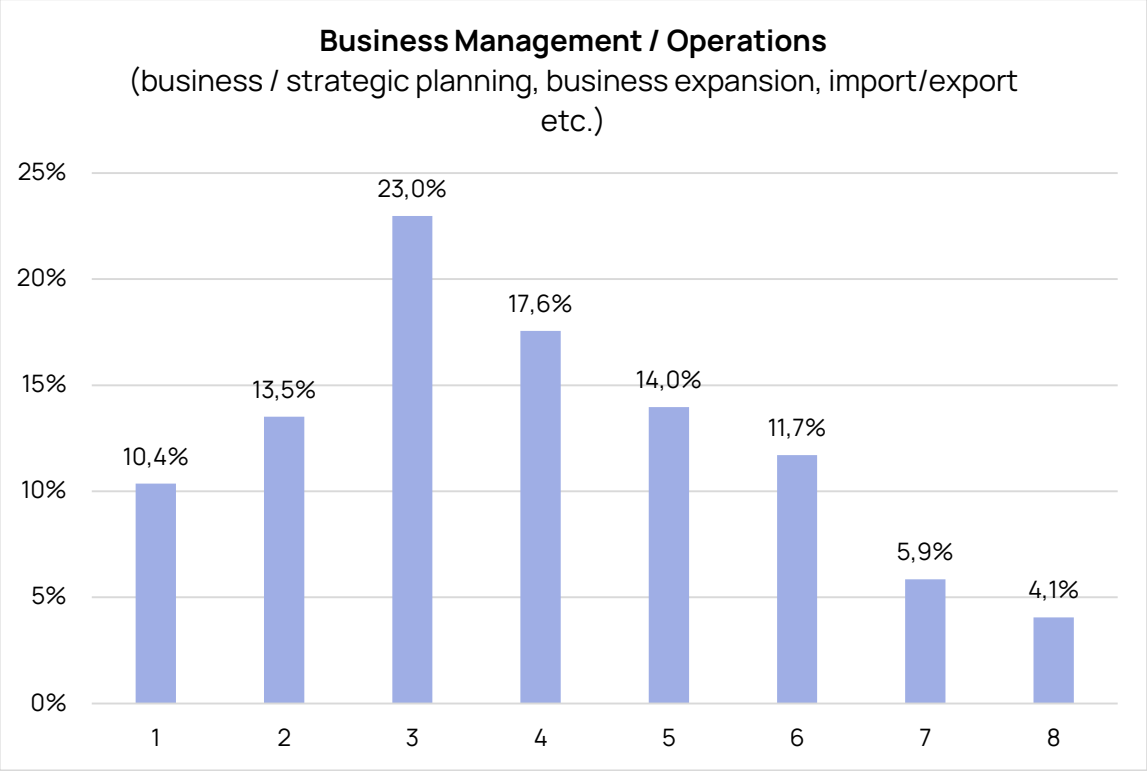


*Figure 39: Business Management/Operations*

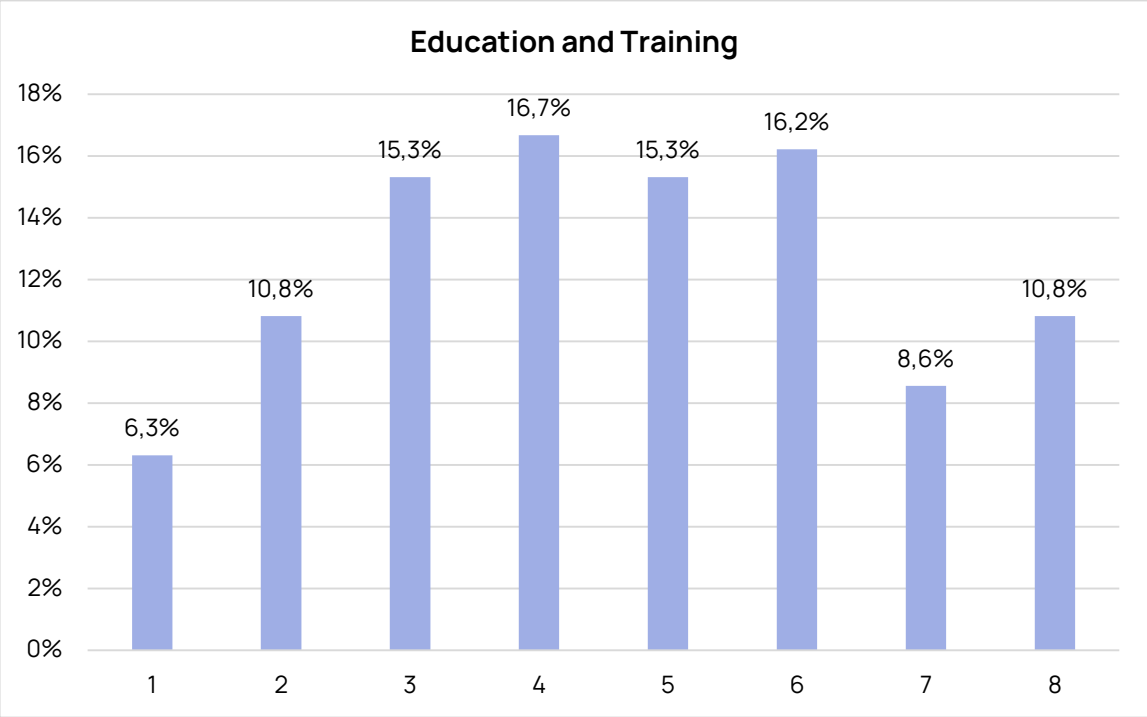


*Figure 40: Education and Training*



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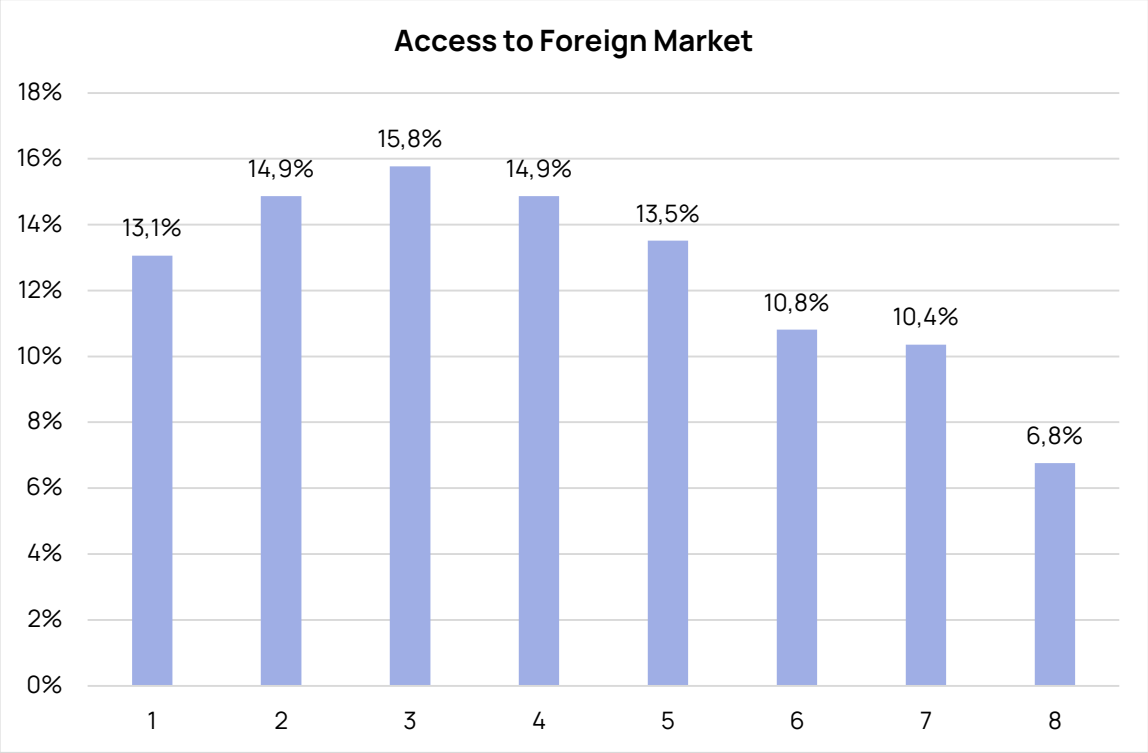


*Figure 41: Access to Foreign Market*

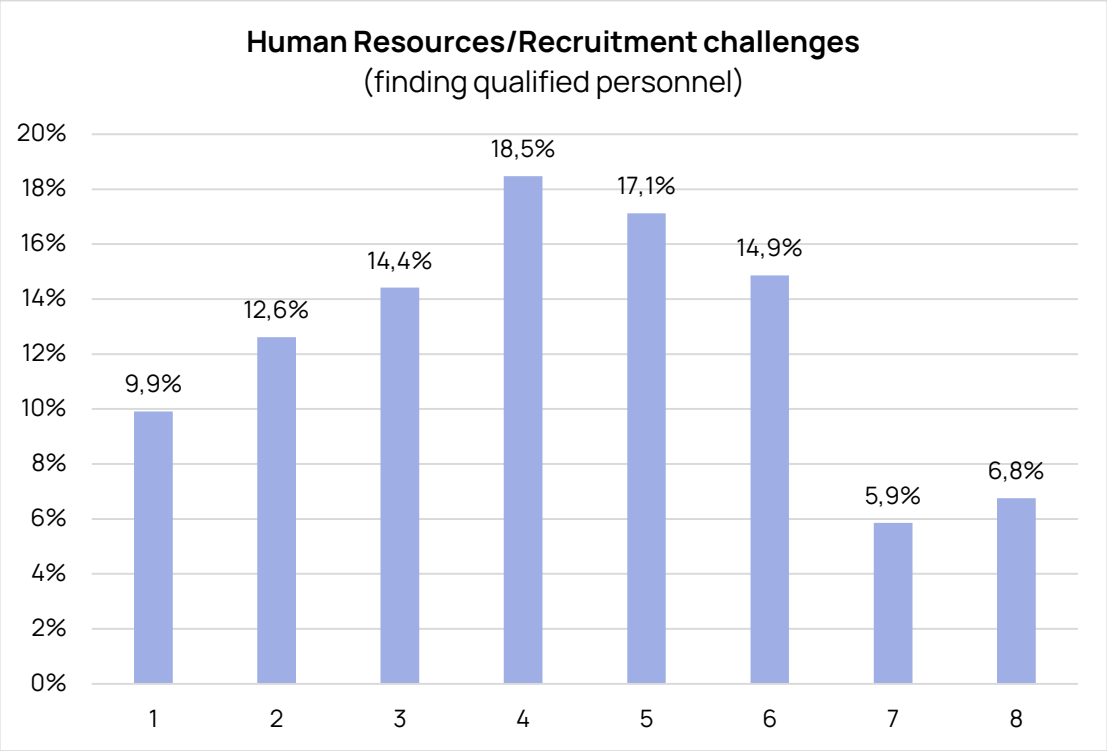


*Figure 42: Human Resources/Recruitment challenges*



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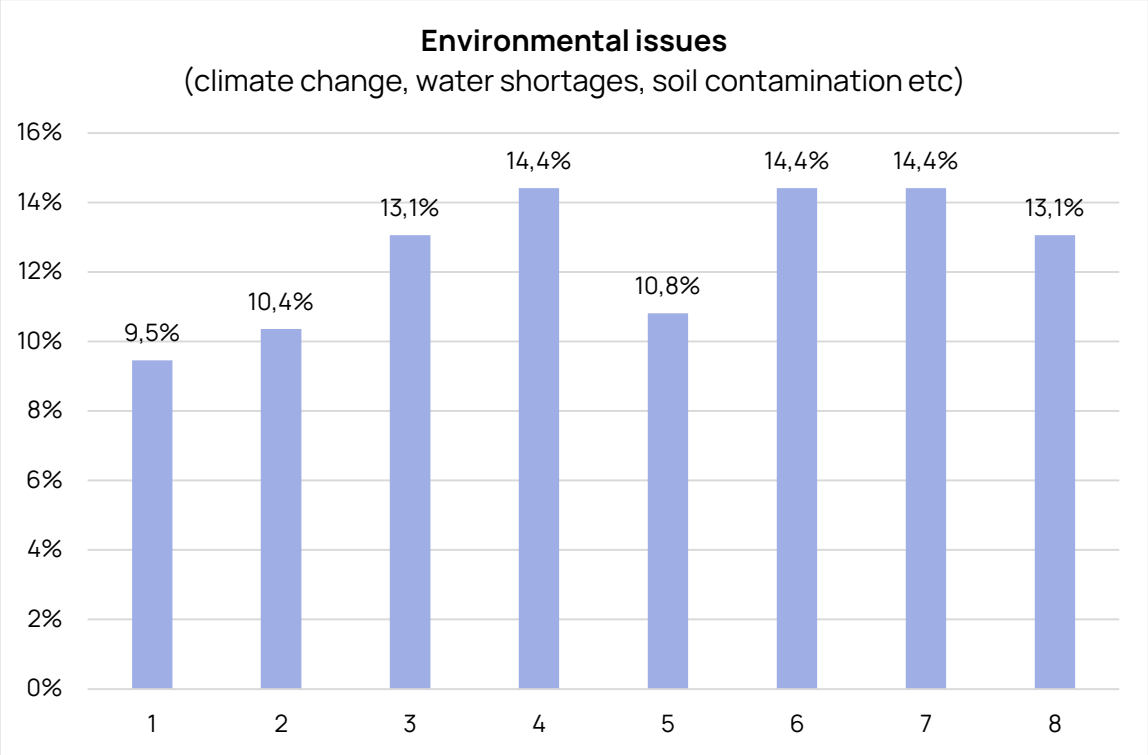


*Figure 43: Environmental issues*

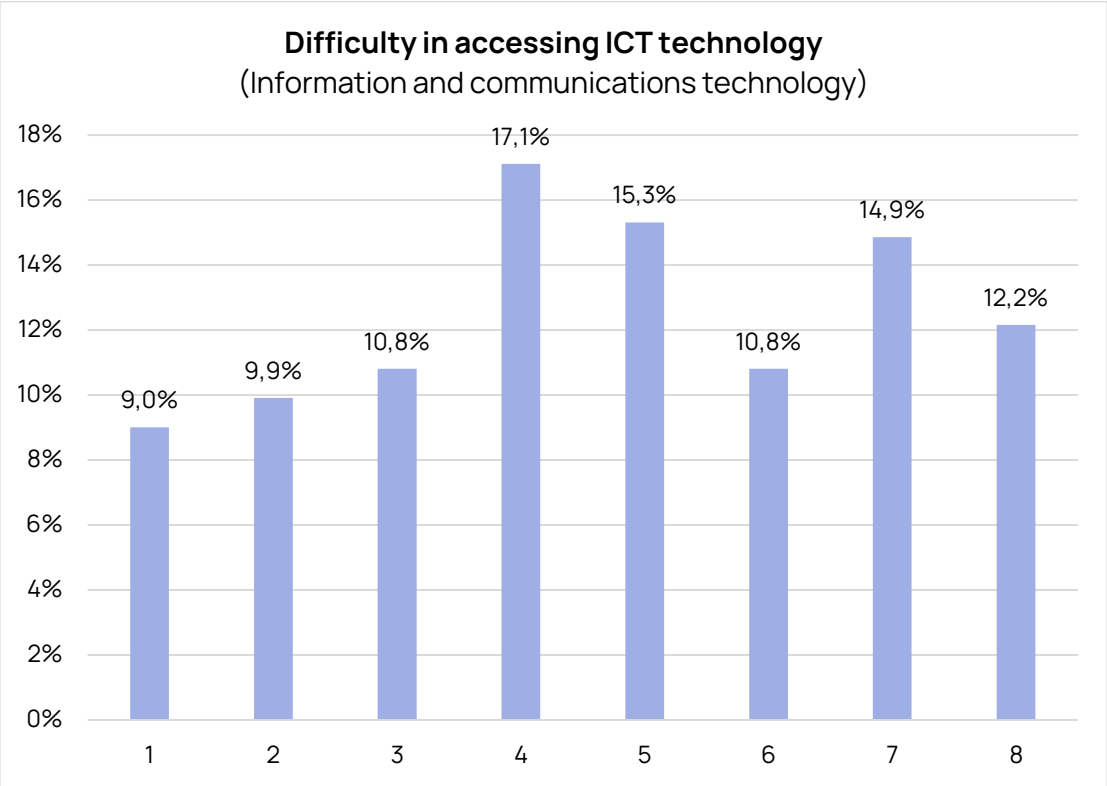


*Figure 44: Difficulty in accessing ICT technology*



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Since financial management has been previously characterized as the biggest problem for agri-food companies, the next figure answers which of the following cost categories: Wages on labor, Transportation & Logistics, Maintenance, Supply of raw and auxiliary material, Administrative expenses, Price fluctuations/inflation, and Energy cost, affect more the total production cost and by extension is a constant concern for agri-food firms' financial managers.

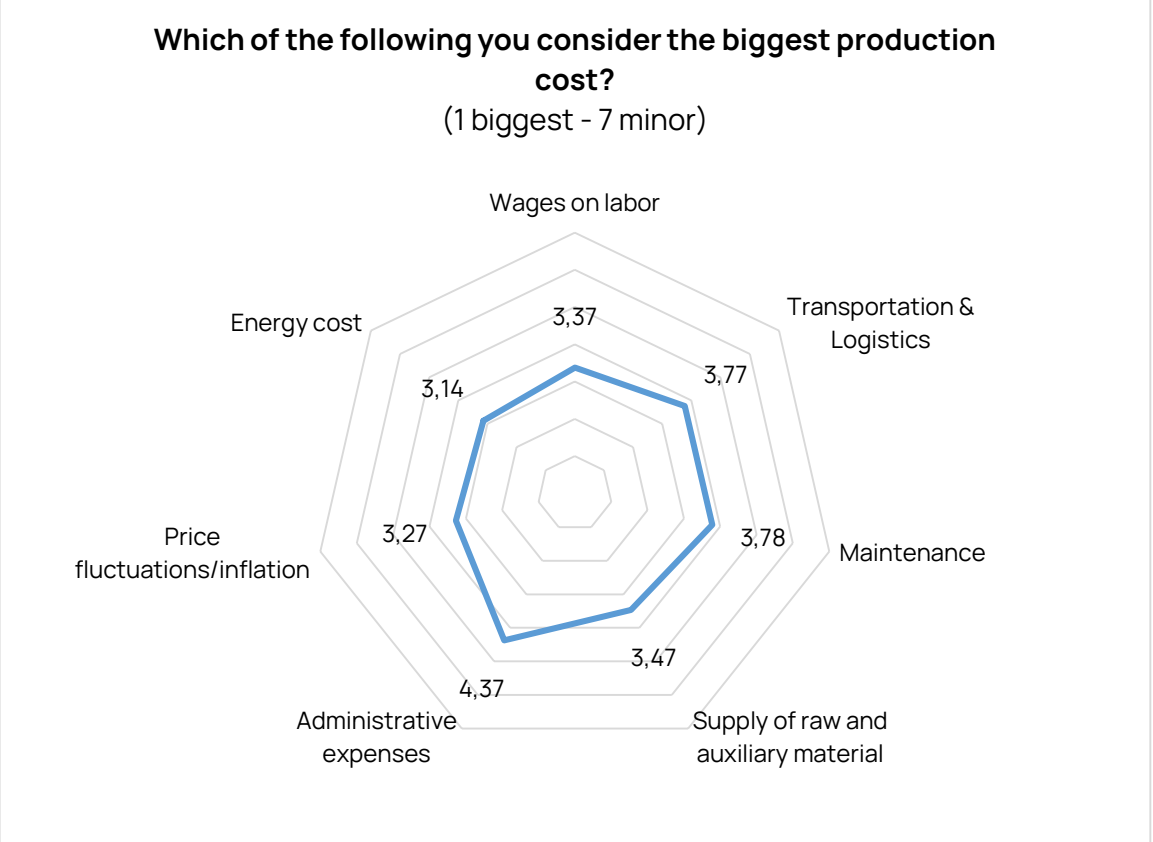


*Figure 45: The Biggest Production Cost (1 biggest - 7 minor)*

In general terms, it is observed again that due to the differences in the companies' daily operations, the average impact power of each cost category on total production cost is moderate according to the respondents. However, Energy costs take the biggest price, 3.14 on average, while less anxious seems to be the respondents about the



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Administrative expenses (4.37). The following bar charts present analytically the answers of the respondents for each cost category:

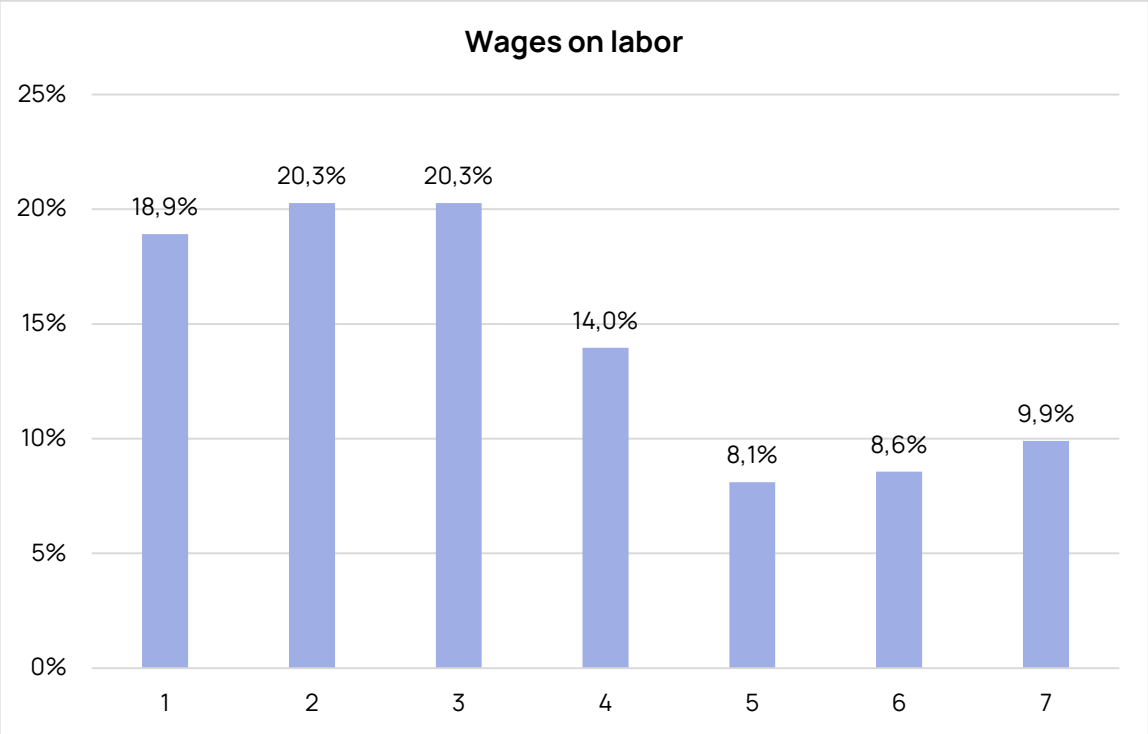


*Figure 46: Wages on Labor*

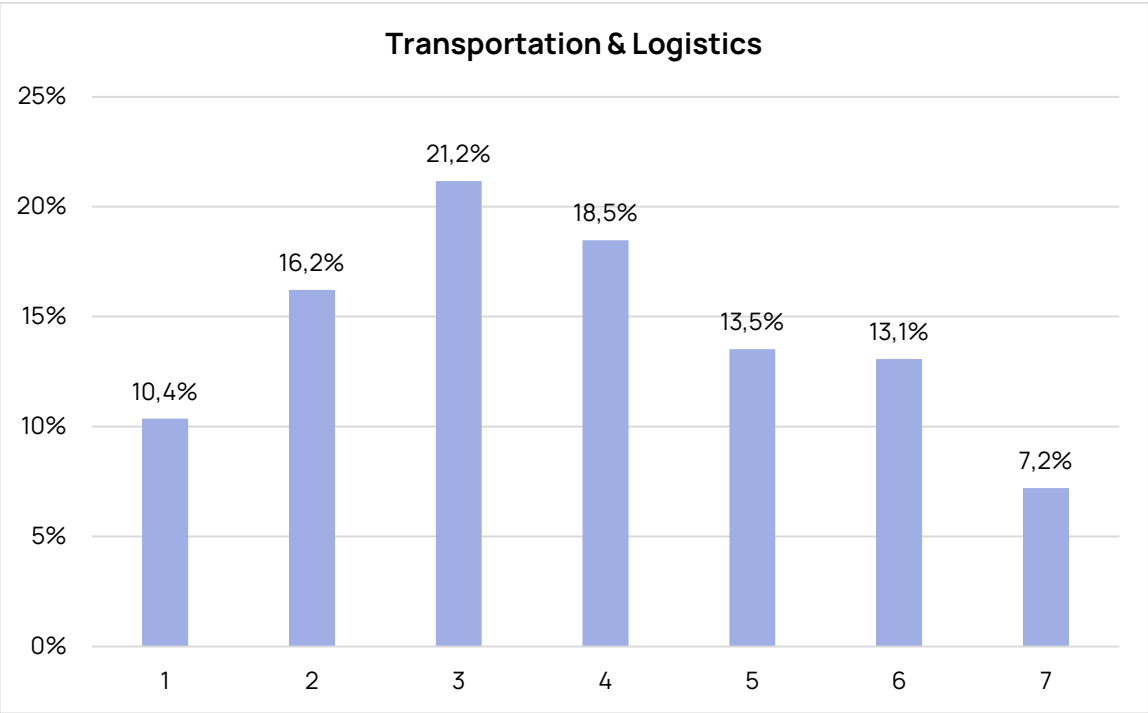


*Figure 47: Transportation & Logistics Cost*



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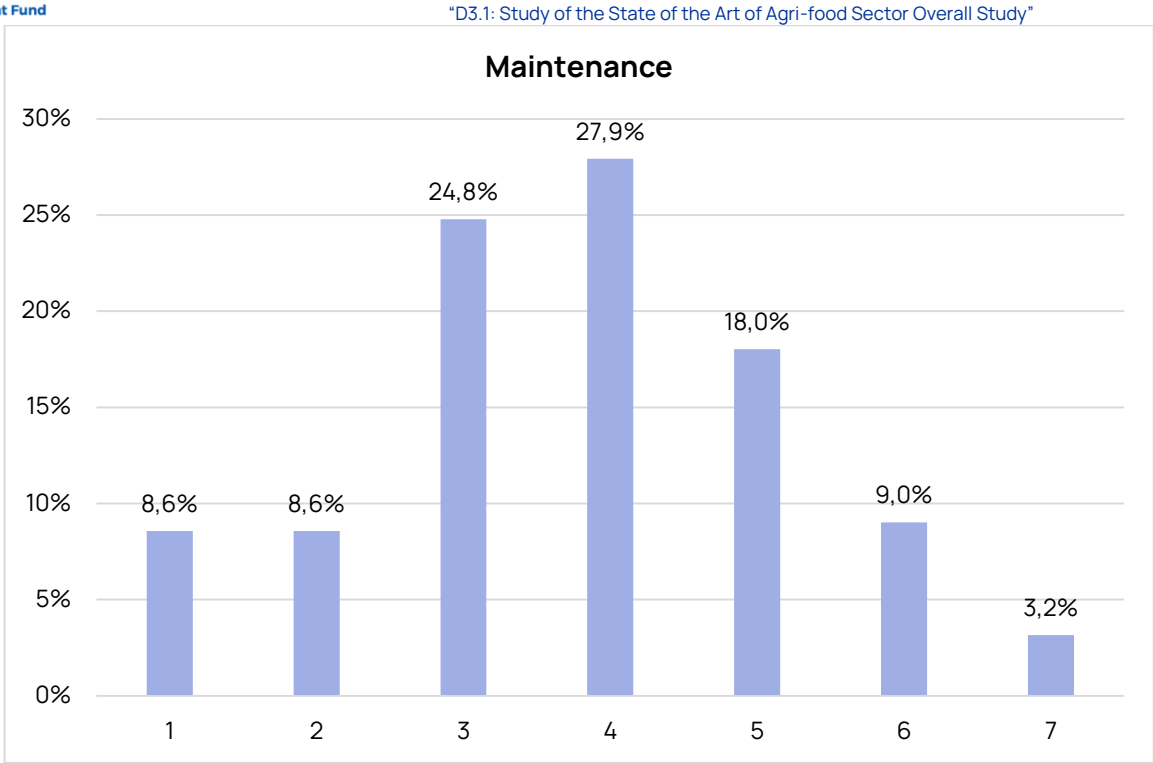


*Figure 48: Maintenance*

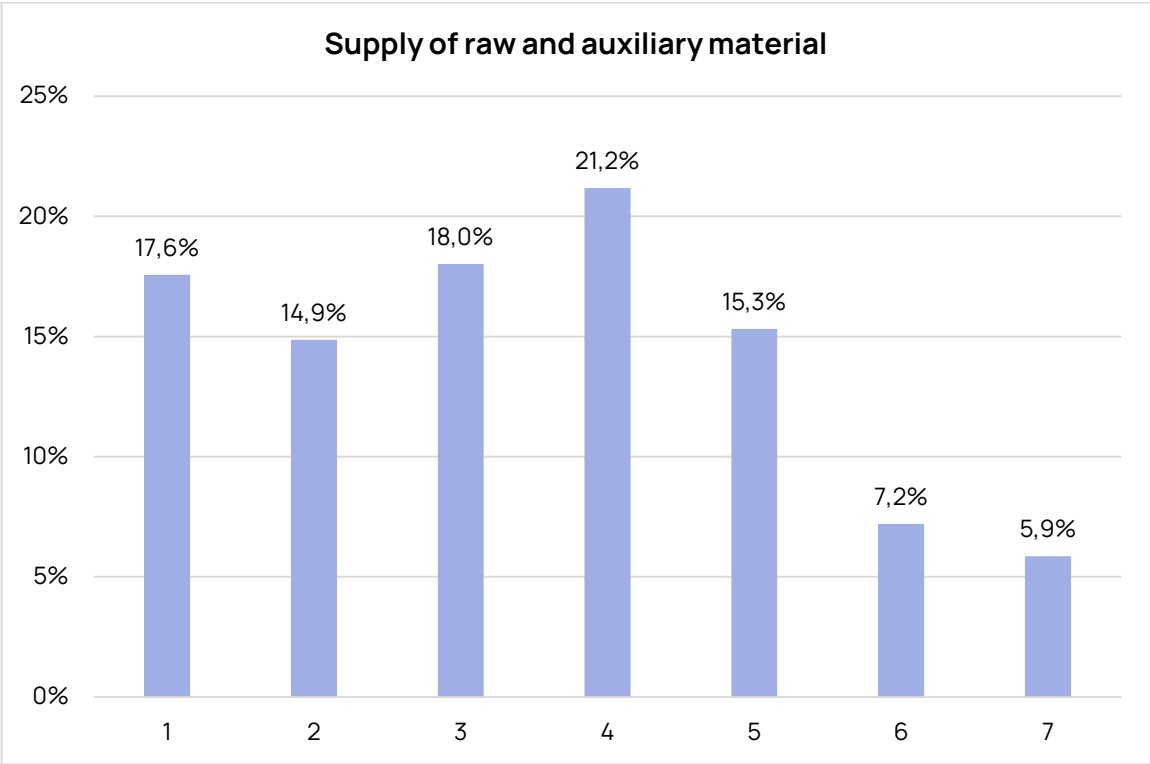


*Figure 49: Supply of Raw and Auxiliary Material Cost*



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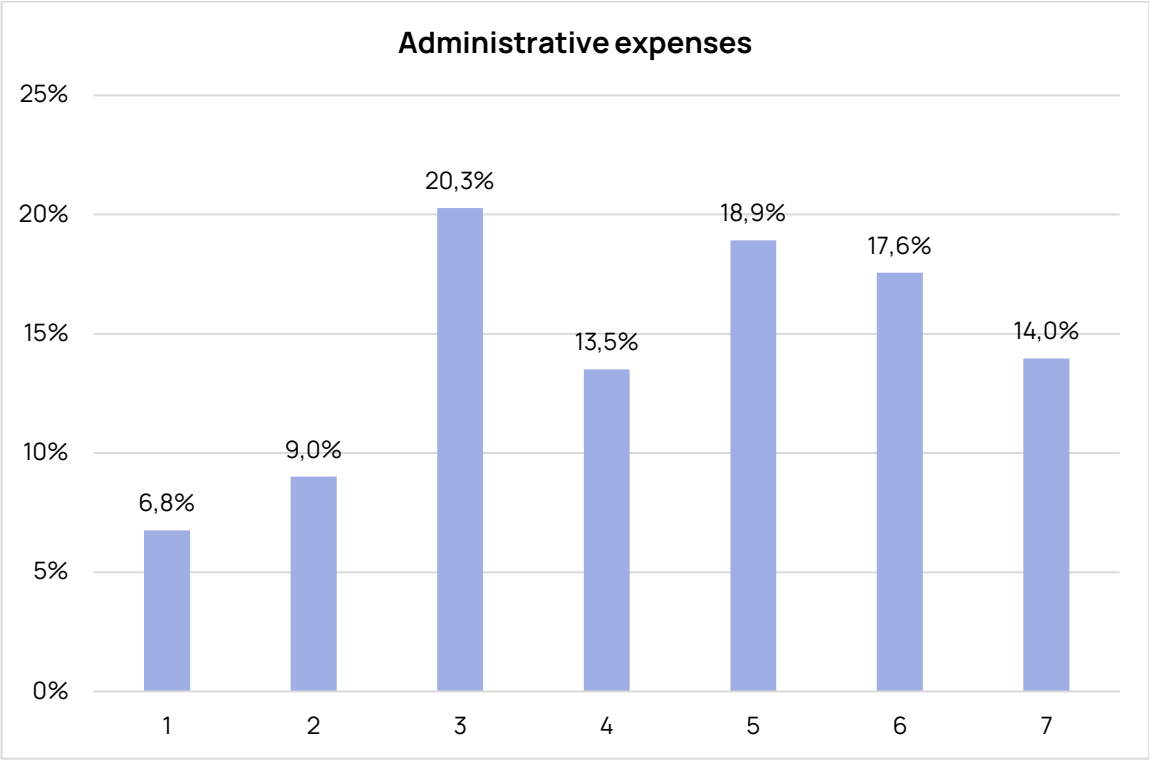


*Figure 50: Administrative Expenses*

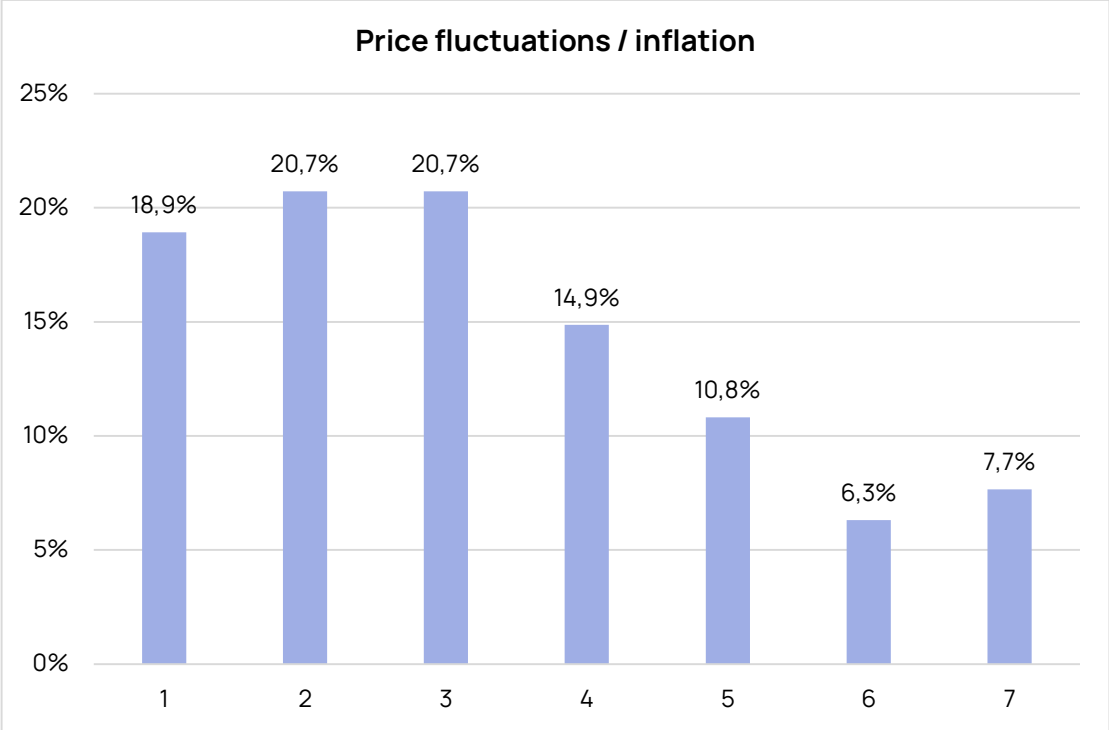


*Figure 51: Price Fluctuations / Inflation*



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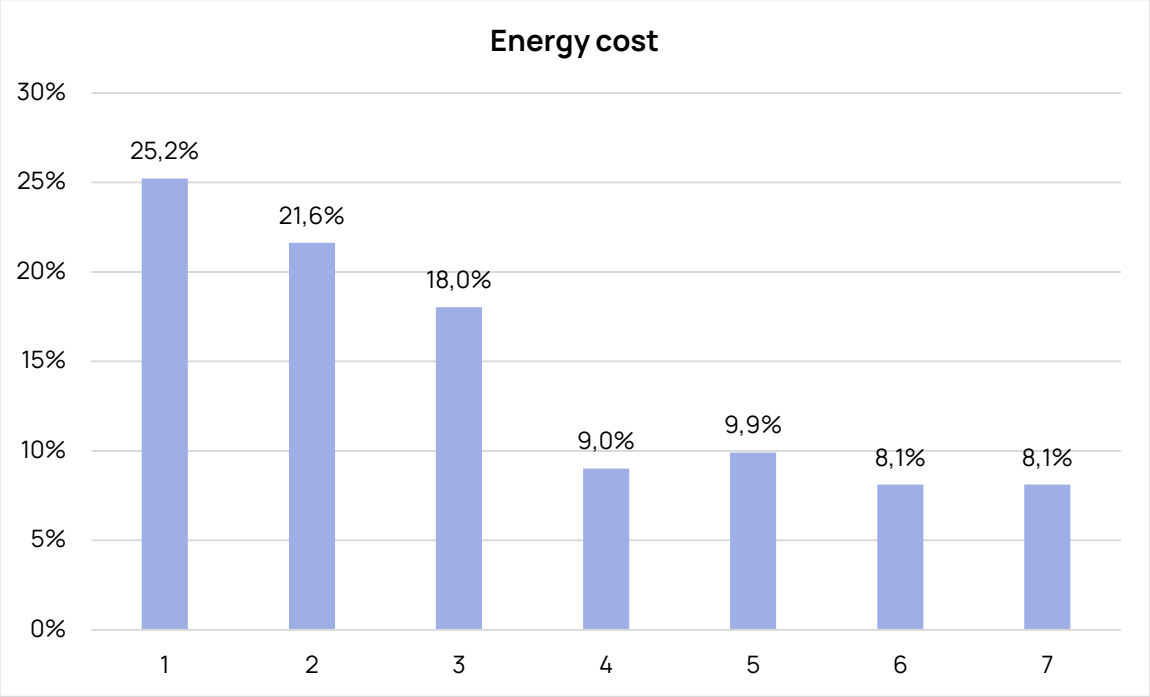


*Figure 52: Energy Cost*

Therefore, since each respondent recognizes the biggest problems and costs in the agri-food sector, have ever been received the firms they are related to a consulting over these issues?

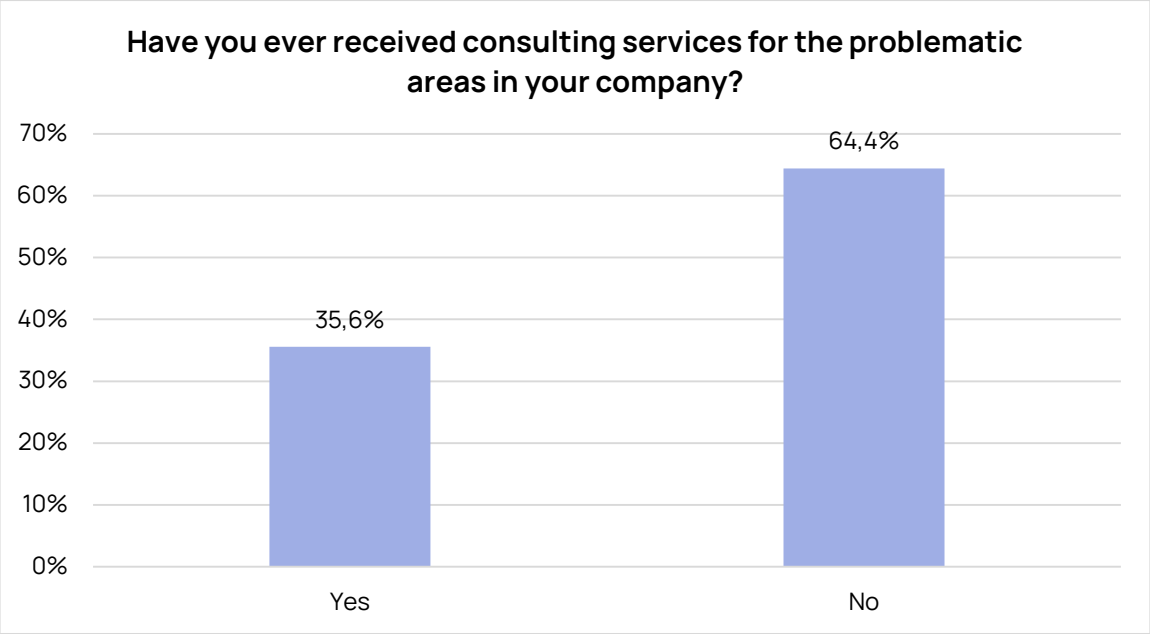


*Figure 53: Have you ever received consulting services for the problematic areas in your company?*



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According to Figure 53, 65% approximately of the companies in the agri-food industry are not familiar to receive a consulting for the problematic areas in their daily operations. The main causes for this are that the existing supporting mechanisms cannot assist holistically their firm, there is not sufficient expertise to identify the actual problems and it is difficult to find the necessary funds to finance the appropriate consulting services. The following graph presents the distribution of the respondents' answers regarding the previous causes:

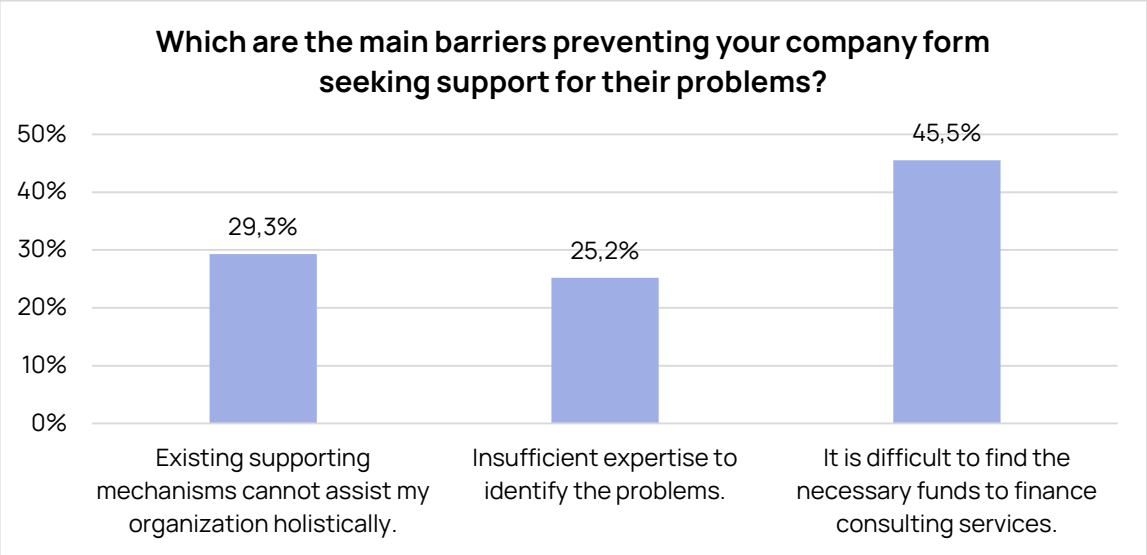


*Figure 54: The main barriers preventing a company form seeking support for their problems*

The difficulty to find the necessary funds to finance the suitable consulting services is evidenced as the main barrier for an agri-food firm in order to receive an external help for its problems according to the 45.5% of the respondents. Moreover, 29.3% of the respondents show as the main barrier that the existing supporting mechanisms cannot assist holistically their firms, while the rest believe that they have not the expertise to identify the actual problems.

Nevertheless, these barriers could be possibly overcome via the firms' participation in business support structures, since they could recognize



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the actual problem areas of the firms, offer several supporting mechanisms for each problem, and of course in a lower cost due to their high buyer power. The following graph examines if the respondents' companies are already members of any business support structure:

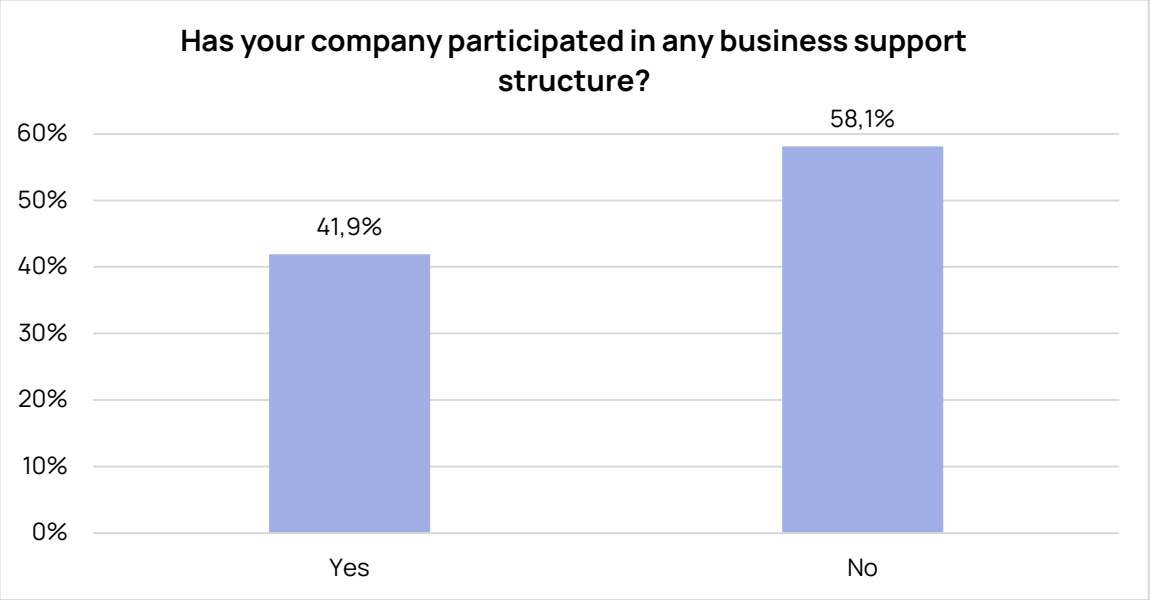


*Figure 55: Companies' Participation in any Business Support Structure*

As it was forecasted taking into consideration the last two previous graphs before the above, the majority of the companies in the sample are not a member of any business support structure. More specifically, only 41.9% of the respondents' companies belong to a business support structure. According to the graph below almost 58% of them are members of the Chamber of Commerce and Industry, 20.4% of them belong to other organization that represents common businesses, 14% of them are members of cooperative formations, while the rest are members either of the Agricultural Chamber or of a Union of Agricultural Enterprises.



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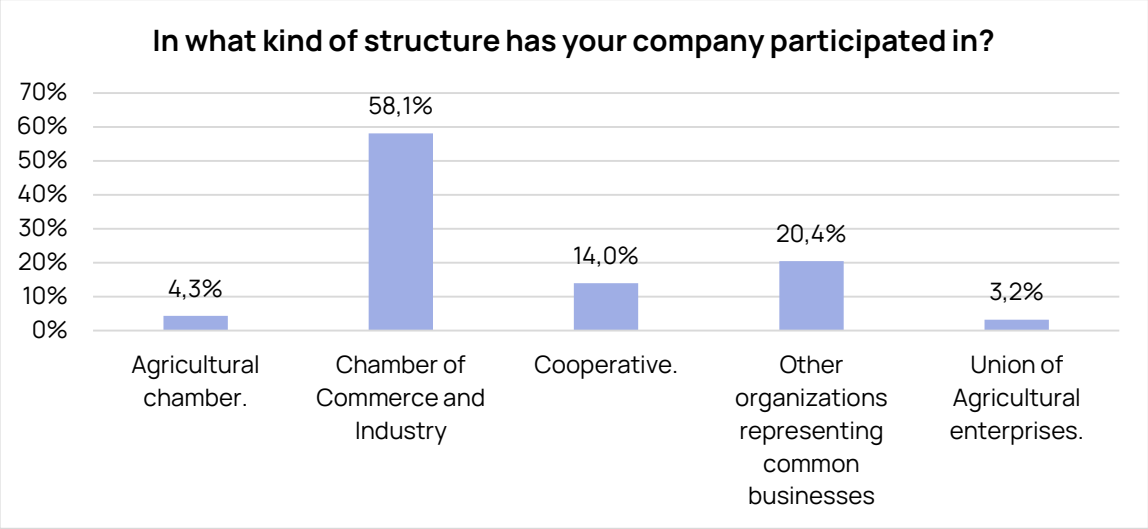


*Figure 56: In what kind of structure has a company participated in?*

Nonetheless, even those companies which are members of larger business entities have not all received until now a kind of support.

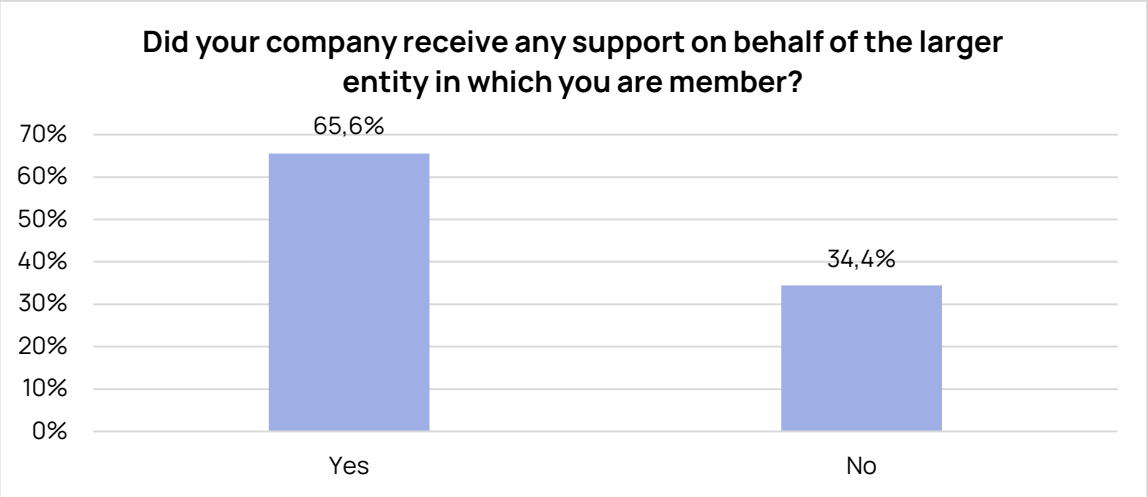


*Figure 57: Did your company receive any support on behalf of the larger entity in which you are member?*

To be more specific, slightly over 65% of them have received help at least once on behalf of the larger entity that are members of. In actual numbers, these firms are 61 out of 222 which are included in this research. Taking into account the next graph, 46% approximately of these 61 agri-food firms have at least once received on behalf of the larger entity they are a member, a representation before the regional and



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national authorities regarding regulations, taxes, local problems, etc. Approximately 28% of these firms also have received at least once a specialized training or workshop for their personnel, as well as 23% of them, have been represented on a local, regional, national or transnational level. Furthermore, almost 15% have at least once received both administrative support and services for the internalizations of their businesses. Finally, 6.6% of these companies have enjoyed services for elaboration and participation in social entrepreneurship in the broad agri-food sector.

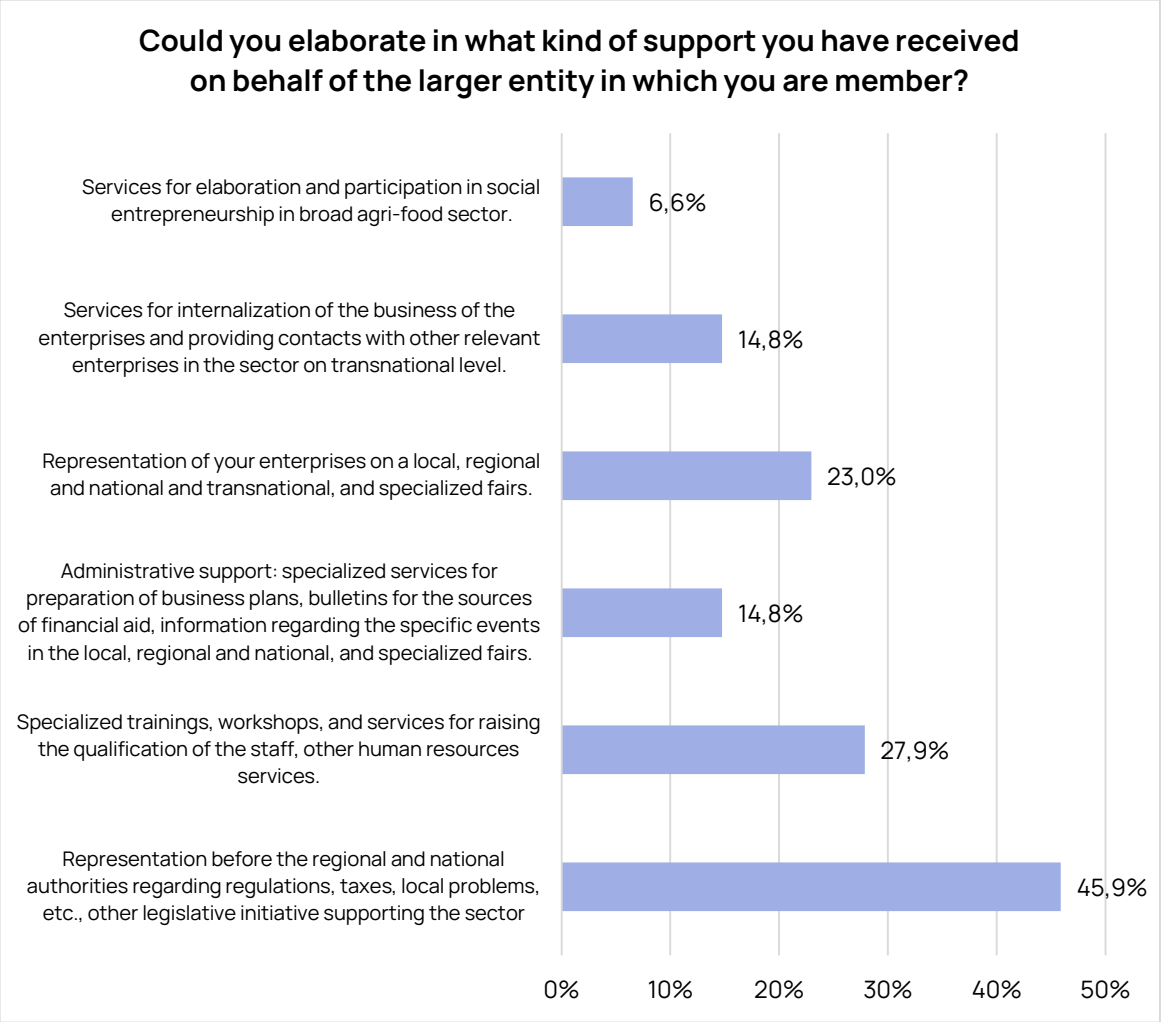


*Figure 58: What kind of support you have received on behalf of the larger entity in which you are member?*



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Closing this result presentation, the following figures present if the respondents' firms have already implemented procedures, policies, and codes for:

- Energy consumption and GHG (e.g. CO2 emissions)
- Reducing the carbon footprint
- Employee Health and Safety
- Diversity, discrimination & harassment
- Supply chain control
- Control for reduction of pollutants from transport
- Actions to reduce emissions from transportation
- Documented food safety control management system
- Certification regarding environmental, social or business ethics issues (e.g. ISO 14001, ISO 45001/OHSAS 18001)

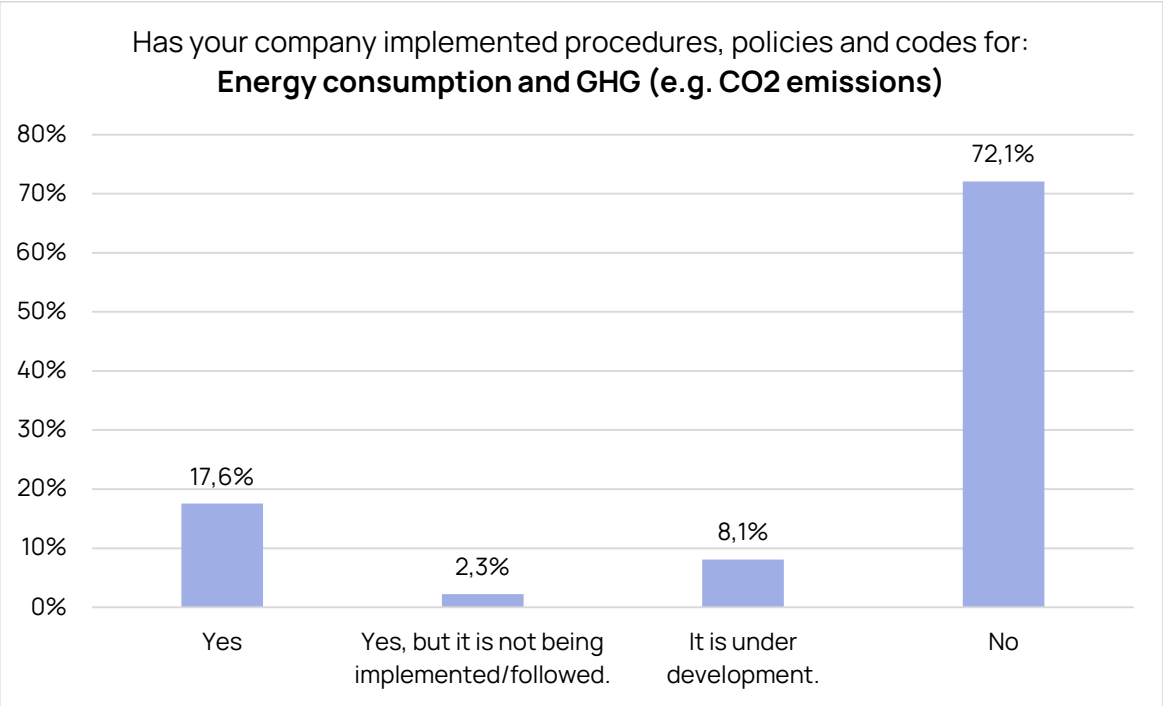


*Figure 59: Energy consumption and GHG (e.g. CO2 emissions)*



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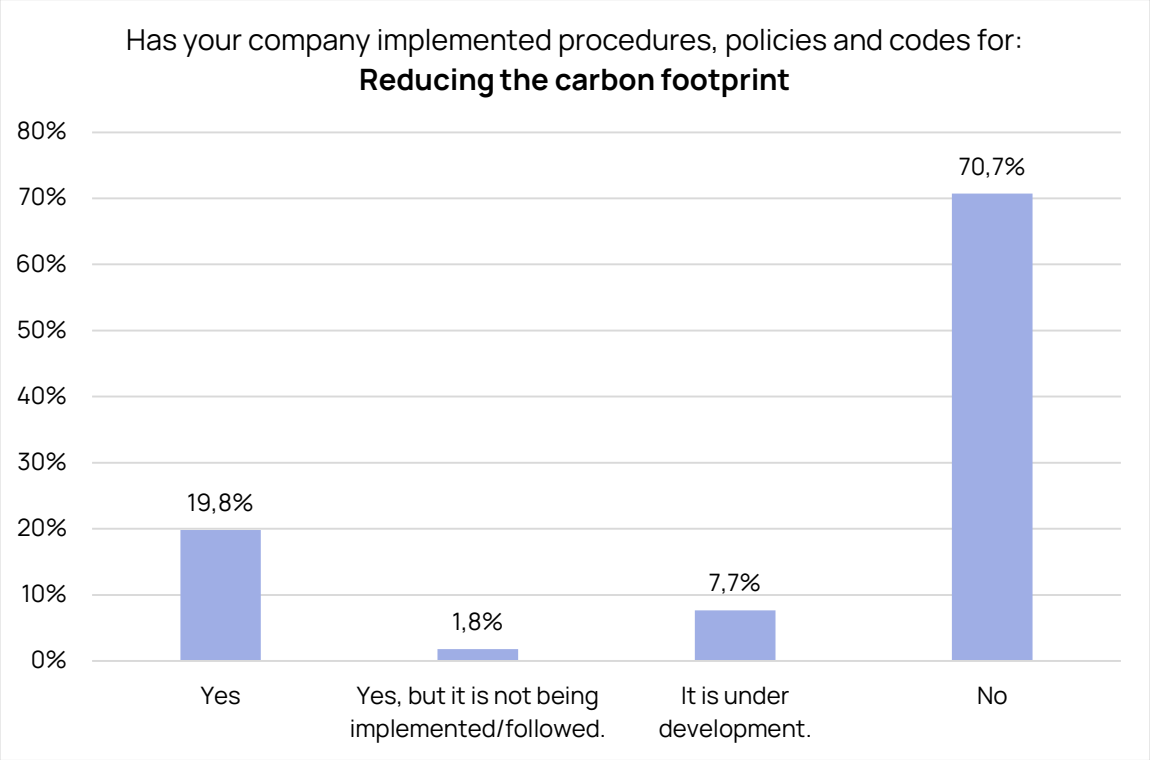


*Figure 60: Reducing the carbon footprint*

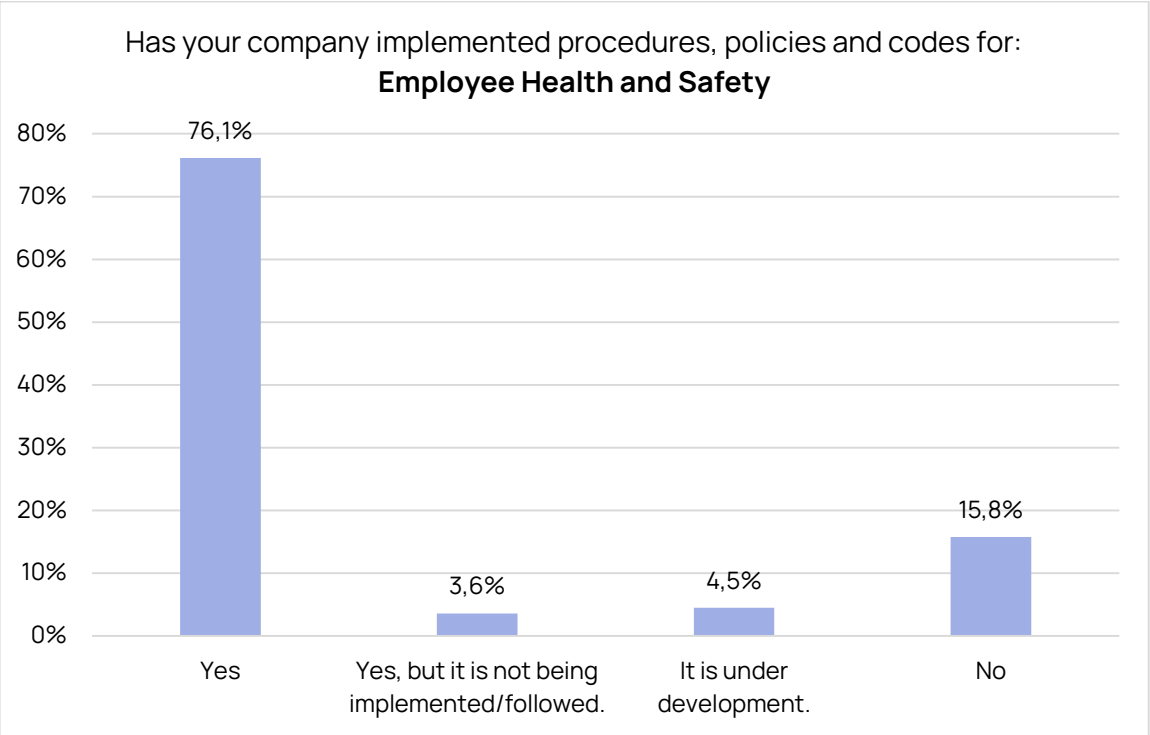


*Figure 61: Employee Health and Safety*



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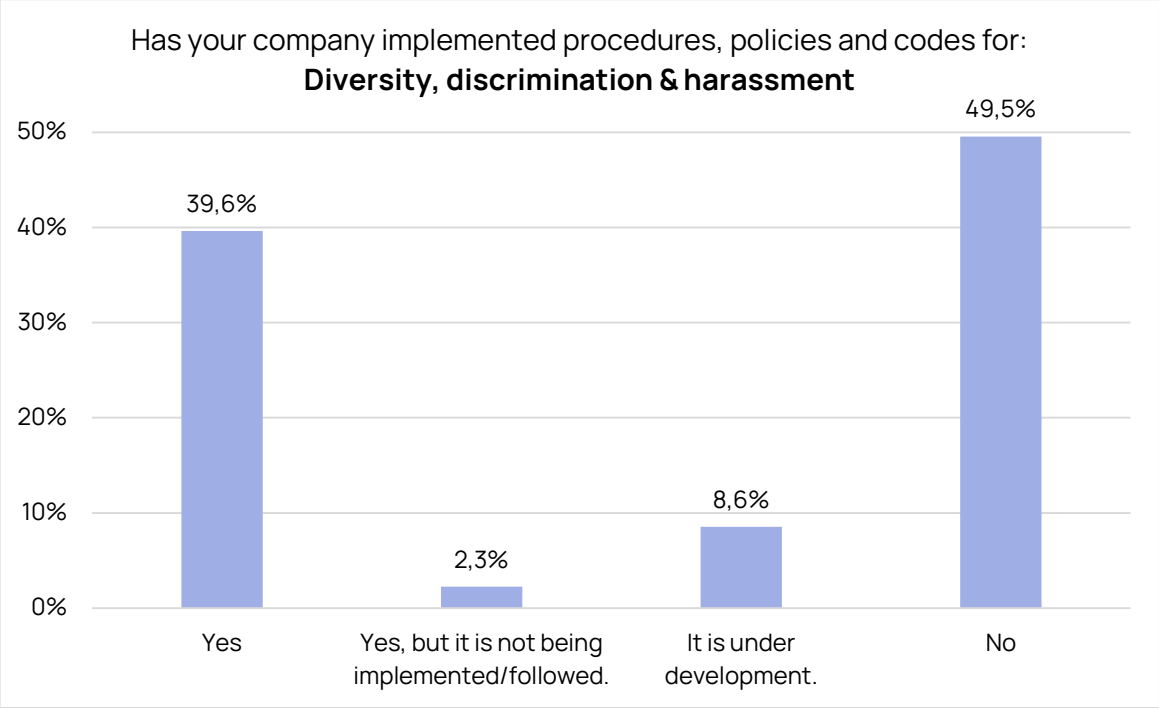


*Figure 62: Diversity, discrimination & harassment*

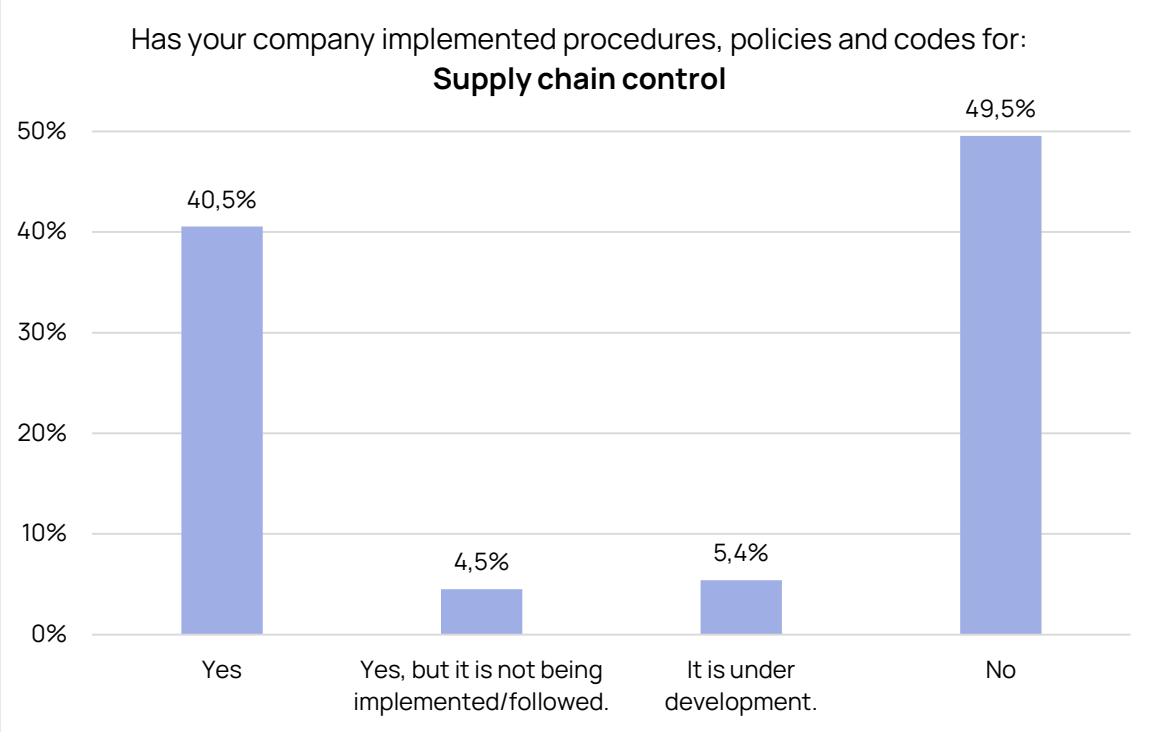


*Figure 63: Supply chain control*



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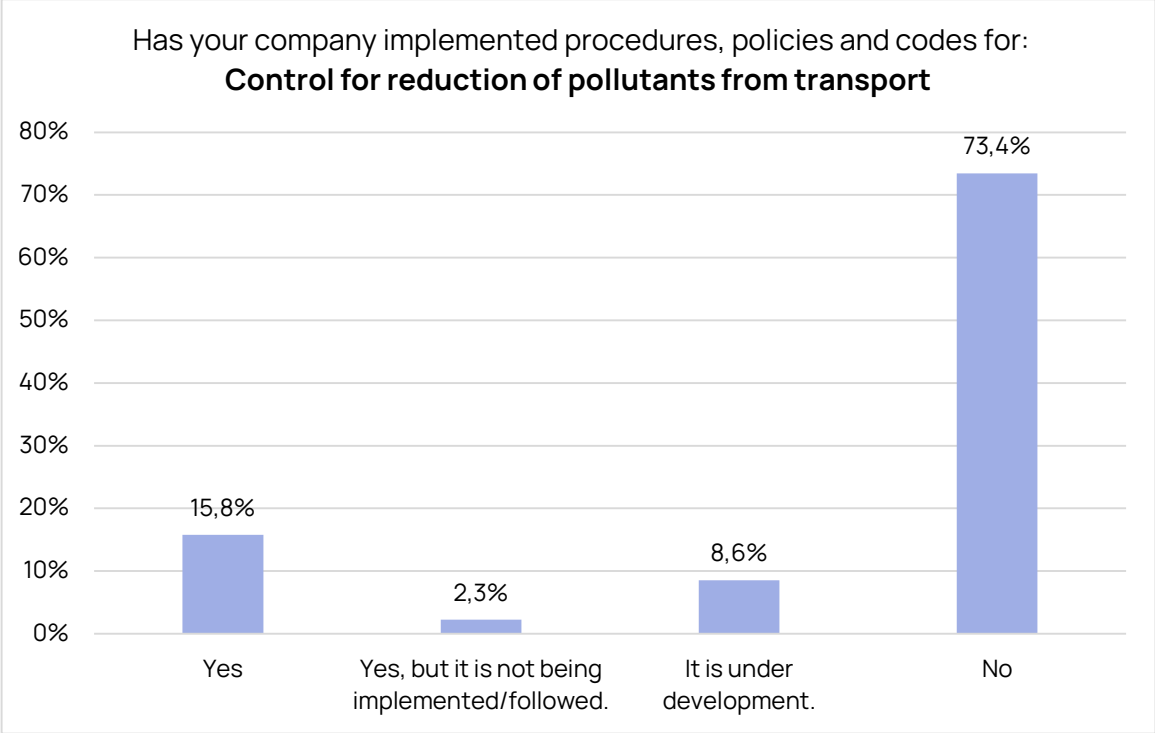


*Figure 64: Control for reduction of pollutants from transport*

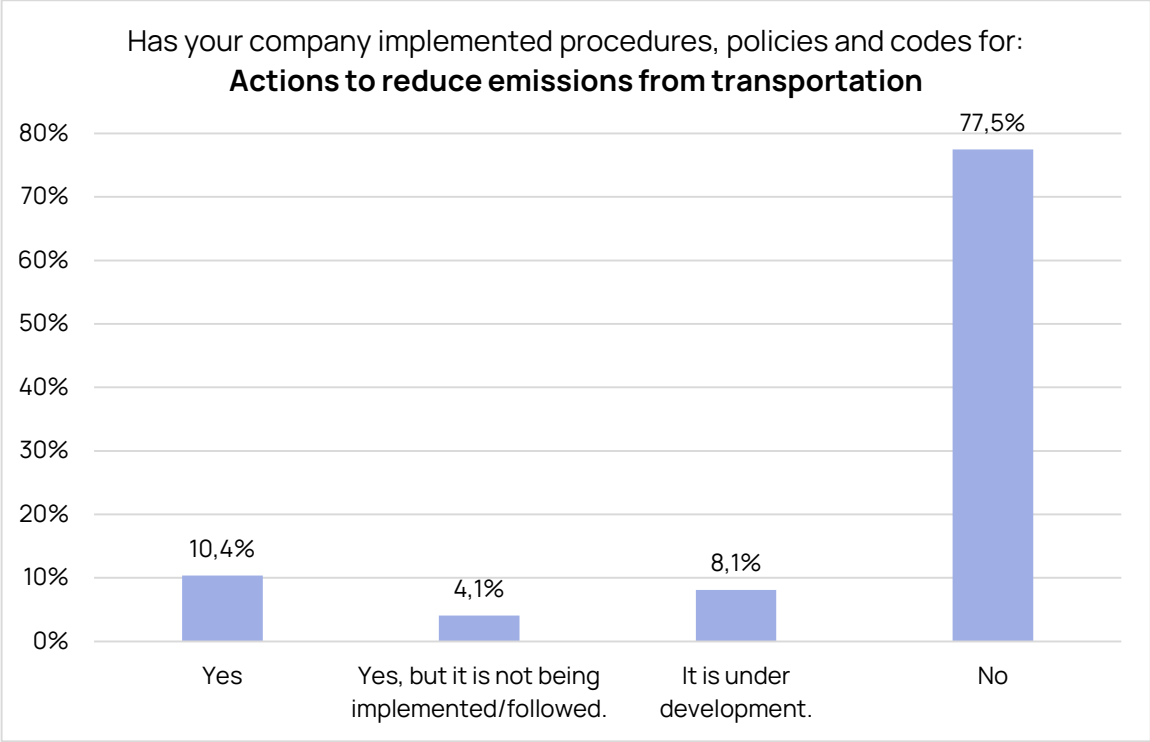


*Figure 65: Control for reduction of pollutants from transport*



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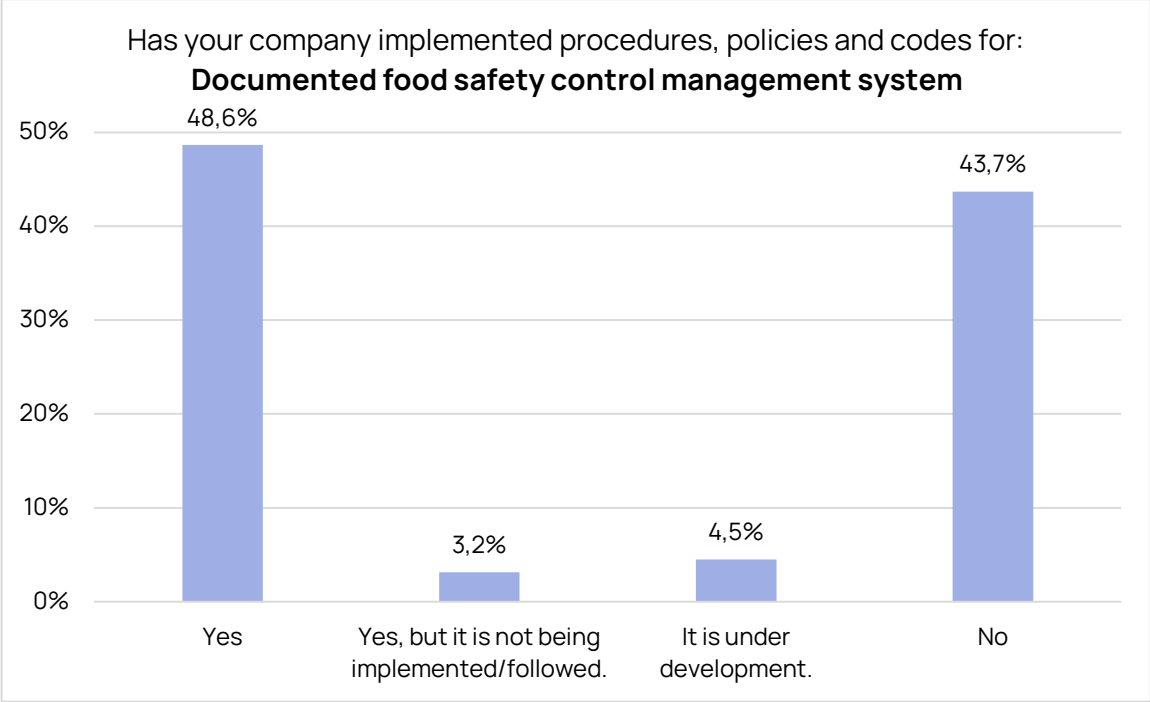


*Figure 66: Control for reduction of pollutants from transport*

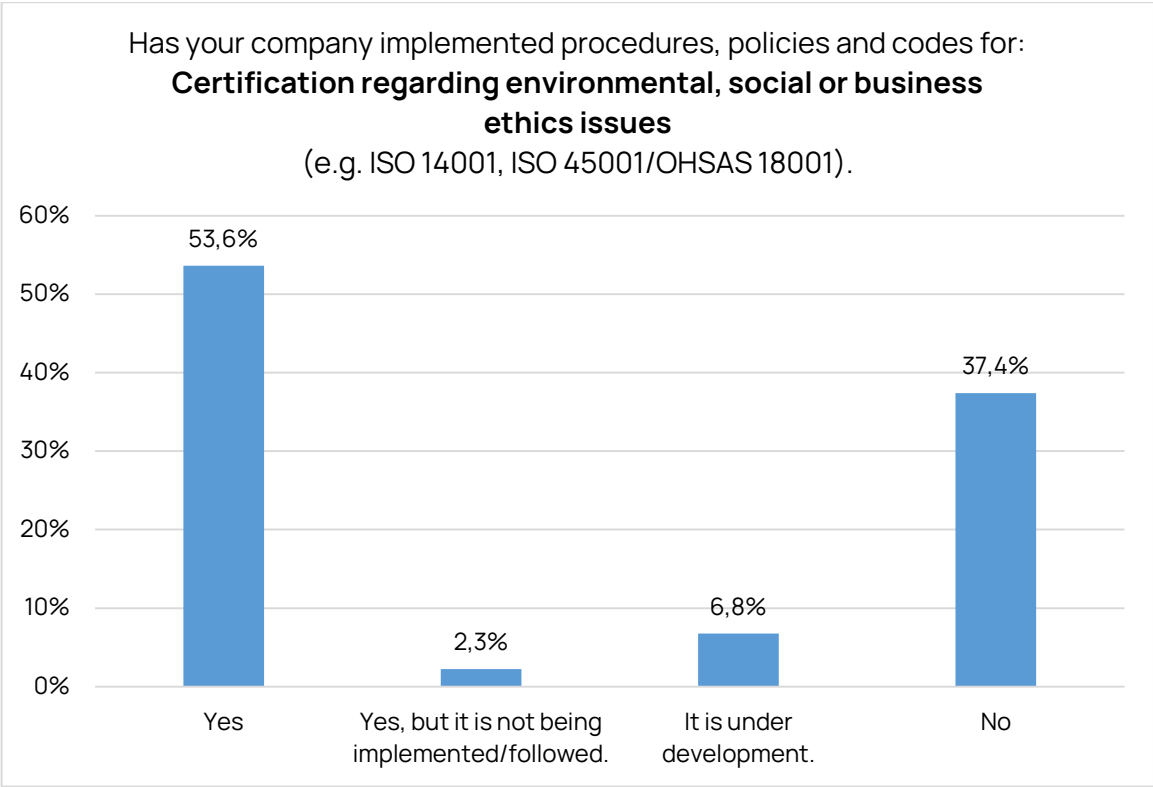


*Figure 67: Control for reduction of pollutants from transport*



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It is observed that the majority of the examined firms have integrated procedures, policies, and codes in their daily operations for their employee health and safety and for certifications regarding environmental, social, or business ethics issues. On the other hand, it is evidenced that the majority of the analyzed agri-food companies have not implemented procedures, policies, and codes for controlling the reduction of pollutants from transport and reducing emissions from transportation as well as for reducing their energy consumption and their carbon footprint. Finally, regarding the adoption and implementation of procedures, policies, and codes for diversity, discrimination & harassment, supply chain control, and documented food safety control management systems, the respondents' answers are approximately equally distributed between "yes" and "no".



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## 6.2. Regarding the Bulgarian Side

### 6.2.1 Main characteristics of the respondents and the enterprises included in the research

The analysis of the data obtained in the course of conducting the research begins with the distribution of respondents from the sample by gender. In this sense, the figure below in the text shows that the presence of men in the sample is more tangible, as it is greater by 11 people, compared to the female respondents who took part in the survey. This makes a difference of almost 10% of all respondents. As nominal values, the number of men and women participating in the research is presented as follows - 52 women and 63 men, and in relative proportions, the data show that women are 45.2% of all respondents, while men are 54.8%.

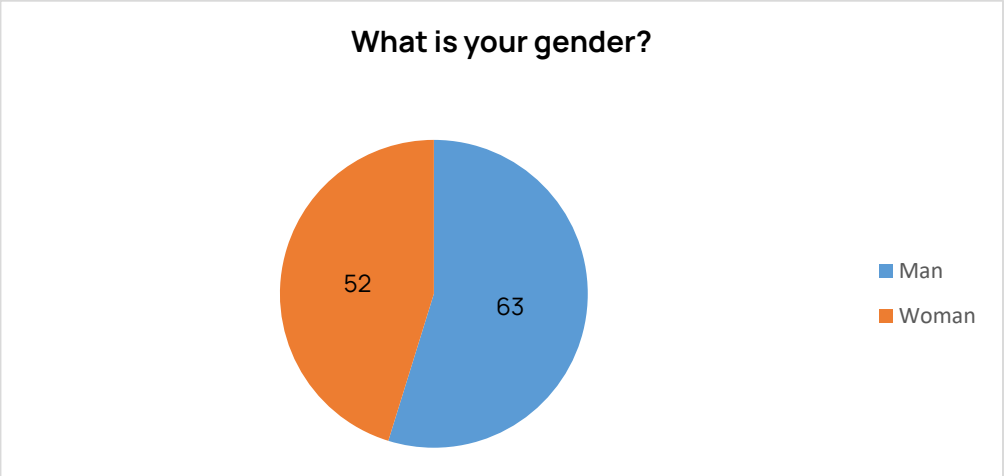


*Figure 1: Respondents' Gender*

With regard to the age structure of the respondents, it can be stated that the youngest and oldest respondents have the strongest representations, and also the more you go into the 35-54 years range, the more the intensity of the answers increases. Apart from that, the number of respondents between the ages of 35 and 44 is the largest (32 persons) and equals 27.8% of all respondents, while the respondents aged between 45 and 54 are in



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approximately the same volume - 31 or 27% of all respondents. The number of respondents between 18 and 24 years old is the smallest - 5 people or 4.3% of all who filled out the survey, and the number of people who are over 65 years old remains relatively low. The last two findings also have their own logical explanation - with regard to the least represented group, it can be reasonably argued that it is the least present, given the fact that in this phase of their lives many people are in the process of of education, and due to the lack of experience, it is more difficult for them to find a job and develop an entrepreneurial activity. On the other hand, the low presence of the oldest is due to the fact that they are entering retirement age and leaving the labor market.

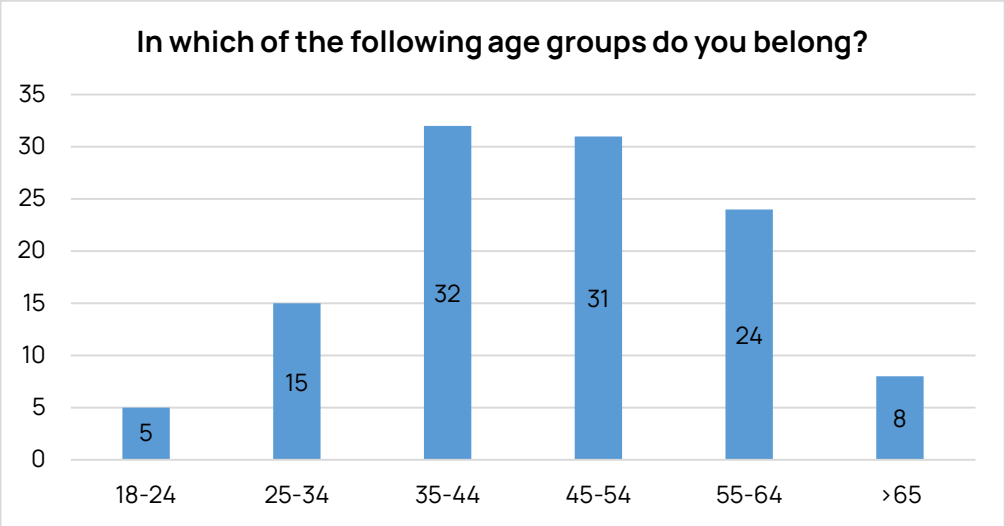


*Figure 2: Respondents' Age Groups*

The distribution of respondents by education shows that there is parity between those who have a higher education and those who have not. The relative share of university graduates with Bachelor's and Master's Degrees (or higher) is a total of 53%, while the sum of all other participants holding other degrees is 47%. The highest is the relative share of people who have completed higher education – 36.5%, while it is followed by those who have completed High School, namely 26.1% of all respondents. The values are the same for people who have a master's degree and higher and those who have



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completed commercial, technical or professional training - namely 16.5% of the respondents. The share of respondents who have completed other degrees of education remains minimal. Data on the nominal values for the attribute "education" are found in Figure 3, below in the text

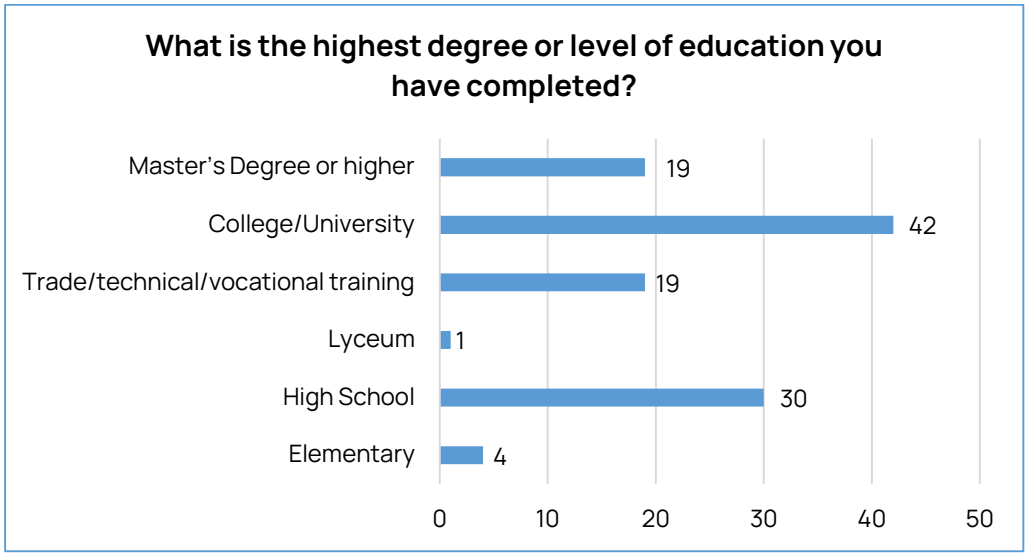


*Figure 3: Respondents' Highest Level of Education*

The territorial distribution of the respondents by regions of the Cross-Border Region shows that there is a concentration of responses in the Blagoevgrad District, while the level of responses in the Smolyan District is critically low. As already mentioned in the study, the highest share of participants is from the Blagoevgrad District – 73.9% of all participants, 16.5% of the participants are from the Kardzhali District, 7.8% are from the Haskovo District, and only 1, 7% are from Smolyan District. The nominal values are explained in the figure below in the text, and it should also be noted that the data from the study will be mostly representative of the Blagoevgrad District and to a lesser extent of those from the other districts.



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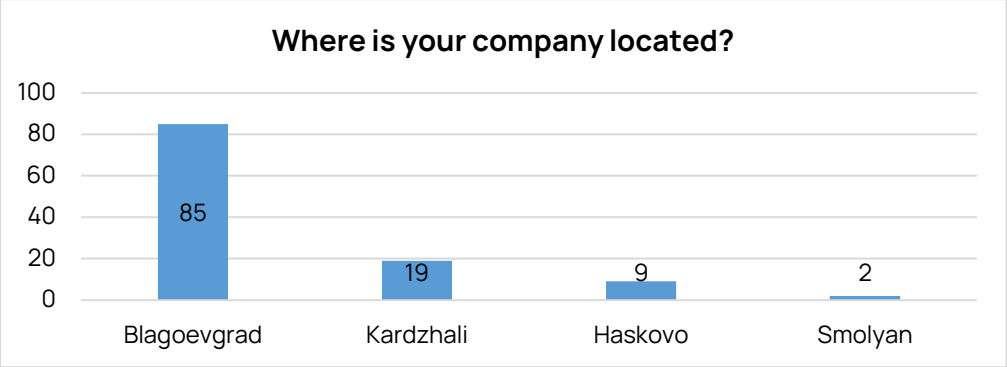


*Figure 4: Location of Respondents' Companies*

Despite the disproportion of responses by area, it can be noted that the data for the respondents in terms of their position in the enterprises and farms in which they work are encouraging from the point of view of the information that is generated. More than 51% of the respondents are company owners, which shows that much of the information that comes from them is the most complete, since these are the people who best know the enterprises and farms they represent and the processes, that take place in them. The share of administrative staff remains serious – 27%, which is the other unit that knows the overall functioning of an organization, while the presence of freelance experts and workers is the weakest, respectively 4.3% and 7% of all respondents. Technical staff responses accounted for over 10% of all responses, and the nominal distribution by position is shown in Figure 5 below in the text.

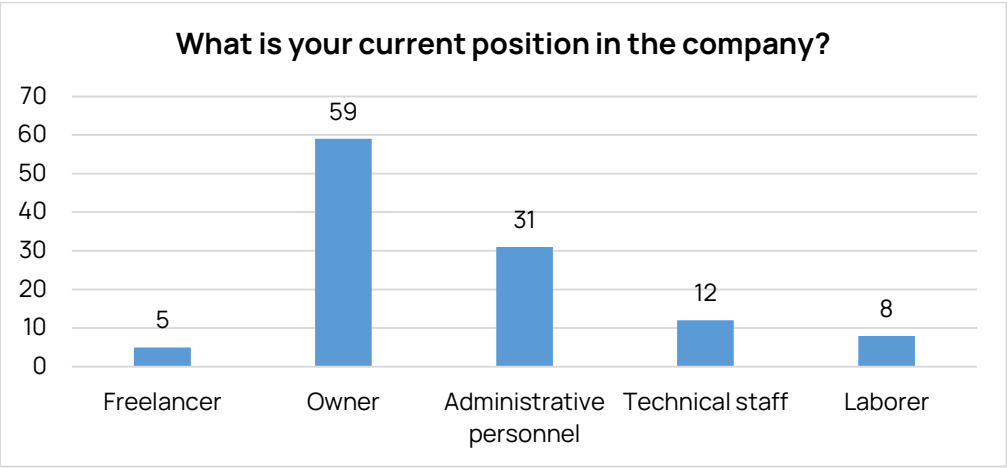


*Figure 5: Respondents' Current Position in their Companies*



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The data on the years in which the enterprises and farms, from the Agro-Food Sector in the cross-border region, participating in the research are active, give reason to state that the more one goes to the extreme - the short market presence or the permanent market presence, the more responses decrease. Enterprises and farms that have been operating for a period of 5-10 years are most strongly represented in the study with 27% of all respondents. The value of the companies represented in the research with experience between 10 and 20 years (24.3%), as well as the companies with a shorter period of operation (20%), is close. The least represented are the youngest enterprises and farms (0-3 years of activity) with 12.2%. On the other hand, companies with an established market presence, i.e. those with over 20 years of experience in the Agri-Food Sector are 16.5% of all those who participated in the study.

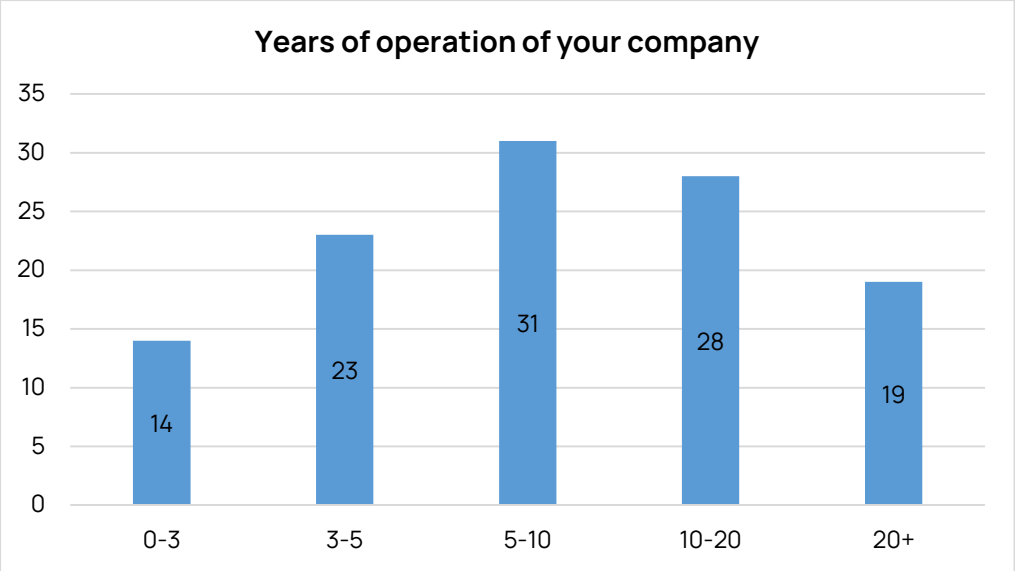


*Figure 6: Years of operation of Respondents' Companies*

The data on the areas in which the enterprises and farms included in the survey carry out their activity allow us to conclude that the sphere of production is the most preferred field of activity, where 77 companies carry out their activity, while trade is in second place. It is reported that 41 of the business entities participating in the survey fall into this sector. 28 and 25



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of the enterprises and farms fall in the areas of packaging and processing, and the least represented area is that of the provision of services, where 15 economic entities operate, and slightly more are those that operate in the field of logistics - 20 The number of enterprises and farms exceeds the total volume of respondents who participated in the survey, due to the fact that the question is multiple and allows participants to indicate more than one answer, i.e. that they operate in more than one area.

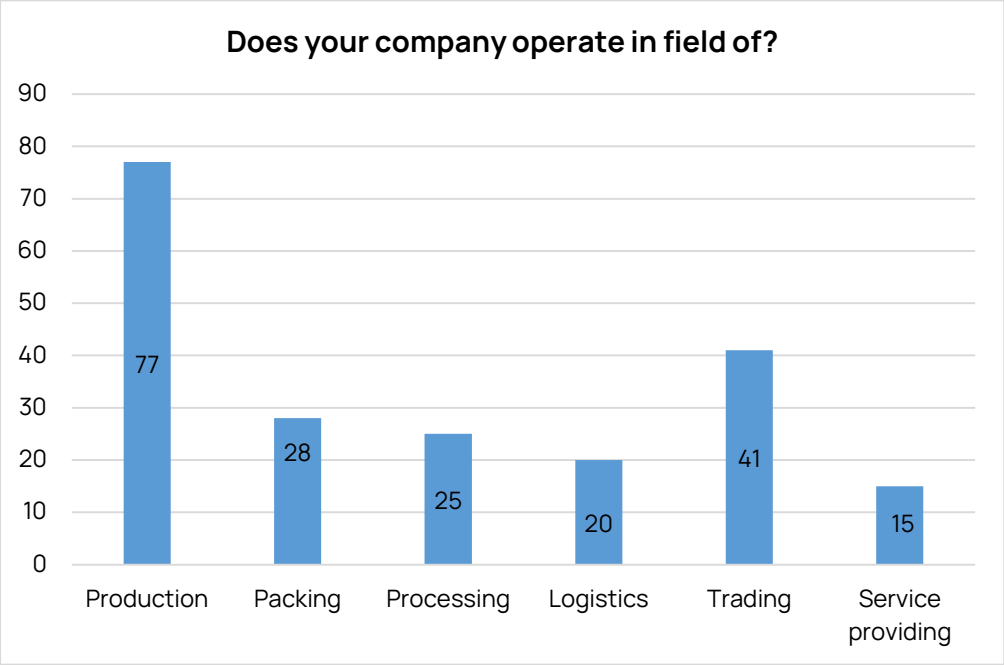


*Figure 7: Respondents' Companies' Operation Field in the Agri-food industry*

The data on what enterprises and farms fall into the research indicate the fact that the presence of those with a staff of up to 10 people is definitely the largest. 74.8% of all respondents are part of the activities of such companies, while 16.6% of all respondents are part of the second largest group (11-49 employees), which are the largest enterprises included in the research (50-100 employees) make up 2.6%. There is no identified presence of respondents who are part of large enterprises among those surveyed.



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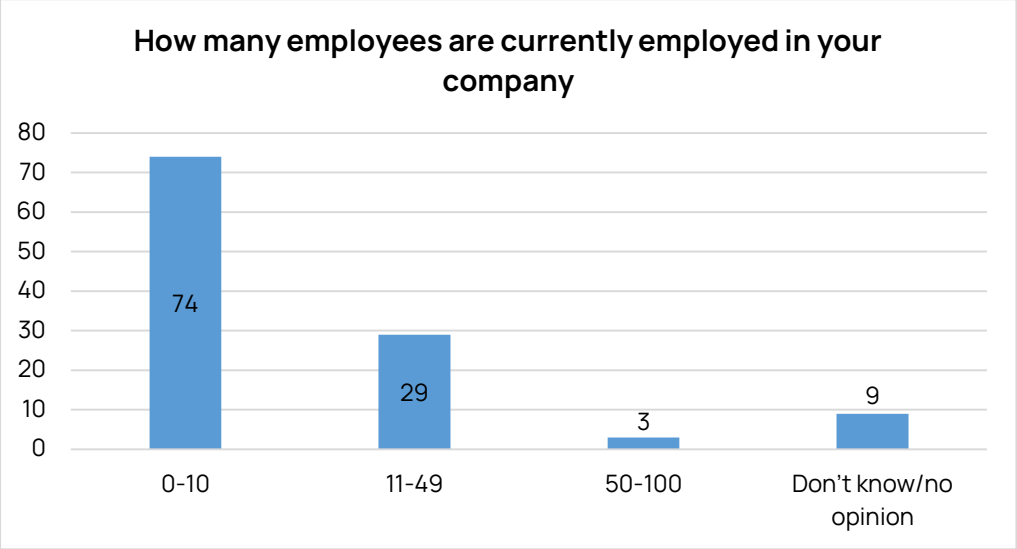


*Figure 8: Number of Employees of the Respondents' Companies*

The groups of enterprises and farms that are formed in terms of their annual turnover are presented as follows: 1) the largest group is that of enterprises with an annual turnover of less than EUR 500,000 and forms 64.3% of all responses; 2) the second largest group is that of companies that have a turnover between EUR 500,000 and EUR 2,000,000 and this group constitutes 25.2% of all responses; 3) the group of companies with a turnover between EUR 2,000,000 and EUR 10,000,000 is the smallest group (2.6%), while the share of people with no opinion and those with no information is 7.8% of all responses .

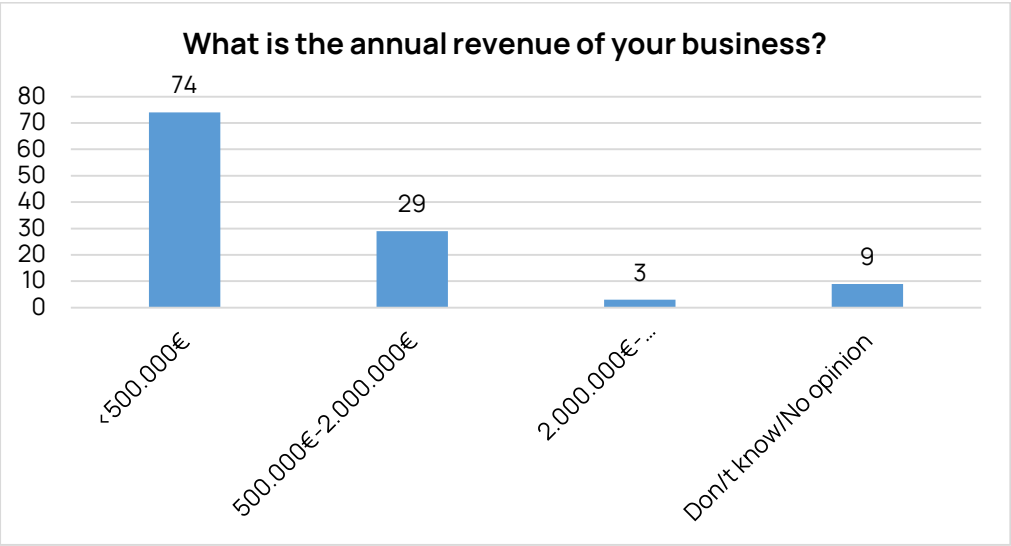


*Figure 9: Annual Revenue of the Respondents' Companies*



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### 6.2.2 General condition of enterprises and farms from the agro-food sector on the territory of the cross-border region

The first question that directly addresses the problem of how business entities from the agri-food sector plan and implement their activities is whether they have developed their development strategy/strategic development plan. In this sense, the data allow us to conclude that more than ¾ (76.5%) of the enterprises and farms have not developed a strategic development plan that is actually implemented. In view of the traditional components that this document includes, it can be found that this part of the respondents did not organize and structure information about the development of their company in terms of defining clear and specific goals, tasks and mission, business plan, etc. This is undoubtedly a problem for achieving an optimal pace of development, as it does not contribute to the management process being a set of practices of coordination, planning, accounting for the dynamics and direction of development, etc. The absence of the development of such a strategy speaks of the fact that the organizational process at the enterprises and farms of the Agro-Food Sector in the Cross-Border Region is not based on coordination, planning and coherence, but rather on the chaotic formulation of policy decisions.

On the other hand, only 16.5% of the respondents share that the farms of which they are a part have developed management plans. In this sense, it can be concluded that they have laid the foundation for their positive economic development, but on the other hand, their number is insufficient to consider that there are favorable conditions for the development of companies from the cross-border region as a whole, who participated in the research, regarding the integration of the main management practices and mechanisms. In addition, it should be noted that 3.5% of respondents are


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part of organizations that have developed their strategic development plans, but do not implement them. The factors for this can be different - from a lack of sufficient personnel to monitor the implementation of the plan and report the results that are achieved, to a lack of motivation for its implementation, etc. The value of the respondents who state that a strategic development plan is being developed in their company/farm is absolutely the same, which shows that, although weak, the tendency to develop such documents continues to exist.

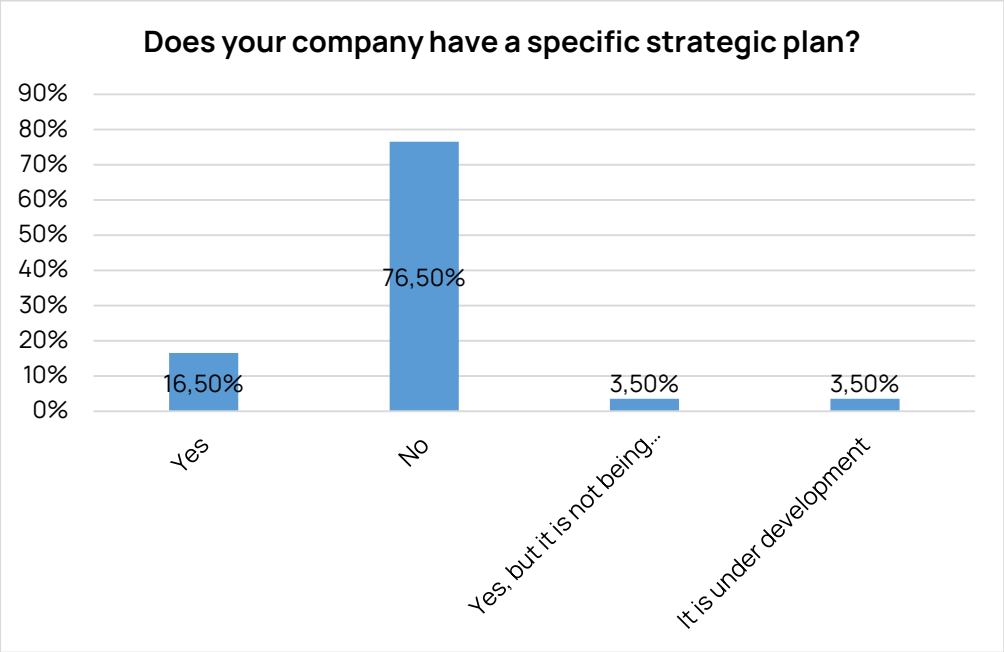


*Figure 10: Strategic Plan*

The analysis of the data from the analysis conducted to establish statistically significant relationships allows to see the presence of a reliable and statistically significant relationship between the implementation of a strategic plan and the receipt of consulting services (Approx. Sign. = 0.000; Cramer's V = 0.404; Phi = 0.404). The strength of the relationship is medium, indicating its high significance.



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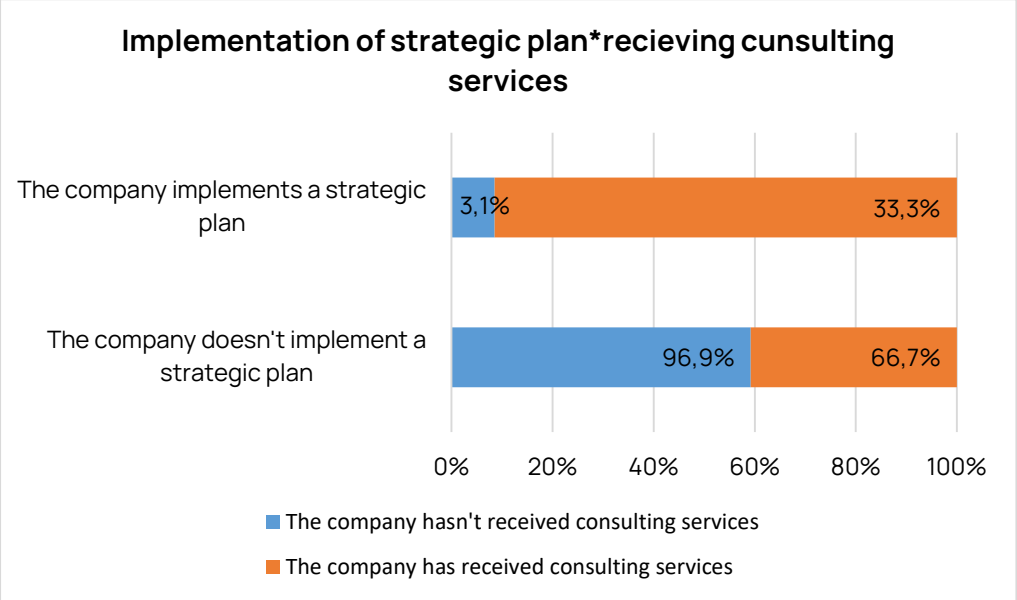


*Figure 10.1: Implementation of strategic plan*receiving consulting services*

The data allow revealing the relationship, which is objectified in that companies that receive consulting services tend significantly more (namely more than 10 times!) to implement a strategic plan in general, in comparison, companies that they don't get. In reality, 1/3 of the enterprises and farms that received consulting services declared that they were implementing their strategic plan, while only 3.1% of the enterprises and farms that participated in the research, which did not receive consulting assistance, declared the implementation of a strategic plan. In this sense, in companies that do not receive consulting support, the phenomenon is observed that they are more likely not to implement a strategic plan, the chance of this being approximately 1.5 times higher than that of enterprises and farms that receive consulting support. In this sense, and quite justifiably, it can be argued that the development and implementation of a business plan is to a greater extent a function of the use of consulting services and to a lesser extent of one's own internal organizational capacity.

The second statistically significant relationship identified in the research is weak and comes to show that in enterprises and farms in which labor costs are considered high, they apply strategic development plans to a higher



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degree, compared to those where the same costs are medium or low (Approx. Sign. = 0.017; Cramer's V = 0.266; Phi = 0.266). This suggests noting that labor costs are not a barrier to the implementation and implementation of strategic plans, which suggests the hypothesis that enterprises and farms in which the main expenditure is aimed at providing staff remuneration should not encounter problems in implementing such plans.

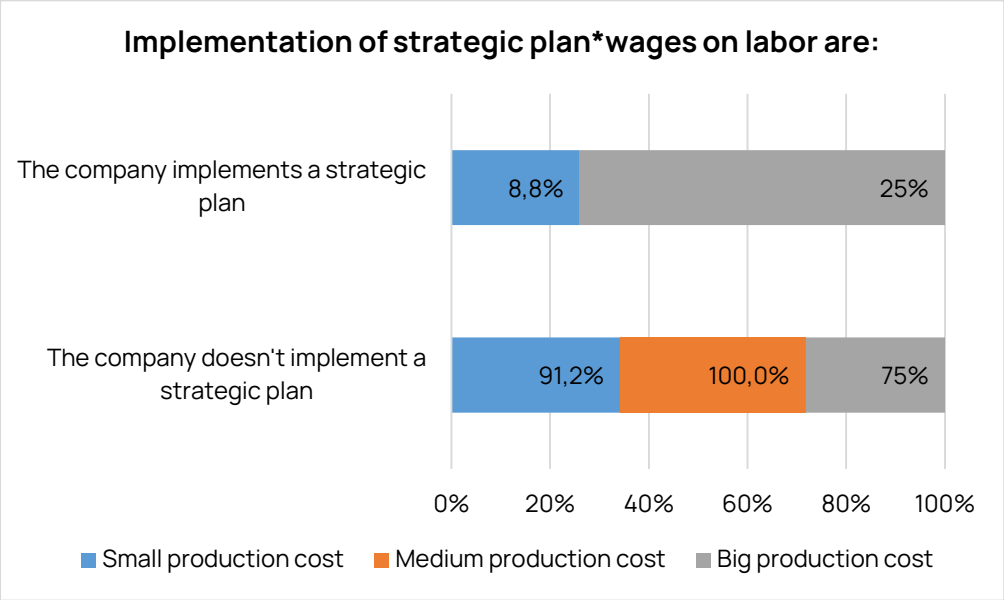


*Figure 10.2: Implementation of strategic plan*wages on labor*

The third relationship subject to the present analysis (Approx. Sign. = 0.002; Cramer's V = 0.324; Phi = 0.324) is moderate and consists in the fact that for those enterprises that consider maintenance costs to be small for them in least likely to develop and implement strategic management plans (see Figure 10.3). In this sense, it can be said that high and average maintenance costs do not represent a barrier to the development of strategic plans, as far as the enterprises in which they are defined as such have a several times higher degree of implementation of such plans.



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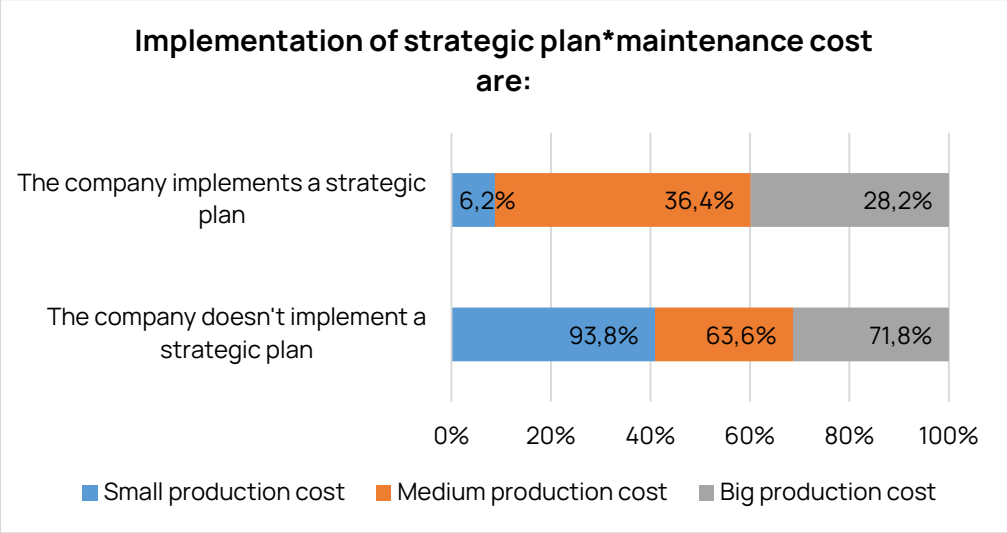


*Figure 10.3: Implementation of strategic plan*maintenance cost*

A statistically significant relationship is also found between the implementation of a strategic plan and the attitude towards energy costs found in the study (Approx. Sign. = 0.028; Cramer's V = 0.250; Phi = 0.250). The strength of the relationship is weak and it is necessary to state that in enterprises and farms where energy costs are small, strategic management plans are applied to the greatest extent. In this sense, it can be stated that low energy costs suggest to a greater extent the implementation of strategic plans, compared to high and medium ones.

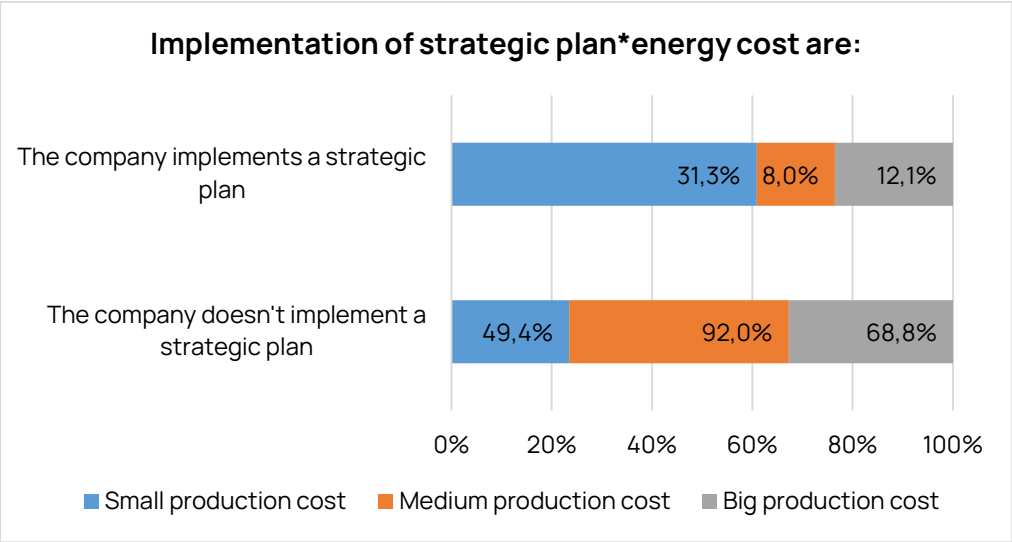


*Figure 10.4: Implementation of strategic plan*energy cost*



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The following relationship revealed in the analysis is moderate and gives reason to conclude that the implementation of a strategic development plan is a characteristic feature of enterprises and farms in which there are no significant problems in the field of human resources, compared to those enterprises that experience such (Approx. Sign. = 0.001; Cramer's V = 0.310; Phi =- 0.310). This may mean both that the application of such tools leads to few problems in this area, and that the good organizational culture and practice regarding the provision of qualified personnel, which is deployed in this type of economic entities, is objectified in the development of strategic management plans. The important thing to say here is that where businesses experience staffing difficulties they are far more likely not to develop and implement strategic plans, indicating that the implementation of this type of plan is not isolated problem, but is part (and result) of numerous organizational difficulties and deficits.

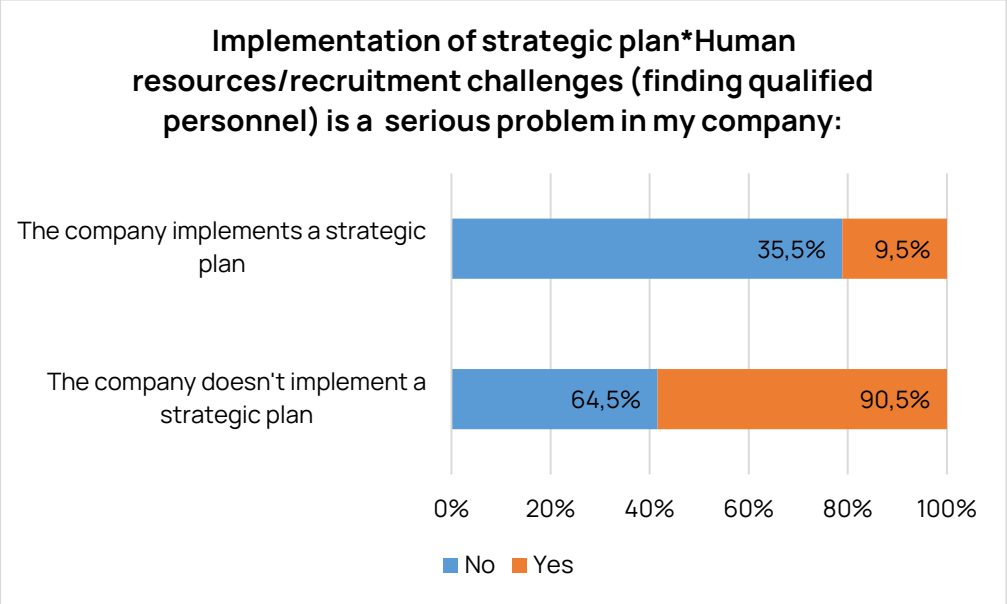


*Figure 10.5: Implementation of strategic plan*human resources*

The question of the implementation of the marketing policy for the enterprises and farms from the Agro-Food Sector on the territory of the



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Cross-Border Region also remains fundamental. A key internal organizational tool for its implementation is the marketing plan/strategy. Data from the conducted survey show even more serious deficits in relation to the levels of development of strategic plans.

What makes the biggest impression is that as many as 80% of the research participants do not work in structures that have created their own marketing plans. This is a phenomenon that is characterized by the fact that for the implementation of their marketing policy, companies rely on chaotic and actions and measures, which suggests that they cannot take advantage of all the advantages that marketing as a tool for the development of organizations allows. The main problems that are objectified consist in the impossibility of establishing the name and brands of the companies as recognizable business entities, and also in the (self) limited scope and impact of the same enterprises and businesses on the market in terms of both consumers, and potential partners. When performing the analysis of bivariate distributions, no statistically significant relationships were found that could be validated as reliable, which could be attributed to the sample size and the structure of the responses.

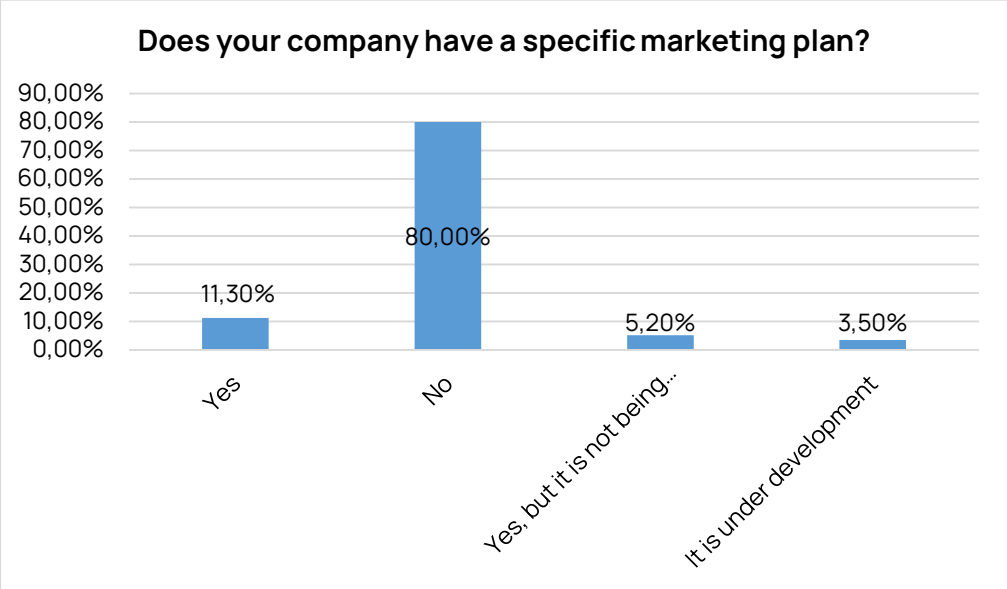


*Figure 11: Marketing Plan*



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The next question that is the subject of analysis is whether the Bulgarian enterprises and farms from the agri-food sector are open to synergy with other interested parties from the sector. In this sense, in contrast to the negative trends in terms of organizational development, which are associated with the planning process and which were ascertained, things are different here. There are attitudes that indicate a very high degree of readiness (67% of respondents declare that the companies they are a part of are open to synergy) for cooperation with other interested parties.

Almost 14% is the share of respondents who share that the economic entities in which they operate are not open to implementing actions and measures for cooperation with interested parties from the agri-food sector, and the share of people who cannot express a position is almost 1/5 of the surveyed individuals. This can be attributed to factors such as their position in the company, which does not imply that they are aware of management decisions and policies, personal attitude and interest in the development of the company, misunderstanding of the essence of synergy, etc.

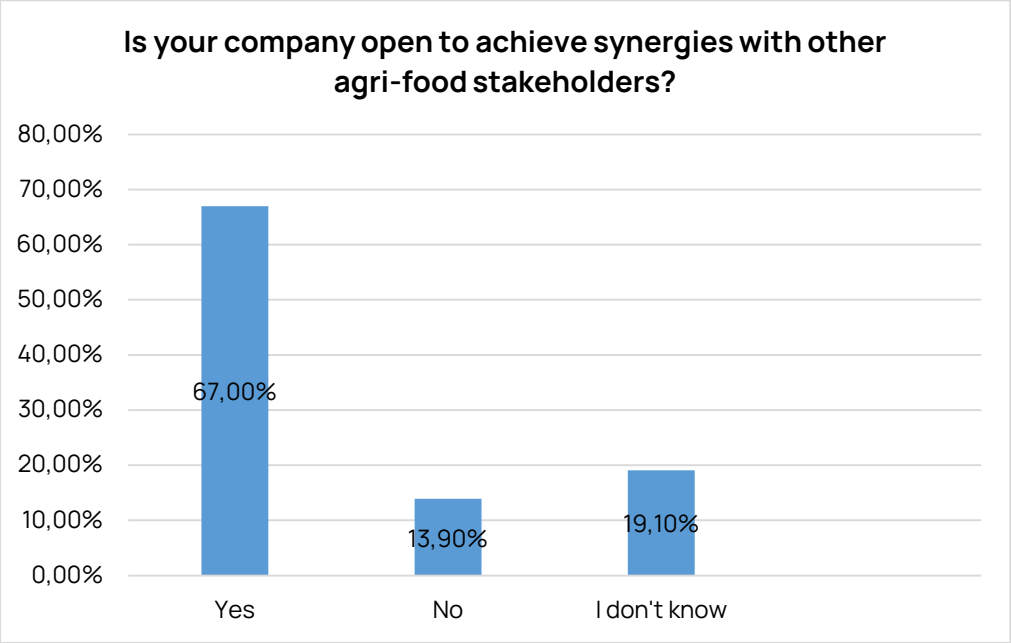


*Figure 12: Synergies*



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Performing an analysis to check for statistically significant relationships between the various variables allows for the discovery of very few that can be validated. Applying the approach to ensure greater informativeness of the research data, by regrouping the responses into a smaller number of semantic meanings, it becomes possible to discover both the available and such statistically significant relationships that otherwise could not be confirmed as credible. In this case, through the recoding operation, 2 groups are distinguished - respondents who claim that their companies are open to achieving synergy with stakeholders with other organizations in the agri-food sector (i.e. this is the group of respondents who have answered "yes" to the question) and a second group of respondents who cannot confirm that their company is currently open to synergy with others., (this is the group of respondents for whom this cannot be concluded - those who answered "no" and "I don't know").

A statistically significant relationship was identified between willingness to achieve synergy with stakeholders in the agri-food sector and the introduction of green practices/technologies (Approx. Sign. = 0.000; Cramer's V = 0.533; Phi = 0.533), with the strength of the relationship strong, which comes to show about the great differences in the responses of the respondents regarding the readiness for synergy in relation to whether the enterprises and farms in which they are situated have introduced green practices and technologies.

Figure 12.1 clearly shows how enterprises and farms that have introduced green practices declare openness to achieving synergy in almost 94% of cases, while in the remaining over 6% for the same market entities this cannot be said. The situation is radically different for respondents who cannot recognize which practices are green. They are more likely not to declare that they are open to synergy, almost 80% of them cannot say that the enterprises in which they work are open to synergy.


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Beyond this, the readiness for synergy can be seen to decrease with the introduction of green practices. For example, enterprises and farms that are aware of the importance of introducing green practices and technologies (i.e., those who have introduced and those who are developing them) are more likely to declare readiness for synergy than the others.

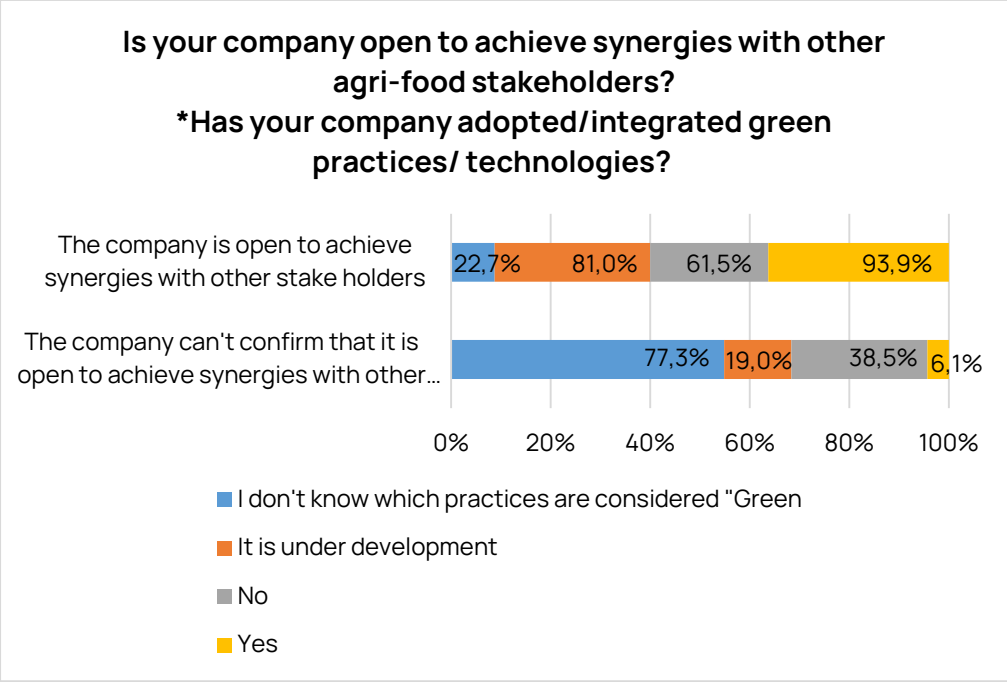


*Figure 12.1: Synergies*green practices*

Another statistically significant relationship that can be found is that between readiness for synergy and opinions about the benefits of using operational business tools (Approx. Sign. = 0.000; Cramer's V = 0.365; Phi = 0.365). The established relationship is moderate. In addition to this, it can be observed how people who tend to consider that the use of operational business tools brings benefits to business entities from the agri-food sector are more likely to answer that their enterprise/farm is open to synergy with stakeholders and to a significantly lesser extent reserved for



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synergy.

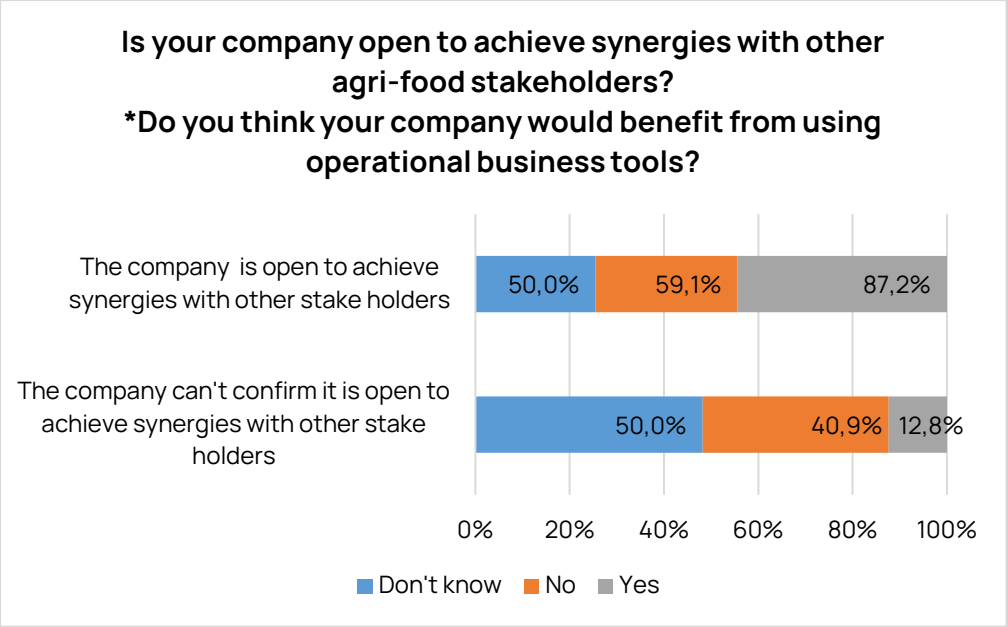


*Figure 12.2: Synergies*operational business tools*

The third statistically significant relationship identified is between the propensity to realize synergy and education (Approx. Sign. = 0.004; Cramer's V = 0.265; Phi = -0.265), but the relationship is not strong. Although the relationship is weak, it can be stated that the answers about the attitudes towards realization of synergy between the companies and the education of the respondents exist in a certain form of consistency, insofar as the respondents with a higher education are more likely to declare that economic entities of which they are a part are open to synergy.



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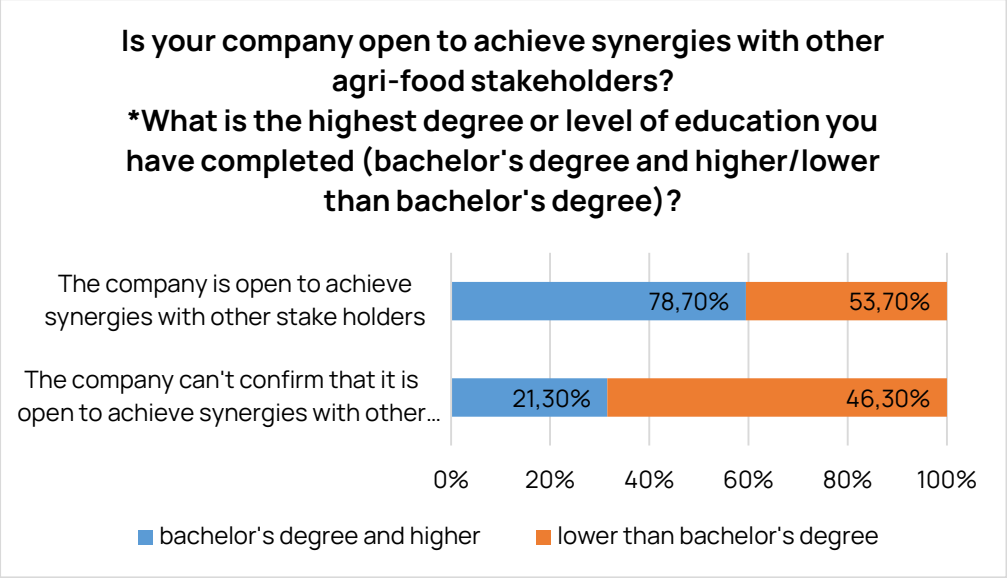


*Figure 12.3: Synergies*education*

Although not strong, a statistical relationship also exists regarding the extent to which marketing is a significant problem area (Approx. Sign. = 0.009; Cramer's V = 0.243; Phi = -0.243). In this sense, it can be noted that enterprises and farms in which marketing is not considered a significant problem are more inclined to realize synergy with interested parties, compared to those that experience such problems.

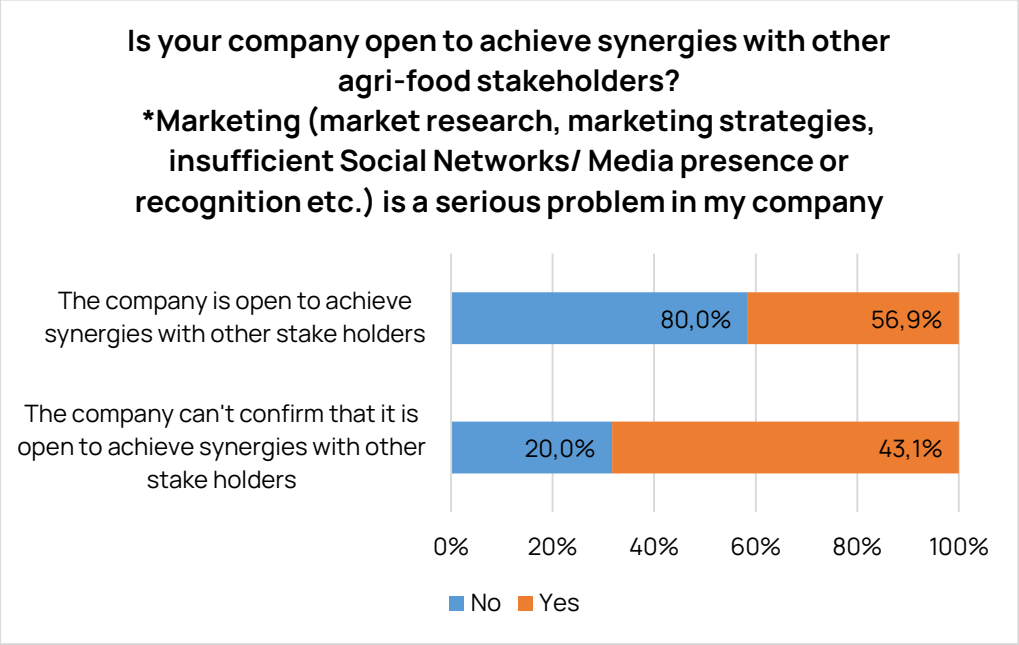


*Figure 12.4: Synergies*marketing*



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The next statistically significant relationship that was found gave similar results, but regarding business management as a specific problem area (Approx. Sign. = 0.001; Cramer's V = 0.314; Phi = -0.314). The relationship is already moderate, which highlights the greater difference in responses to treating marketing as a problem area and makes it clear that enterprises and farms that do not experience significant problems in the area of business management are more likely to declare readiness for synergy, versus those who experience problems in this area.

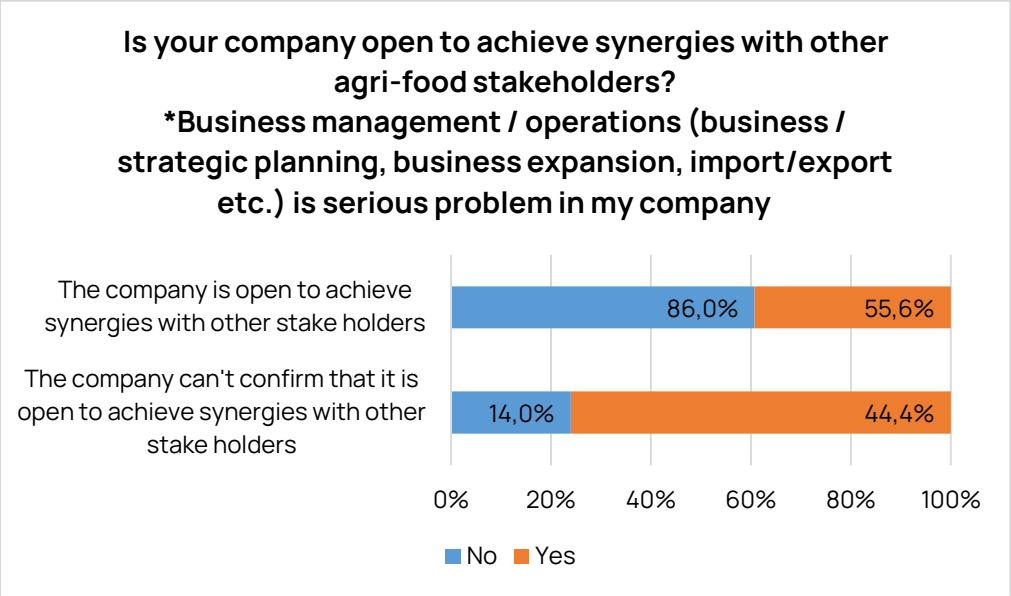


*Figure 12.5: Synergies*business management*

In contrast to the problem areas considered so far, it can be said that the next relationship subject to analysis makes it clear that the readiness for synergy is greater not where significant problems are absent, but where they are present and in particular such problems that are related to foreign market access (Approx. Sign. = 0.020; Cramer's V = 0.218; Phi = 0.218). To the extent that access to foreign markets is a problem that is characteristic of export-oriented companies, it can be concluded that they are more likely to declare readiness for synergy.



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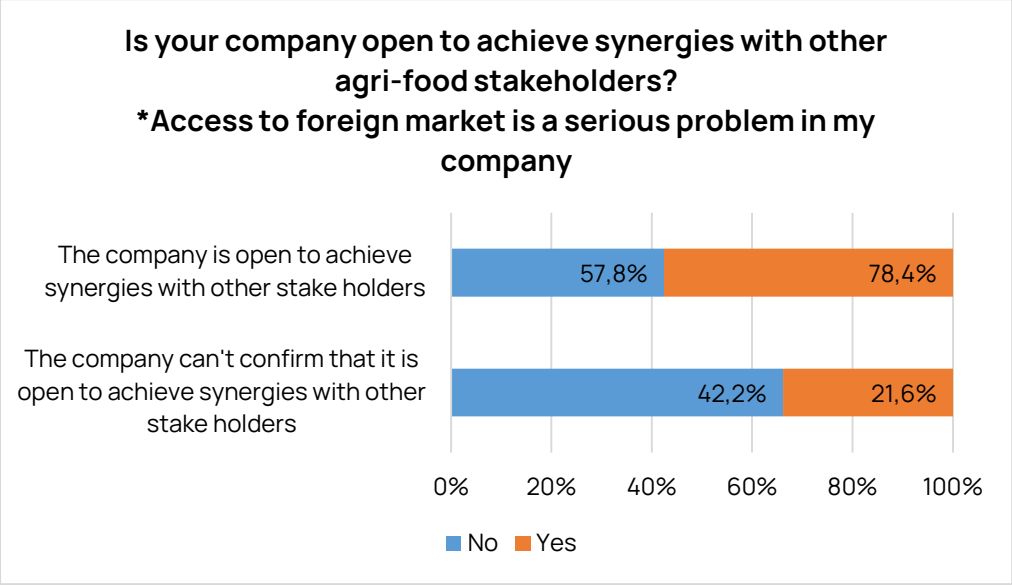


*Figure 12.6: Synergies*foreign market*

The relationship observed between the readiness for synergy and the attitude towards the importance of problems in the field of human resources is also statistically significant (Approx. Sign. = 0.003; Cramer's V = 0.281; Phi = 0.281). The relationship is weak and comes to show that enterprises and farms that experience such problems are more likely to declare readiness for synergy, compared to companies in which these problems are not considered significant.

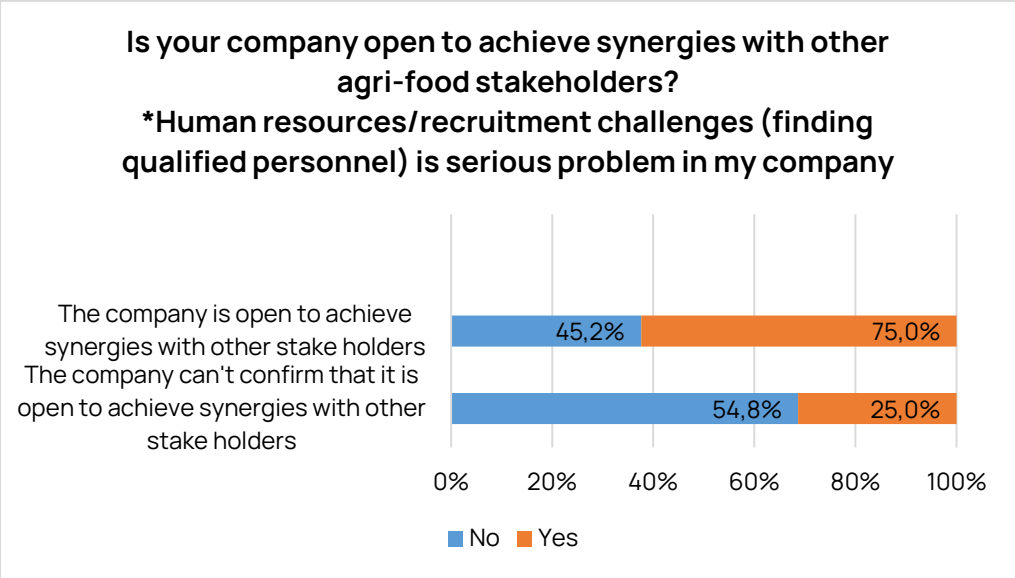


*Figure 12.7: Synergies*human resources*



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The same conclusion can be drawn for enterprises and farms experiencing problems as a result of environmental changes (Approx. Sign. = 0.008; Cramer's V = 0.249; Phi = 0.249). The data from the figure below in the text illustrates the fact that those business entities for which environmental changes are a significant problem are more open to synergy than those where the same problems are not treated as significant.

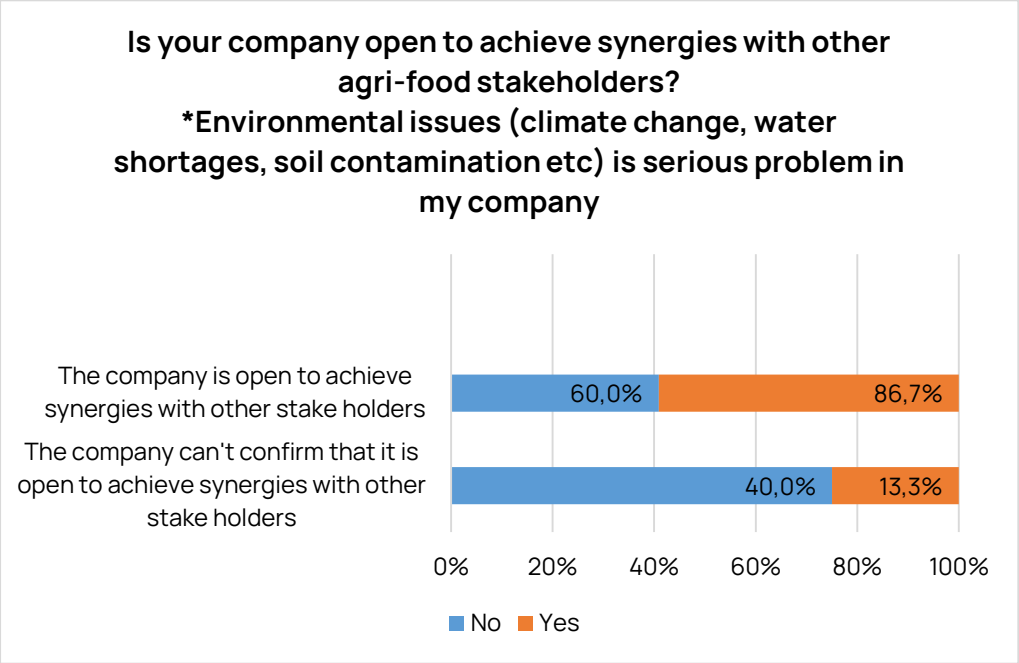


*Figure 12.8: Synergies*environmental issues*

Several statistically significant relationships also emerged with respect to costs. The first of them states that enterprises and farms with the lowest maintenance costs declare the highest degree of readiness for synergy, while those enterprises and farms with medium and heavy maintenance costs tend to express less readiness for synergy (Approx. Sign. = 0.001; Cramer's V = 0.354; Phi = 0.354).



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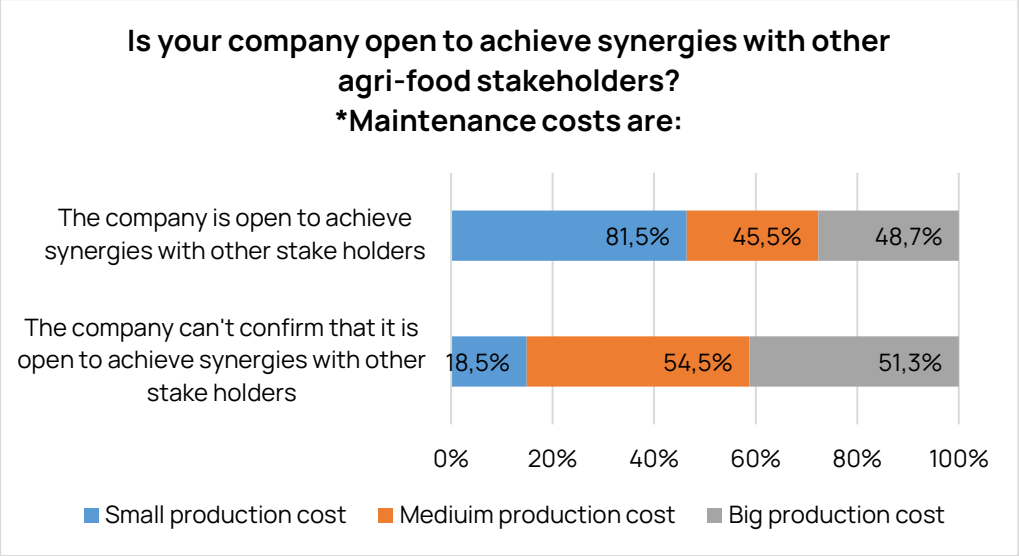


*Figure 12.9: Synergies*maintenance costs*

The statistically significant relationship regarding the costs of raw materials (Approx. Sign. = 0.039; Cramer's V = 0.238; Phi = 0.238) is weak and comes to reflect the fact that in enterprises and farms where the costs of raw materials are considered large are most open to synergy. This gives reason to conclude that high material costs do not represent a barrier to achieving synergy.

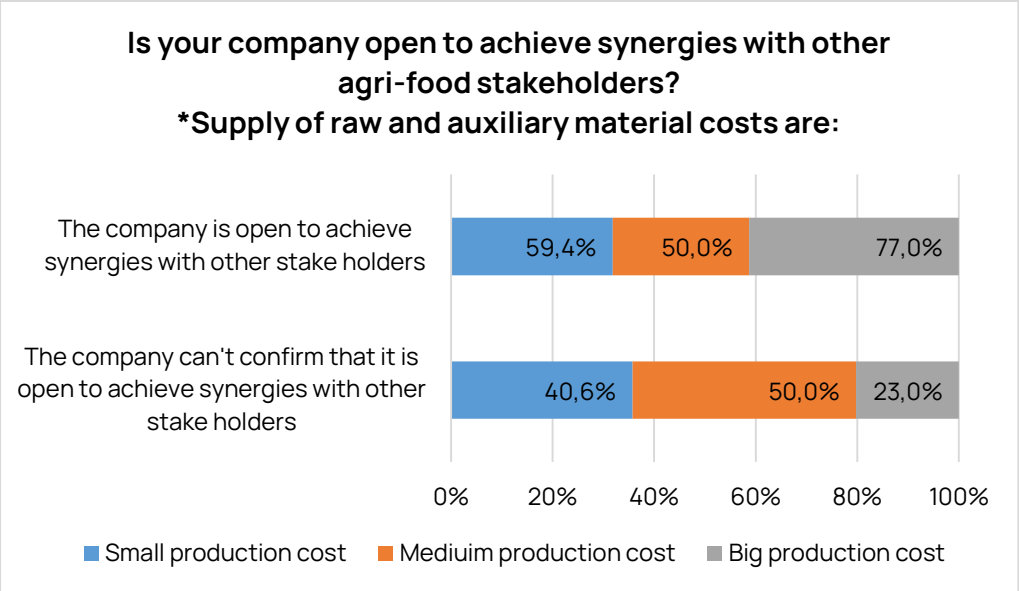


*Figure 12.10: Synergies*material costs*



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A similar trend is observed in terms of cost inflation, although rather more severely expressed (Approx. Sign. = 0.000; Cramer's V = 0.368; Phi = 0.368). The data from the research show that the companies and farms in which the costs caused by inflation are considered to be high declare readiness for synergy with the interested parties to the highest degree. On the other hand, it can be said that the large share of these costs, not only do not represent a barrier to the readiness for synergy, but rather conditions for the expression of such readiness, as far as the burden of the costs caused by inflation decreases and readiness for synergy.

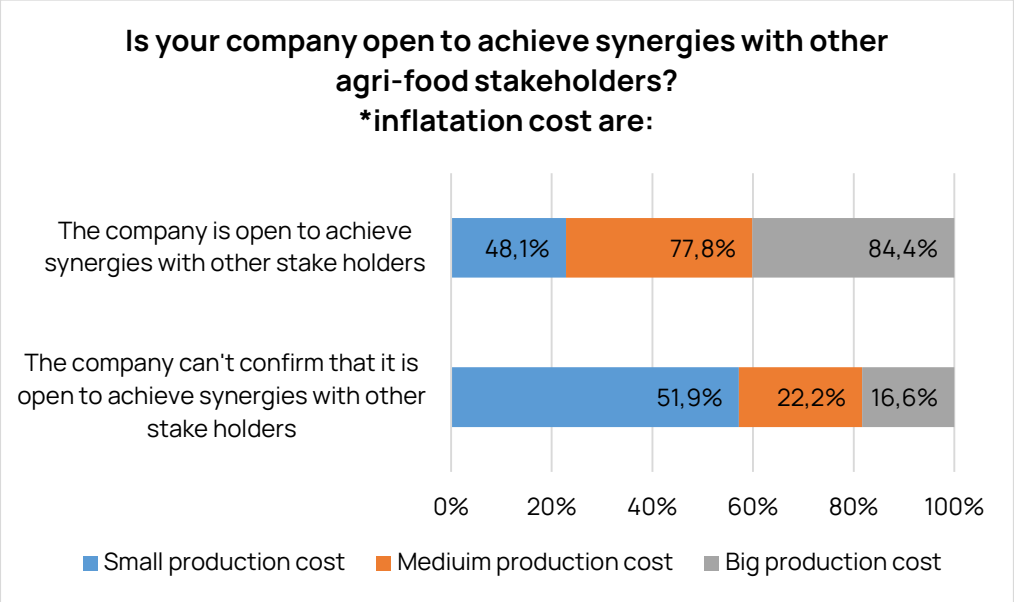


*Figure 12.11: Synergies*inflation cost*

The relationship that can be found regarding the implementation of procedures, policies and codes for the safety of employees in the workplace is also statistically significant (Approx. Sign. = 0.002; Cramer's V = 0.283; Phi = 0.283), which is expressed in that enterprises and farms developing such regulations are more likely to express readiness for synergy than those that do not.



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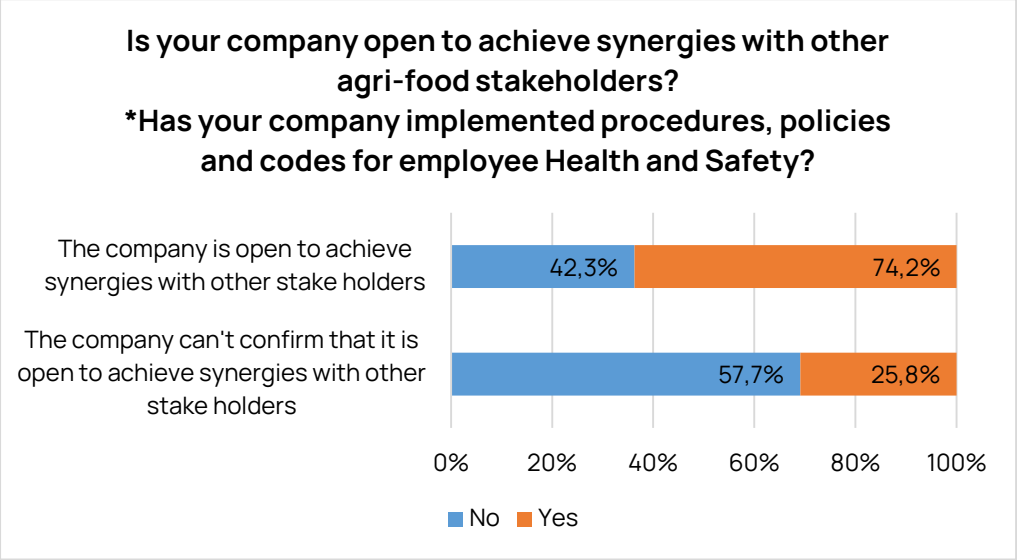


*Figure 12.12: Synergies*health & safety*

The situation is similar with regard to the procedures, policies and codes in the field of the documented food safety control system (Approx. Sign. = 0.011; Cramer's V = 0.237; Phi = 0.237), where enterprises and farms developing such tools declare -high level of readiness for synergy, compared to those who do not develop.

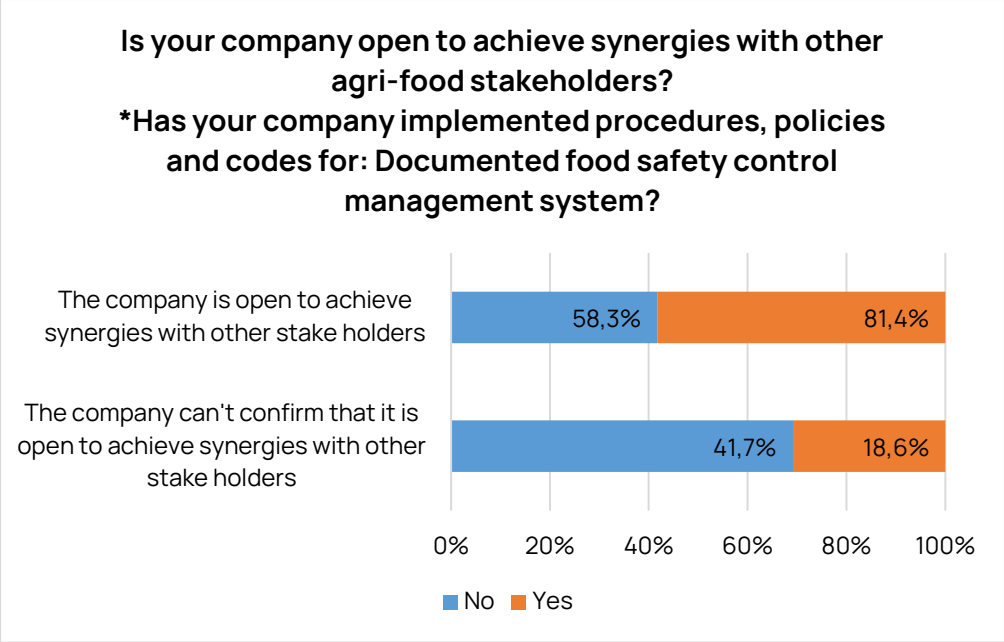


*Figure 12.13: Synergies*food safety*



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One of the most important questions concentrates research efforts to investigate whether enterprises and farms in the Agro-Food Sector have introduced/and/or adopted green practices and/or technologies in their operations. The data gives reason to conclude several important facts on the subject. Almost 1/5 (19.1%) is the share of people who cannot recognize whether a practice/technology is green or not. This indicates major deficits in conservation culture and environmental care among a significant group of respondents. On the other hand, this may in all probability mean that in the enterprises in which they work, such a culture is not strongly advocated and/or defined, and accordingly the chances that they have really integrated green practices in their activity are low. The issue of green practices and technologies also has a completely different dimension - the economic one. In other words, the lack of introduction of green practices (for example, reducing the use of paper) and technologies in the activity of an enterprise and/or farm has the potential to contribute to the reduction of production and other costs (in the example of paper, these are the costs of, but the same can be applied to electricity, etc.), as by not introducing them, the managers of such organizations fail to achieve optimal economic management.

Another alarming signal can be seen in the answers of the group, which indicates that there are no green practices and/or technologies implemented in the enterprises and farms in which they work. Its relative share is more than one-third of all respondents (almost 34%), making it the largest group of respondents. The non-introduction of such practices and technologies in the activities of enterprises and farms from the Agro-Food Sector in the cross-border region leads to the same negative effects that were explained above and does not give grounds to state that an ecological consciousness has been reached, which is centered on environmental protection, in the context of production processes.


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On the other hand, 28.70% of the respondents declare that the enterprises and farms of which they are a part have introduced green practices and technologies in their activity. This comes to show that although this is not the main group in Bulgaria and in particular in the cross-border region, the economic culture that is concentrated on the protection of the environment exists and is objectified not only in wishes and readiness for realization, but also in real actions and practices. This thesis is supported by the data that currently 18.30% of respondents declare that green practices and technologies are being developed in their company, which gives reason to conclude that the process of neglecting green practices and technologies is slowing down. and their integration becomes a fundamental part of the functioning of enterprises and farms from the Agro-Food Sector on the territory of the Cross-Border Region.

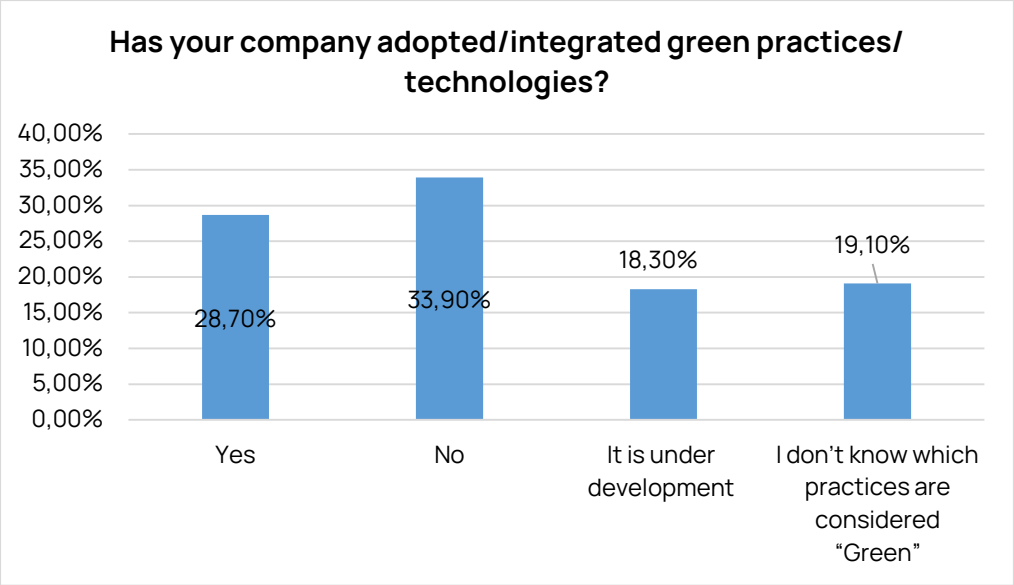


*Figure 13: Integration of Green Practices/Technologies*

Analysis of bivariate distributions indicated the presence of a statistically significant relationship between the adoption of green practices and technologies and gender (Approx. Sign. = 0.000; Cramer's V = 0.400; Phi = 0.400) with a moderate strength of the relationship.



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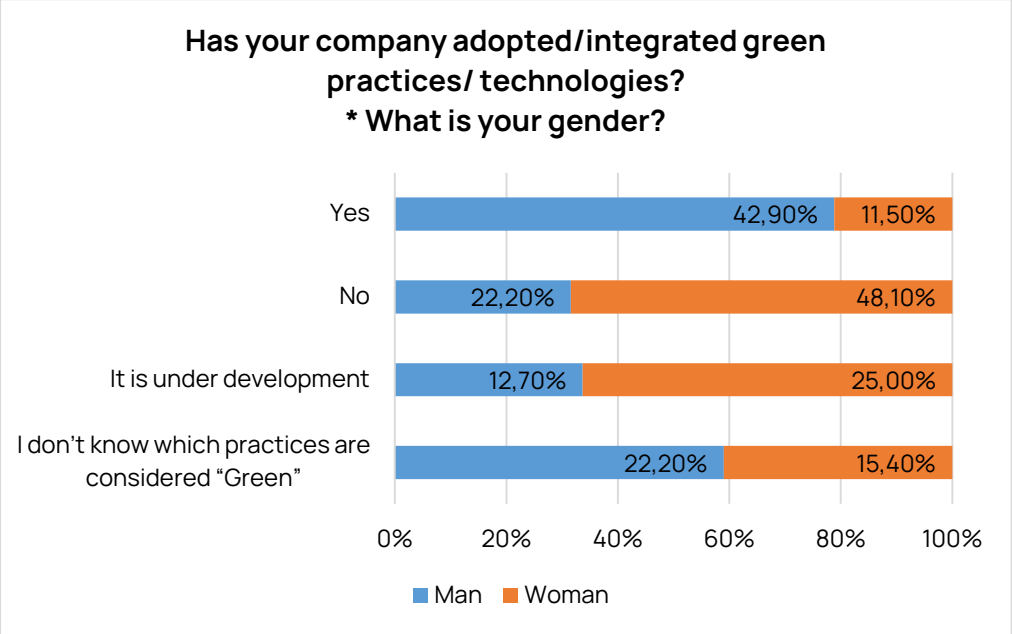


*Figure 13.1: Integration of Green Practices/Technologies*gender*

As can be seen from the figure above in the text, the relationship between the two variables is objectified in the fact that men are almost 4 times more likely (42.9% for men vs. 11.5% for women) to declare that in their enterprise or farm has green practices and/or technologies in place. This fact gives reason to construct the hypothesis that areas of economic activity in the agri-food sector that are dominated by men have made more progress in terms of the introduction of green practices and technologies. On the other hand, women are more than twice as likely to state that such practices or technologies have not been introduced in the enterprises and farms where they work (48.1% for women versus 22.2% for men). Interestingly, however, almost twice as many women (25% of women vs. 12.7% of men) declare that green practices or technologies are being developed in their enterprises and farms. This comes to show that lagging in the economic areas of the Agro-Food Sector, which are dominated by women, is gradually melting and decreasing. In support of this hypothesis can be the data that women generally have a higher culture and are more able to recognize green practices, which comes to show that the implementation of green practices



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and technologies in the male-dominated areas of economic life will is slowing down and declining, while in female-dominated fields the adoption of such practices and technologies will increase.

In conclusion, it can be said that gender has a moderate influence on the adoption of green practices and technologies. Male-dominated economic entities have implemented such practices and technologies to a greater extent, but it is currently more typical for enterprises and farms that predominantly employ women to introduce such practices and technologies.

The presence of a statistically significant relationship is also found regarding the introduction of green practices and technologies and whether the economic entity carries out activity in the field of trade (Approx. Sign. = 0.024; Cramer's V = 0.287; Phi = 0.287), as the strength of the connection is weak.

The data shows that, in general, respondents engaged in trade activities are less likely (and almost twice as much!) to introduce green practices and technologies in their activity (35.1% of enterprises and farms that do not work in the field of trade have introduced green practices and technologies, while only 17.9% of those who work there have introduced similar measures). This fact can also serve to support the hypothesis defined above, that the spheres of economic activity that are dominated by women (such as the sphere of commerce) are less inclined to implement green practices and technologies.

On the other hand, respondents, engaged in trade activities are more likely to implement green practices and technologies. At the same time, this readiness is declared by almost 3 times as many respondents (31.7% vs. 10.8%). This fact is again in harmony with the gender distribution, where women declared to a greater extent that in the enterprises and farms of


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which they are a part, they are more ready to implement green practices and technologies. On the other hand, however, it comes to show the static nature of the spheres external to the sphere of trade in terms of the introduction of green practices and technologies in their activity.

Since the ignorance of green practices and technologies is distributed almost equally among the market agents operating in the sphere of commerce, it will not be given special attention to the issue. In conclusion, it can be stated that whether a company is engaged in trade has a connection, albeit a weak one, with the introduction of good practices and technologies in enterprises and farms from the Agro-Food Sector. Companies that are not part of this sphere of the agri-food sector in the cross-border region declare a higher level of already implemented such practices and technologies, but also the data indicate that those operating in the sphere of influence trade are more active in terms of the development of such practices and technologies.

This makes it possible to note that there is a new trend, which consists in the fact that the share of economic entities carrying out trade in the field of the Agro-Food Sector, which introduce green practices and technologies in their activity, is increasing and they are becoming leaders in relation not the development of green practices and technologies, to the economic agents external to them.

Another statistically significant relationship is found between the introduction of green practices and technologies and, on the one hand, the respondents' opinion on whether operational business tools would have a positive impact on their companies (Approx. Sign. = 0.000; Cramer's V = 0.349; Phi = 0.494), with a moderate strength of the relationship.

*Figure 13.1: Integration of Green Practices/Technologies*gender*


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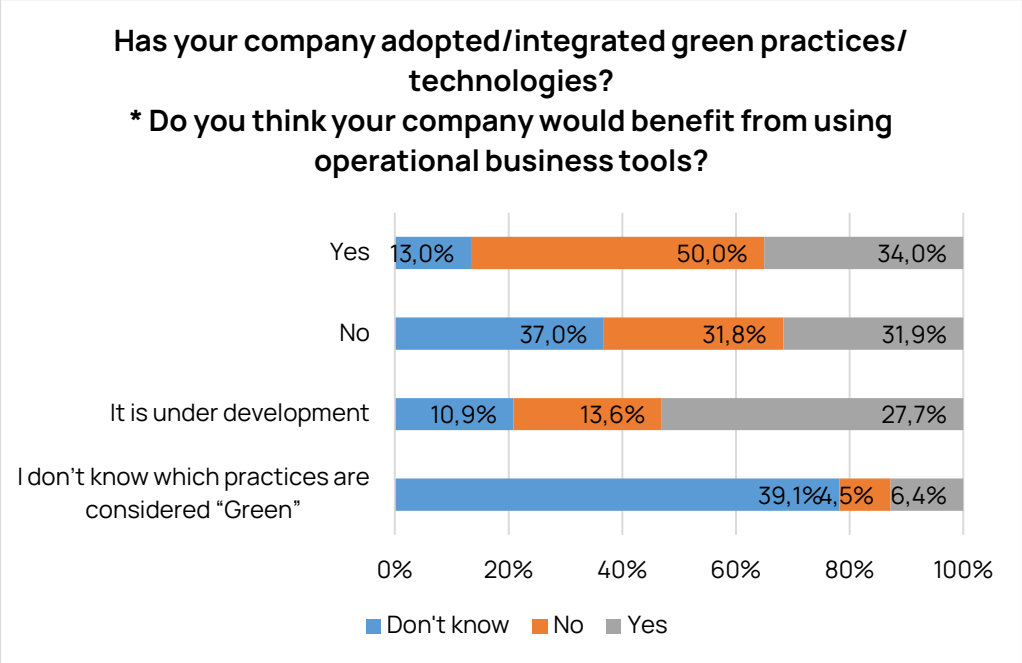


*Figure 13.2: Integration of Green Practices/Technologies*operational business tools*

The most obvious fact from Figure 13.3 is that almost 40% of respondents who do not have information about which practices and technologies are considered green cannot assess whether the use of operational business tools will provide benefits to enterprises and farms. in which they work. In this sense, this can be explained mostly as a lack of specific competence in the respondents regarding the two case studies.

On the other hand, it is striking that among the positive answers about whether enterprises and farms have introduced green practices and technologies, the group of people with no opinion regarding whether the use of operational business tools can provide benefits to the structures from which are part The other important finding consists in the fact that the implementation of green practices and technologies is most actively observed among the group of respondents who believe that the use of operational business tools can have a positive impact on the development of their organizations.



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The next statistically significant relationship that can be confirmed this time relates to the data on the educational status of the respondents. (Approx. Sign. = 0.019; Cramer's V = 0.295; Phi = 0.295), the strength of the relationship being weak. The data give reason to conclude that where the education of the respondents is higher, the level of introduction of green practices and technologies is almost 3 times higher than where the education is lower. It can reasonably be assumed that in high-tech and specialized enterprises and farms, which, as a rule, are dominated by the presence of more qualified personnel, a higher level of introduction of green practices and technologies is observed.

It can be seen from figure 13.4 that in the enterprises where the less educated respondents work, the level of development of green practices and technologies is significantly lower (almost 3 times!) compared to where more highly qualified employees work. At the same time, almost 40% of the less educated respondents state that green practices and technologies have not been introduced in their companies, while among the better educated this share is below 30%. It is characteristic that, although not to a high degree, education appears to be a differentiating principle regarding the introduction of green practices and technologies, as far as it can be considered that enterprises that have more highly qualified personnel implement more green practices and technologies.

Education is also a determining factor in terms of levels of ignorance of the nature of green practices and technologies. Persons with lower education who declared that they do not know which practices and technologies are more than 2 times more as a relative share compared to those who cannot help but know this type of practices and technologies, but have a bachelor's degree and higher (the relative share of the former among all persons with an educational degree lower than a bachelor's is 27.8%, while only 11.5% of


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those with a higher education declare that they do not know green practices and technologies).

This allows us to conclude that education plays a significant role in terms of the introduction of green practices and technologies, as where it is lower there is generally a lower degree of implementation of such practices and technologies, their weaker development and higher ignorance. These findings, in general, lead to the formulation of a hypothesis that at the moment there are no serious prospects for improving the situation in enterprises and farms dominated by employees with lower education.

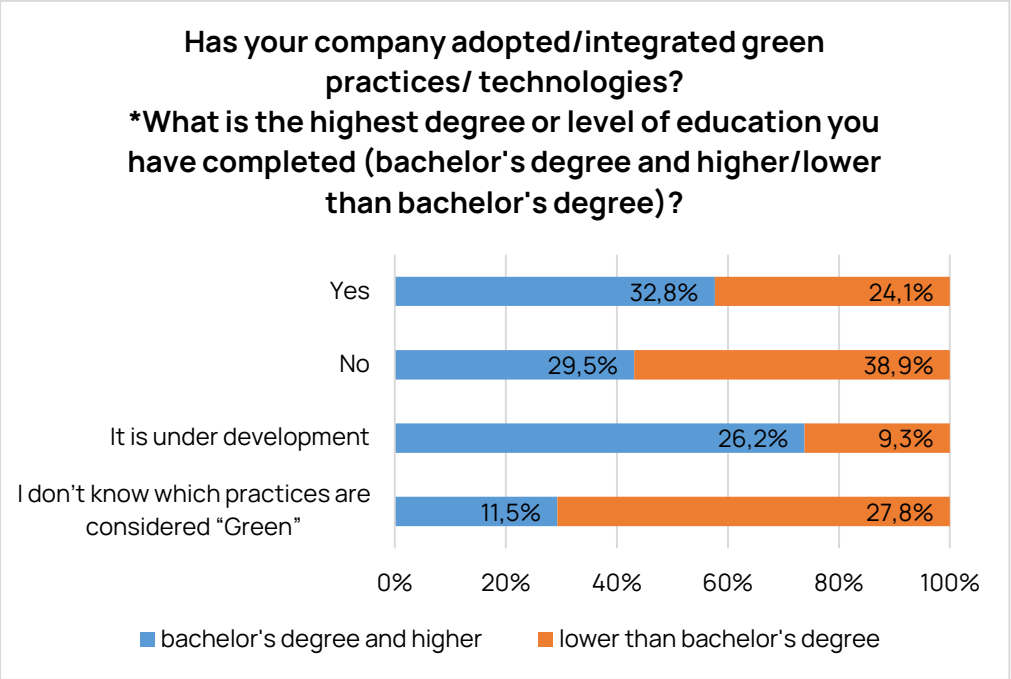


*Figure 13.4: Integration of Green Practices/Technologies*education*

The strength of the following relationship is significant (Approx. Sign. = 0.000; Cramer's V = 0.533; Phi = 0.533) and consists in the fact that there is a dependence between the introduction of green practices and technologies and the readiness for synergy of enterprises and farms from the Agro-Food Sector that participated in the research. In this sense, it can be stated that where there is a greater readiness for synergy, a higher degree of introduction and development of green practices and



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technologies is observed, and the competence on the subject is significantly higher.

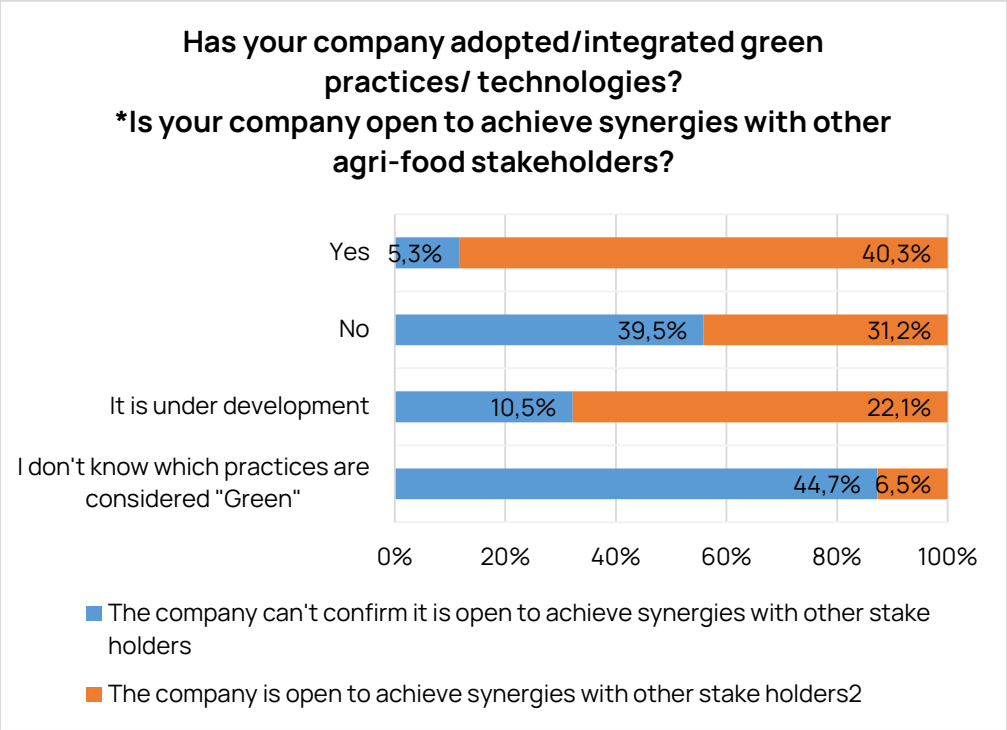


*Figure 13.5: Integration of Green Practices/Technologies*synergies*

The analysis of the data shows the presence of statistically significant relationships between the adoption of green practices and technologies and attitudes towards the importance of almost all problem areas considered in the study. Regarding marketing as a problem area, a moderate relationship can be concluded, indicating that enterprises and farms that do not experience significant marketing problems are more likely to introduce green practices and technologies and less likely not to recognize them, versus those who experience problems (Approx. Sign. = 0.005; Cramer's V = 0.324; Phi = 0.324).



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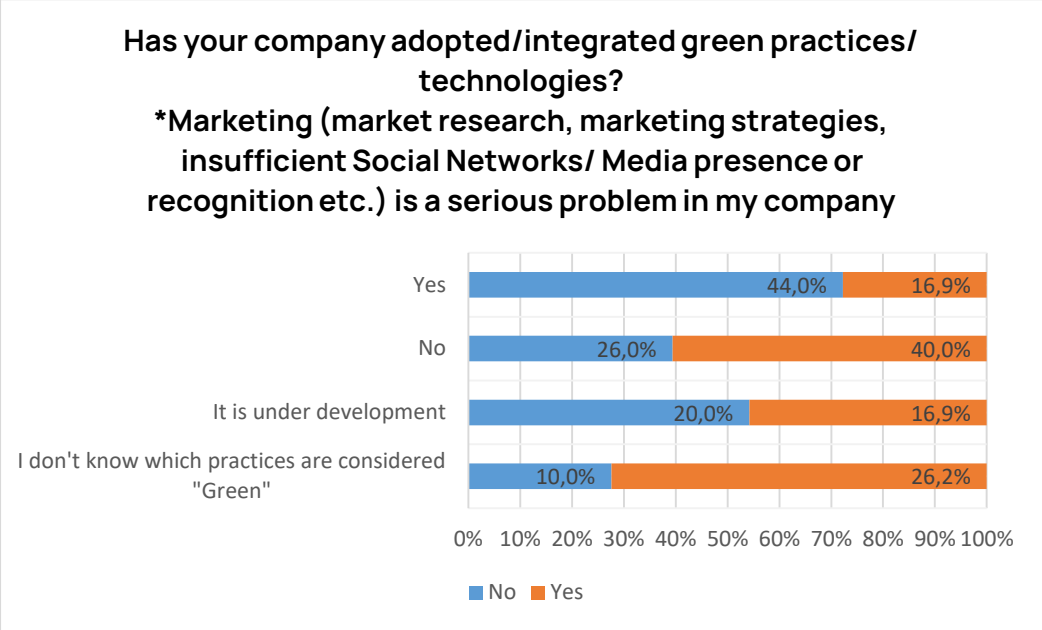


*Figure 13.6: Integration of Green Practices/Technologies*marketing*

The same regularity is found in business management, even more pronounced (Approx. Sign. = 0.000; Cramer's V = 0.435; Phi = 0435). The data in the figure below in the text serve to support the thesis that in enterprises and farms that do not register, significant problems in the field of marketing, the implementation and development of green practices and technologies is more prevalent, and ignorance is weaker, compared to enterprises and farms that experience problems in the field of business management.



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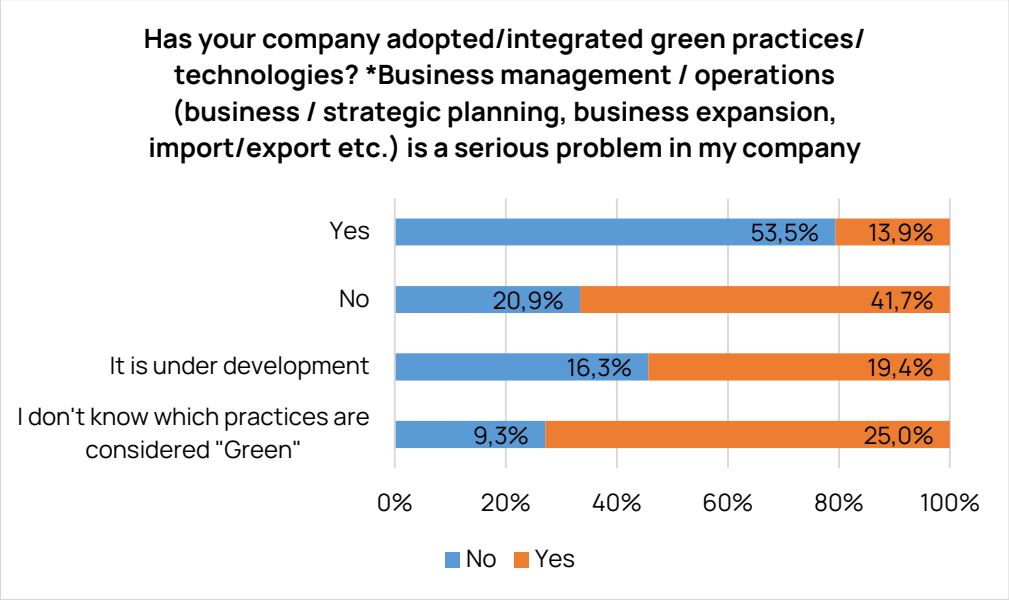


*Figure 13.7: Integration of Green Practices/Technologies*business management*

Regarding the field of education and training, the relationship is again moderate (Approx. Sign. = 0.001; Cramer's V = 0.375; Phi = 0375), but it rather comes to show that for companies where such problems are present it is more typically, green practices and technologies are not known. To some extent, this complements the finding that linked educational status with knowledge of green practices and technologies.

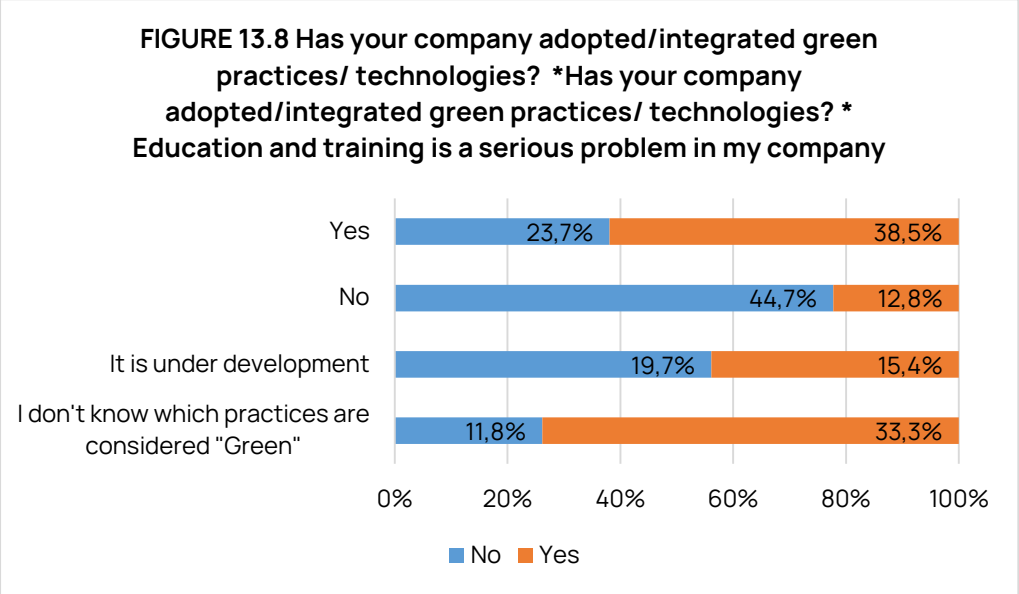


*Figure 13.8: Integration of Green Practices/Technologies*education*



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The next statistically significant relationship, which is the subject of the present analysis, indicates a similar regularity, but transferred to the field of human resources and problems related to finding qualified personnel (Approx. Sign. = 0.001; Cramer's V = 0.424; Phi = 0424). As can be seen in the figure below in the text, companies that do not experience problems in the field of human resources are to a greater extent not competent to recognize the practices and technologies that are considered green, compared to enterprises and farms that experience such problems.

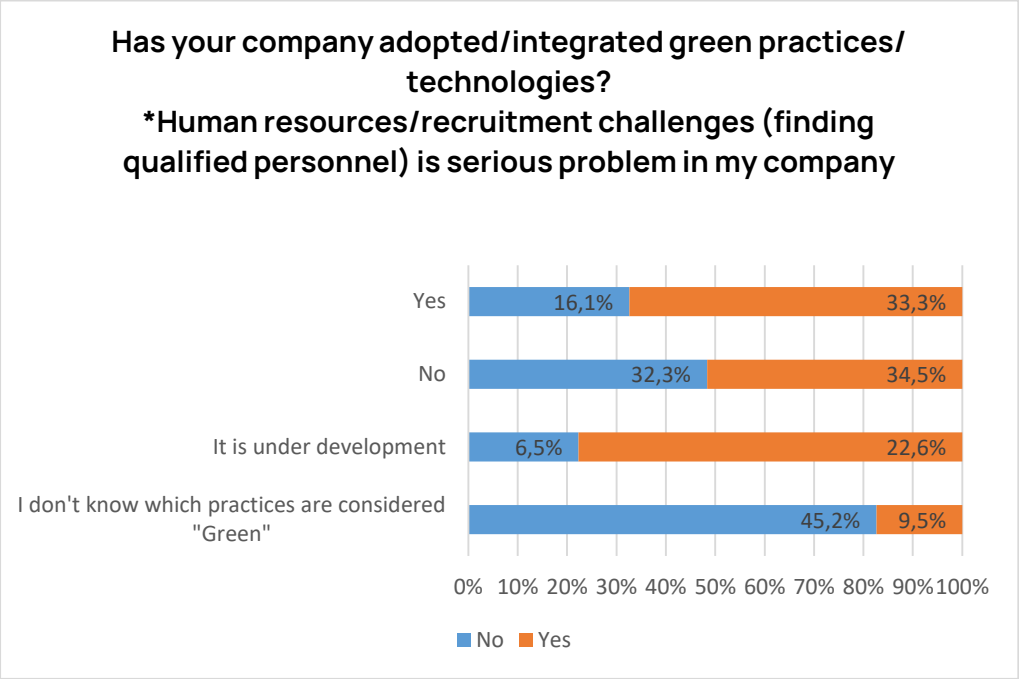


*Figure 13.9: Integration of Green Practices/Technologies*gender*

A statistically significant relationship is found to be moderate and is in relation to access to a foreign market (Approx. Sign. = 0.014; Cramer's V = 0.304; Phi = 0304). And here the relationship is most strongly expressed not in the non/application of green practices and technologies, or in their development, in the competence to recognize. The data give reason to say that in enterprises and farms where such problems are not observed, the lack of knowledge about the nature of green practices and technologies is significantly higher.



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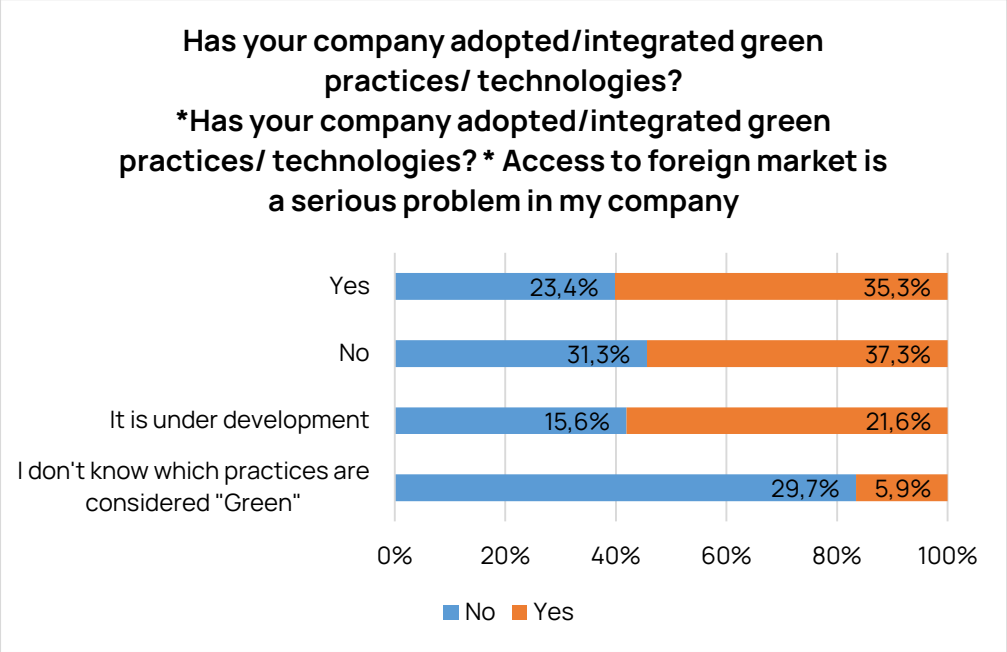


*Figure 13.10: Integration of Green Practices/Technologies*foreign market*

A statistically significant relationship was also identified regarding the significance of the problems caused by environmental changes (Approx. Sign. = 0.000; Cramer's V = 0.411; Phi = 0.411). The relationship is moderate, showing that enterprises and farms for which environmental changes are a big problem are significantly more likely to declare that they have introduced green practices and technologies in their activities.



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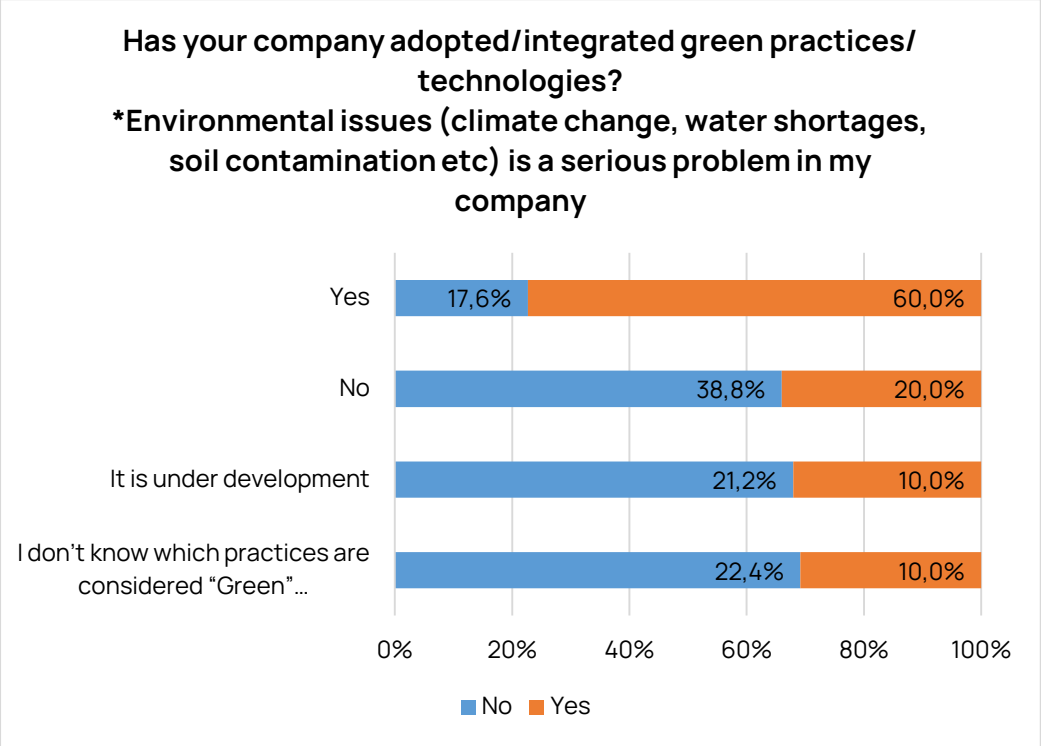


*Figure 13.11: Integration of Green Practices/Technologies*environmental issues*

The analysis of the relationship that is revealed between the introduction of green practices and technologies and the costs of transport and logistics gives reason to register the fact that enterprises and farms in which the costs of transport and logistics are small are the least likely to introduce green practices and most likely to develop such at the moment, for the difference from those companies in which the same costs are large or medium (Approx. Sign. = 0.001; Cramer's V = 0.318; Phi = 0.450).



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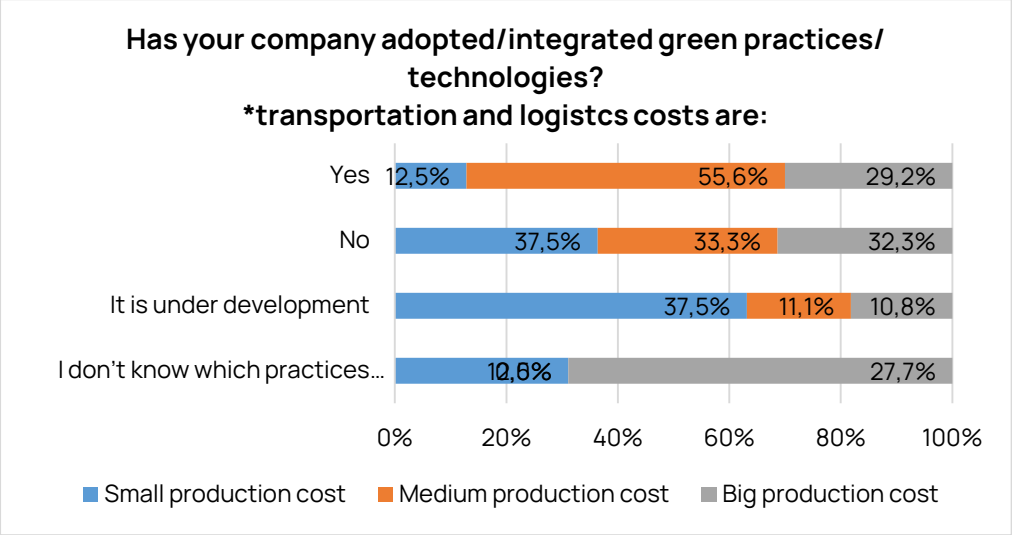


*Figure 13.12: Integration of Green Practices/Technologies* transportation and logistics costs*

A statistically significant relationship is also observed in terms of cost inflation (Approx. Sign. = 0.013; Cramer's V = 0.266; Phi = 0.376). The relationship is weak and explains the fact that in enterprises and farms, in which the costs arising from inflation are high, the highest propensity to implement green practices and technologies is observed.

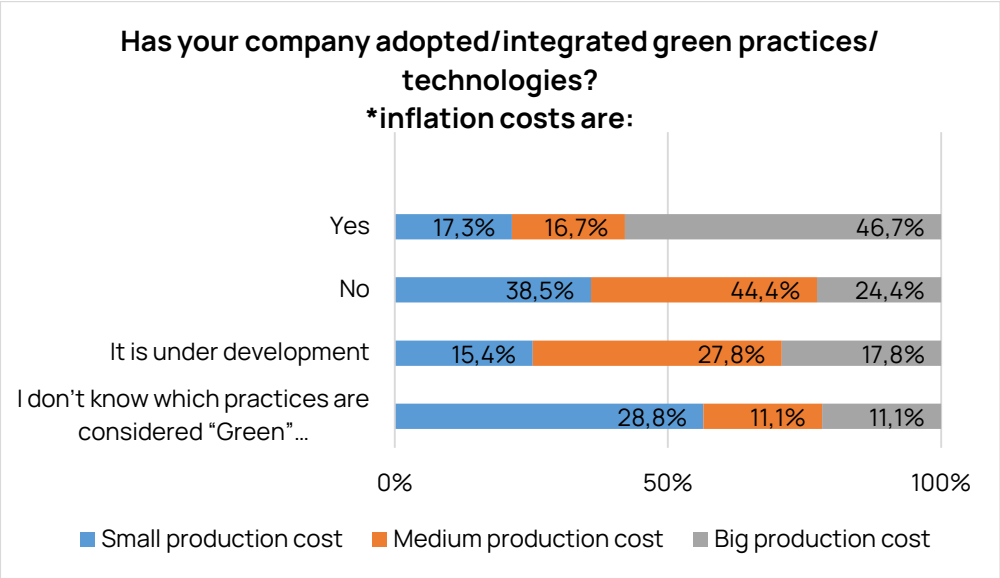


*Figure 13.13: Integration of Green Practices/Technologies* inflation costs*

The data analysis allows to identify a statistically significant relationship between the integration of green practices and technologies and the cost



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of energy, which is weak and is objectified in the fact that in enterprises and farms where this cost is considered low in the most largely do not know the nature of green practices and technologies (Approx. Sign. = 0.018; Cramer's V = 0.258; Phi = 0.365).

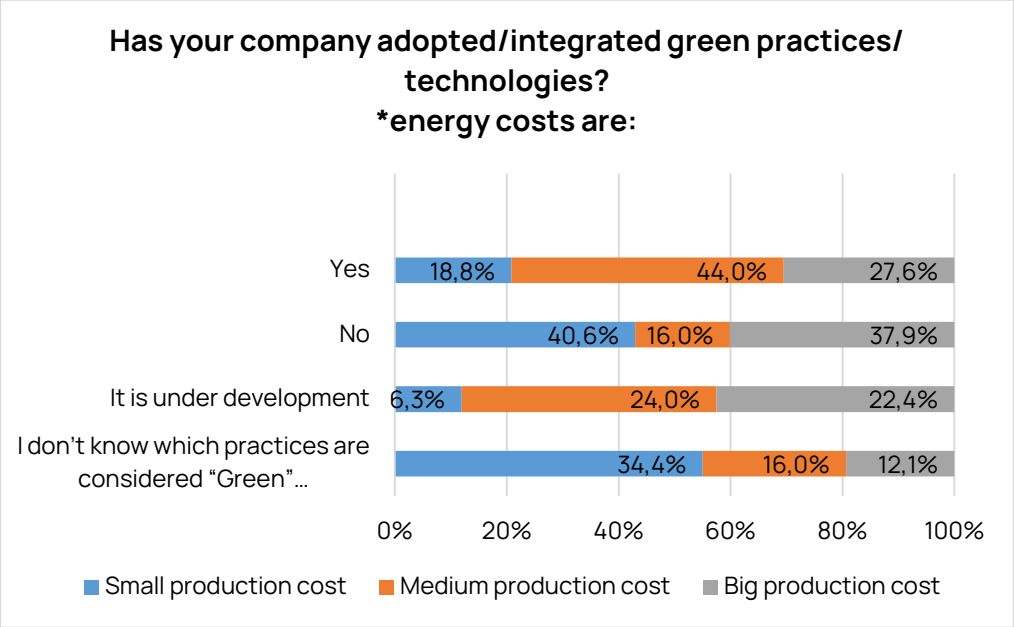


*Figure 13.14: Integration of Green Practices/Technologies* energy costs*

The analysis of the data allows to discover two more statistically significant relationships, and without going into details it will be noted that respondents that have developed procedures, policies and control codes to reduce pollutants from transport, and those that have not developed such in the area of documented food safety control system are more likely not to recognize the essence of green practices and technologies.

The data from the research conducted among the respondents regarding the introduced, adopted and introduced practices and technologies, characteristic of the circular economy, make it possible to ascertain the presence of far more serious problems compared to the analysis of the introduced green practices and technologies. The largest group of respondents is that of those who are unable to recognize Circular Economy practices and technologies. Even more problematic is that the relative



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share of this group of respondents exceeds 50%. In addition to this, exactly 40% of the respondents (the second largest group) state that the enterprises and farms in which they work have not introduced similar practices and technologies. Realistically, it can be assumed that in the short term only 10% of those asked can answer positively to the question of whether they have introduced them - 7% who have actually introduced them and another 2.6% who are in the process of introducing practices and circular economy technologies.

This practically means that the integration of such practices among the surveyed persons and the enterprises and farms of which they are a part is actually a process that is not only poorly known, but as can be seen from the distribution of all the answers, it is a process that is almost not has started on the territory of the cross-border region, and also there are no serious indications of change. This is confirmed by the response values of two of the groups – those who are not familiar and those who are in the process of introduction.

The difference with respect to the levels of integration of green practices and technologies in enterprises from the cross-border region is striking, insofar as in percentage points it is expressed as 15.7 percentage points more for respondents who state that their companies have introduced green practices and technologies and 31 .3 percentage points less for those unfamiliar with the essence of green practices and technologies, which once again emphasizes the difference in the dynamics and degree of introduction of the various practices.

In this regard, once again is evident the lack of interest the Bulgarian enterprises and farms from the Cross-Border Region, which participated in the present study, towards the care of the environment, including reducing the pressure on it, the maximum efficient use of resources, etc., insofar as the circular economy as a model and concept focuses precisely on the


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benefits for the environment and the benefits for economic subjects of a similar production model. Unlike the introduction of green practices and technologies in farms and agro-food enterprises, where economic benefits are generated mainly from saving certain costs, in the circular economy model, profits for businesses increase not because of saving, but because of investment of resources (which outside the model of the circular economy are treated as waste), which are discarded in the linear model. In this sense, it can be noted that the enterprises included in the study are not characterized by management approaches that are based on optimal management of resources and, accordingly, the maximization of income from the activity and care for the environment.

One more thing should be noted here. For the difference from green practices and technologies, the practices that are characteristic of the Circular Economy may require a higher readiness and opportunity for investments and/or know-how to be based on, which is necessarily a deterrent to their introduction. Apart from this, it should be noted that the analysis of the data on the research question cannot detect the presence of statistically significant relationships that can be verified as reliable.

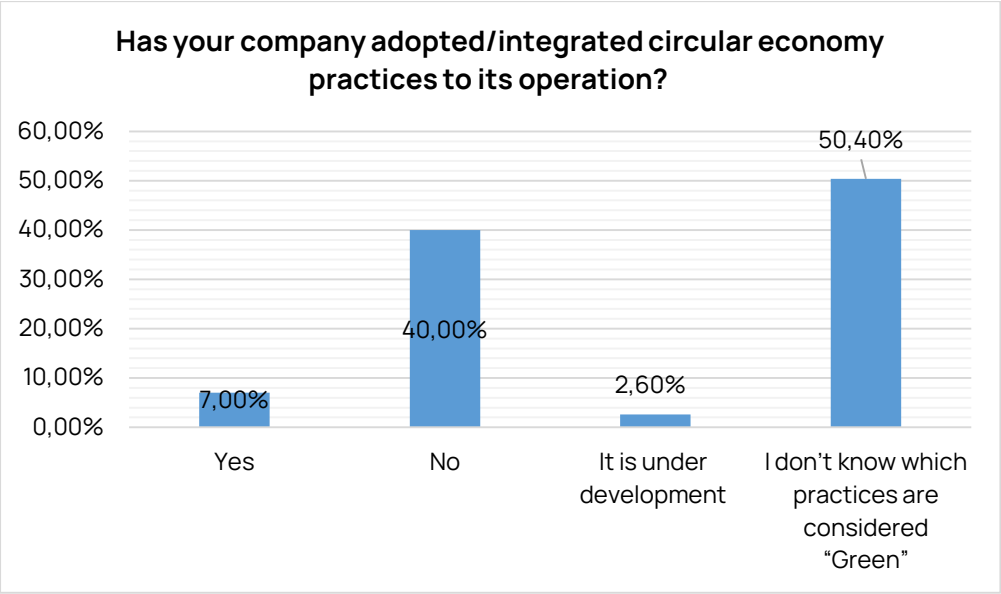




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*Figure 14: Integration of Circular Economy Practices*

The next question, subject of the analysis, probes the opinion of the respondents on whether, according to them, the enterprises and farms in which they work can derive benefits and dividends from the use of operational business tools. On the one hand, the data can unequivocally show that there is a majority of categorical answers (positive and negative), which is expressed in the fact that there is a double dominance of those who answered the question positively, but on the other hand, it cannot be misses the extremely large number of respondents who cannot judge (almost equal to that of the largest group). The main hypothesis for the impossibility of judgment is the ignorance of the specifics of operational business tools, but the important thing here is that the parity between positive and negative answers and the high relative share of such answers, does not allow to make a definite conclusion about which direction the opinion is directed of the respondents.

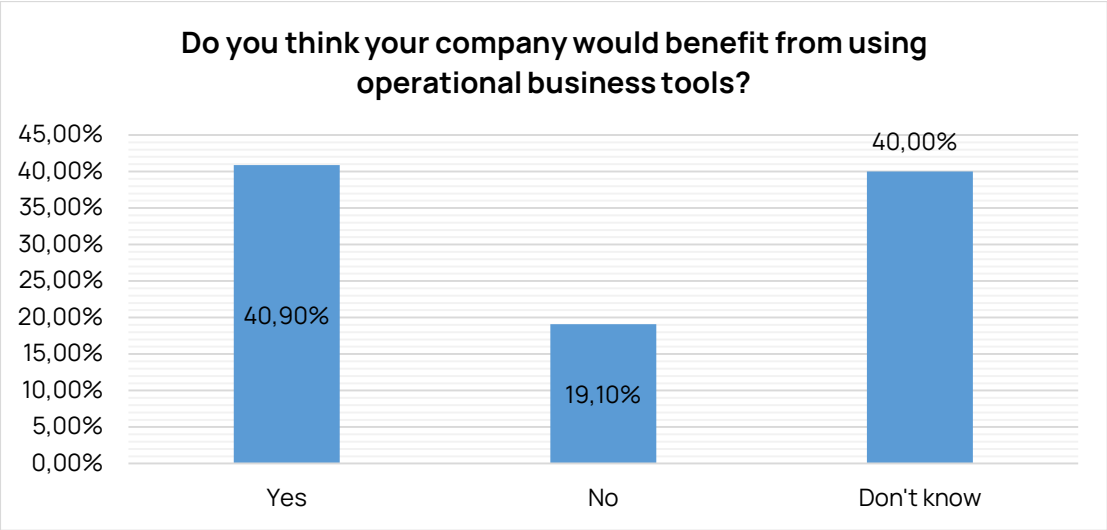


*Figure 15: Do you think your company would benefit from using operational business tools?*

Apart from that, the first statistically significant relationship observed is between respondents' opinion on the use of operational business tools and the introduction of green technologies and practices (Approx. Sign. =



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0.000; Cramer's V = 0.349; Phi = 0.494). At the outset of the analysis, it should be mentioned that while the strength of the relationship is moderate, it can be said that the differences in the responses are higher depending on the position from which they are constructed.

It can be seen from Figure 15.1 that the attitude towards the role of operational business tools varies with respect to the introduction, development and knowledge of green practices and technologies in companies from the agri-food sector. For example, companies that are in the process of developing green practices and technologies are the most likely to respond that the use of operational business tools brings dividends to the companies that use them, and the least likely to respond in the same way are respondents who do not know which practices and technologies are considered "green". On the other hand, among respondents who are reserved about the application of operational business tools, it can be seen that the most skeptical are those who work in enterprises and farms that have implemented green practices and technologies, which can be explained by this. that already formed polar opinions on the subject, and the least opposed are the respondents who are not aware of the essence of these practices and technologies.

The data show that those who answer that they do not know which practices can be considered green are the most likely to answer that they cannot assess whether the use of operational tools will bring benefits to the enterprises and companies in which the respondents are located. It is on this fact that the difference in the answers of the respondents is most clearly expressed. In this case, the difference is colossal, insofar as the relative share of people who cannot recognize the essence of green practices and technologies (of all representatives of this group) in over 81% of cases declare that they do not know whether the use of operational business tools will led to the provision of benefits for enterprises and farms


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In this sense, it can be stated that this is the group that is most likely to be unable to assess whether the use of operational business tools will provide benefits and competitive advantages for the enterprises in which they are employed, while the least likely to state that they cannot assess whether the use of operational business tools is that of respondents who state that green technologies and practices have been implemented in their enterprises.

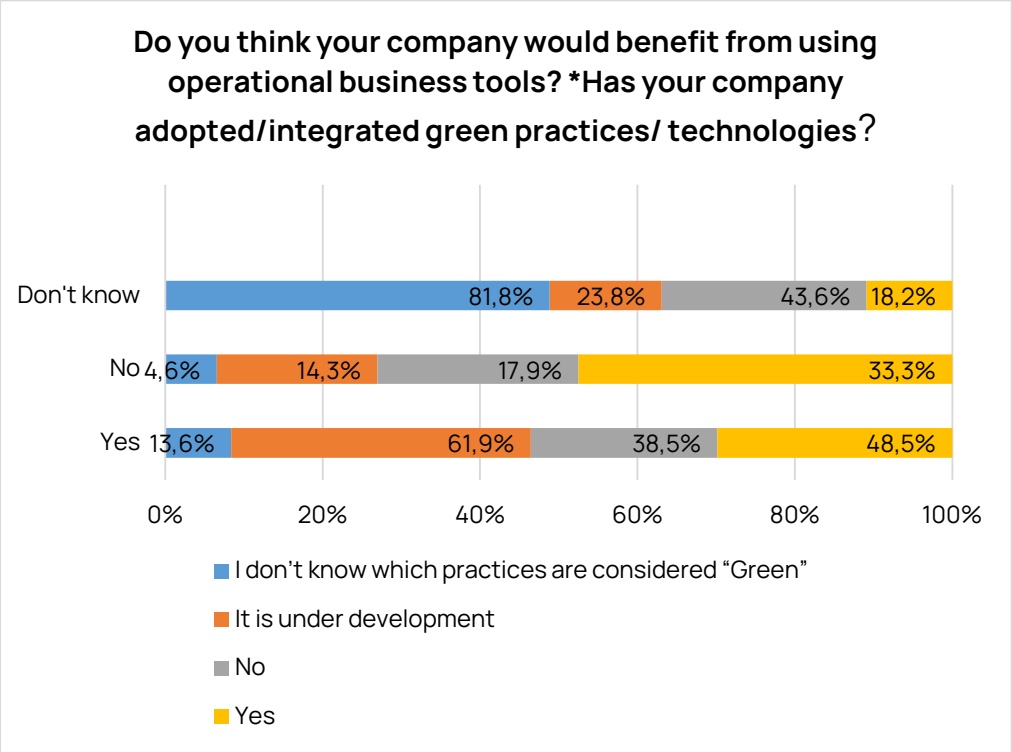


*Figure 15.1: Do you think your company would benefit from using operational business tools? *integrated green practices*

Another important point where the visibility of the relationship stands out is with regard to the positive opinion of the respondents regarding the use of operational business tools, insofar as the chance of obtaining a positive response is mostly aligned with whether in the enterprises and companies from which they are part of the respondents are currently implementing green practices and technologies 61.9%, in contrast, for example, to cases where green practices and technologies are not recognized, only 13.6% of



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which indicate that they consider the use of operational business tools as relevant approach.

The second identified statistically significant relationship that can be treated as credible is observed between the variable subject to the present analysis and the variable that treats the degree of importance of staff remuneration (Approx. Sign. = 0.008; Cramer's V = 0.244; Phi = 0.346). The strength of the relationship is weak, indicating that the effect is not significant.

The analysis of the data allows us to say that the difference in the answers of the respondents stems from those of them who consider that labor costs are not a significant expense for the enterprises and farms where they work. In this sense, it should be noted that they are the group most prone to answer that operational business tools are not able to provide benefits to the companies in which they work. The difference found here is more than 3 times, as almost 40% of the respondents who consider that labor costs are not a significant expense for their companies are reserved to the use of operational business tools. Among respondents who stated that labor costs were an average significant labor cost, only 11.8% were reserved for the use of operational business tools, and for those who considered it a significant cost for their enterprises, only 10.9% were skeptical of operational business tools.

In addition to this, it can be noted that the most prone to use operational business tools are respondents who state that labor costs are of medium importance, and for those who state that these are the most significant for their cost companies are most likely to have no opinion on the subject.


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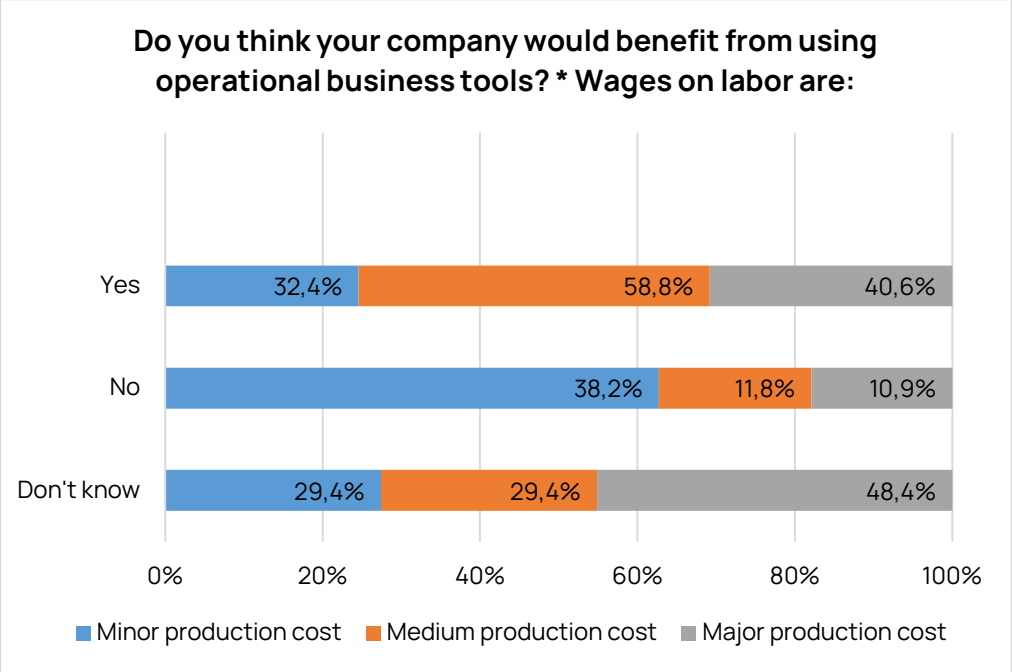


*Figure 15.2: Do you think your company would benefit from using operational business tools? *wages*

The next statistically significant relationship that can be confirmed is that between the attitudes towards the use of operational business tools and the readiness for synergy of enterprises and farms from the agri-food sector, which was shown earlier (Approx. Sign. = 0.000; Cramer's V = 0.365; Phi = 0.365). In Figure 15.3 it can be seen that the relationship between the two variables regarding the benefits of using operational business tools is that it is more typical for companies that are open to synergy to consider that the use of operational business tools will provide benefits to the enterprises and farms of which they are a constituent part. On the other hand, for companies that cannot guarantee readiness for synergy, it is more typical not to express an opinion on the subject.



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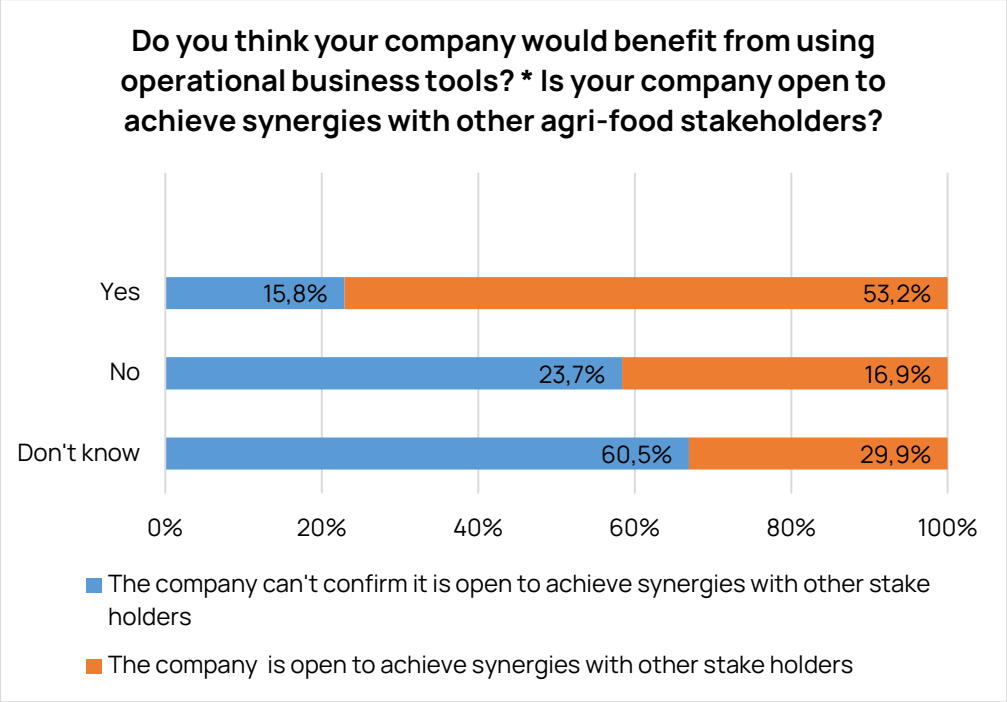


*Figure 15.3: Do you think your company would benefit from using operational business tools? *synergies*

In the course of the analysis, the presence of another statistically significant relationship was discovered and confirmed. In this case, the correlation is observed between the attitude towards the use of operational business tools and the attitude towards the problematization of marketing (Approx. Sign. = 0.004; Cramer's V = 0.307; Phi = 0.307). The strength of the established relationship is moderate, which means that the influence that can be found between the variables is of more serious importance.

The data in Figure 15.3 give reason to conclude that the largest difference in responses is observed in that respondents who treat marketing as a problem area, to the smallest extent (compared to skeptics and those with no opinion) consider that the use of operational business tools will not lead to the registration of benefits for the organizations in which they are situated. Skeptical attitudes remain more characteristic of respondents who do not consider marketing to be a serious problem. On the other hand, those who believe that marketing is significant to their company are more



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likely than others to have no opinion on the topic of the benefits of operational business tools. In the context of the bivariate distribution for the positive answers to the question, practically the two groups answer the same.

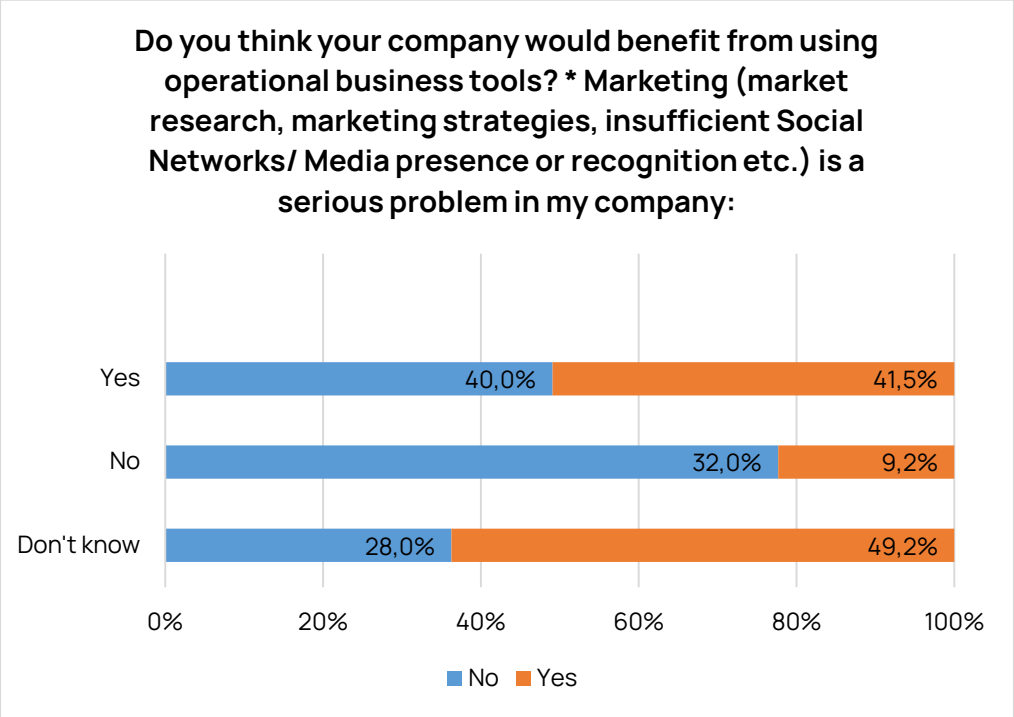


*Figure 15.4: Do you think your company would benefit from using operational business tools? *marketing*

Another identified statistically significant relationship that can be validated is observed between respondents' attitudes about the usefulness of using operational business tools and categorizing business management as a problem for the company (Approx. Sign. = 0.031; Cramer's V = 0.246; Phi = 0.246). The identified relationship between the variables is weak, meaning that the differences in responses vary to a lesser extent.



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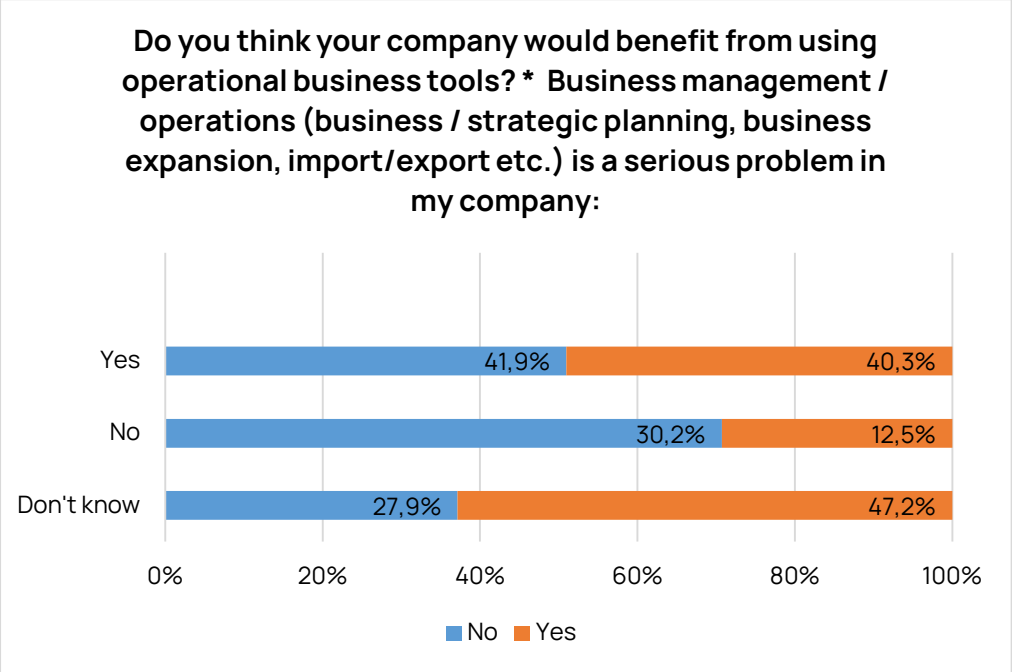


*Figure 15.5: Do you think your company would benefit from using operational business tools? *business management*

The data in Figure 15.5 show that respondents who consider business management to be a serious problem are the least likely to deny the benefits of using operational business tools. This may mean that the cause of the problems is precisely the lack of exploitation of such tools. On the other hand, respondents who say that business management is not a serious problem in their company are more than twice as skeptical. In contrast, people who claim that in the organizations where they work business management is a serious problem are significantly more likely to have no opinion on the topic of the benefits of operational business tools in the context of the activities of the companies in which they are situated.

Another statistically significant relationship that is identified is the relationship between the assessment of the benefits of operational business tools and the assessment of the severity of problems arising from environmental changes (Approx. Sign. = 0.000; Cramer's V = 0.371; Phi = 0.371). The relationship between the two variables is weak, as indicated by



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the value of the Phi and Kramer coefficients. It can be seen from the data in Figure 15.6 that the most significant difference in the responses of the respondents is regarding the negative responses. Respondents who believe that environmental issues are a significant problem in companies are significantly more likely to express reservations about the benefits of using operational business tools in the context of their workplace. The differences between the two types of respondents decrease with regard to the impossibility of judgement, and with positive responses regarding the positives of using operational business tools, the differences are the most minimal.

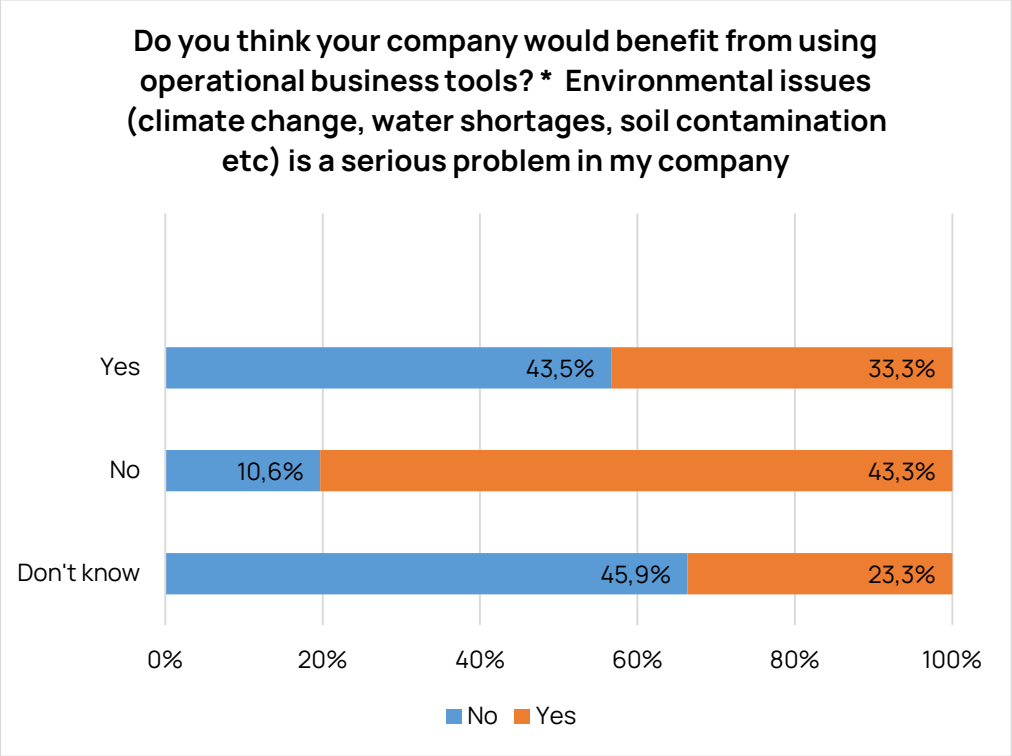


*Figure 15.6: Do you think your company would benefit from using operational business tools? *environmental issues*

The next statistically significant relationship that is found in the analysis is between the answers to the question about whether there will be a benefit from the introduction of operational business tools in the enterprises in which the respondents are located and their opinion about the significance



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of the costs caused by inflation. (Approx. Sign. = 0.021; Cramer's V = 0.224; Phi = 0.316). The established relationship between the two variables is weak, which shows that the variation in the responses is not significant and the influence that takes place between them is not high, which is also confirmed by the data in Figure 15.7. The difference in the answers is that the respondents who consider the costs of inflation to be small in magnitude for their company are the most undecided on the topic of the benefits of operational business tools. On the other hand, showing optimism is the least characteristic of enterprises and farms in which the costs caused by inflation are low, which allows us to conclude that rising costs as a result of inflation do not represent an obstacle to a positive opinion is expressed on the subject.

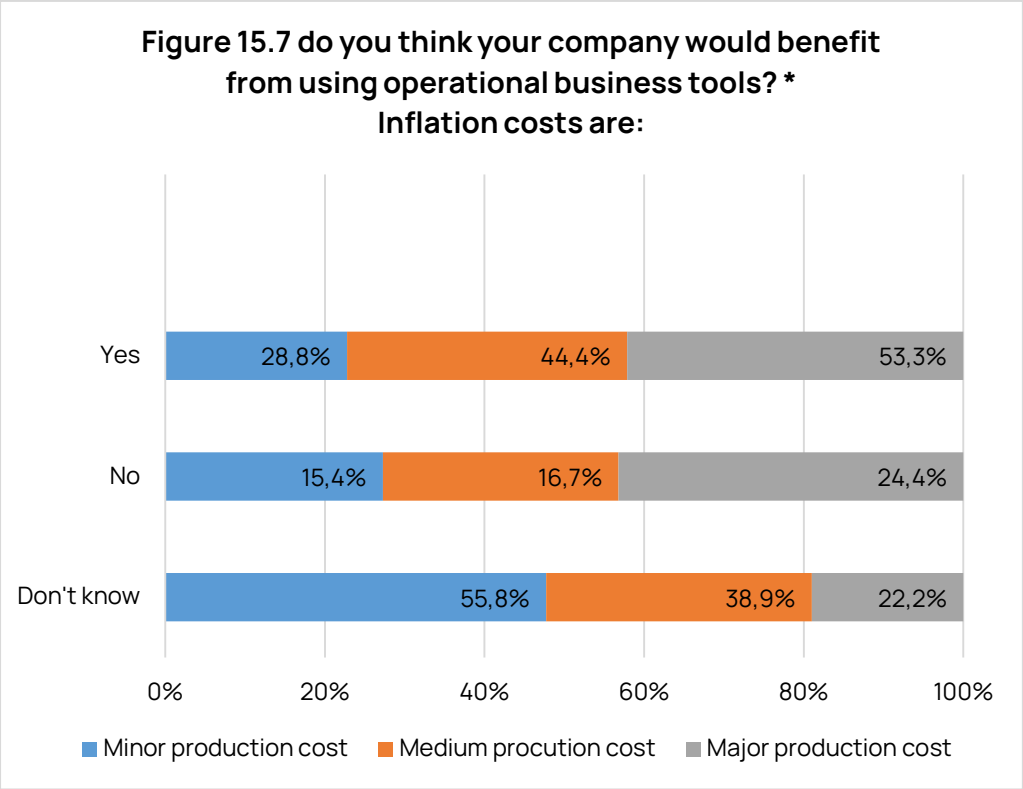


*Figure 15.7: Do you think your company would benefit from using operational business tools? *inflation costs*



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The next statistically significant relationship regarding the opinion of the respondents on whether the use of operational business tools could bring benefits to the enterprises and farms of which they are a part is objectified in the connection with the question of the education of the respondents (Approx. Sign. = 0.001; Cramer's V = 0.363; Phi = 0.363). The strength of the relationship between the two variables is moderate, which gives reason to conclude that the differences in responses will be more pronounced.

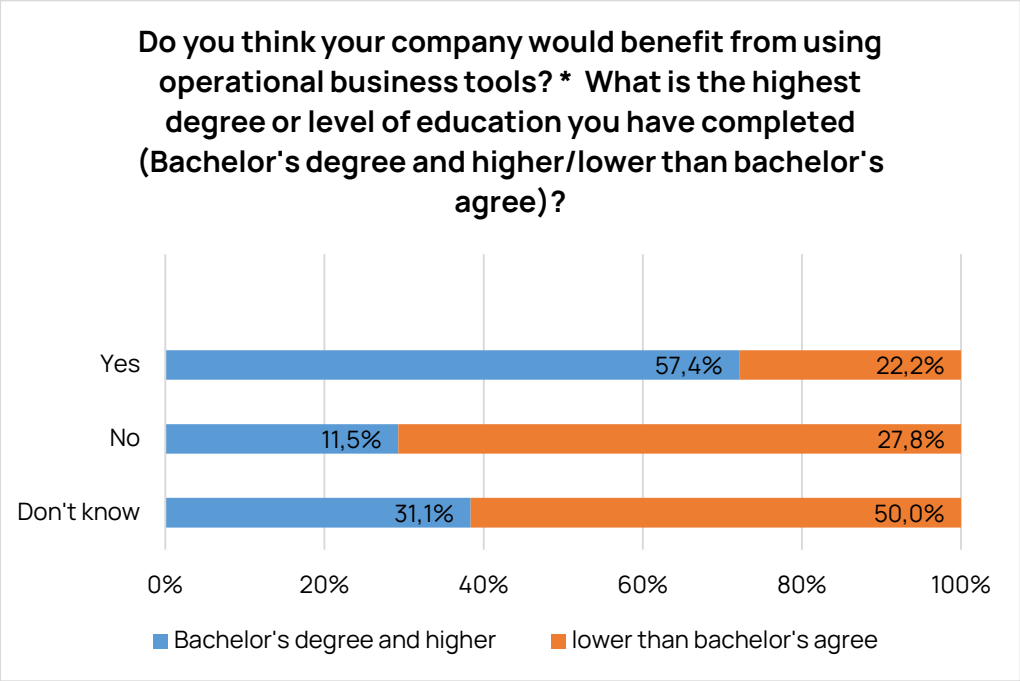


*Figure 15.8: Do you think your company would benefit from using operational business tools? *education*

The data from the analysis reflect the fact that the differences are significant. Thus, for example, approval of operational business tools is highly characteristic of respondents who are better educated, while reservation and lack of opinion on the matter is characteristic of less educated respondents. It can be noted here that to the extent that education can be considered the more static category, it appears to be a factor in the responses regarding whether the use of operational business tools can provide benefits to enterprises in the cross-border region. The



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distribution of responses on both characteristics gives reason to think that higher education is related to better knowledge of the benefits of operational tools and is the basis for respondents sharing their positive attitude. On the other hand, the less educated respondents are less likely to express an attitude, which shows that they do not know the essence of operational business tools. In this sense, it can be concluded that the mobilization of such tools can occur to the highest degree in enterprises and farms dominated by the presence of more highly educated employees, management personnel, etc., insofar as they are the group, which to the greatest extent can recognize the benefits of their introduction.

A number of statistically significant relationships are also found regarding respondents' views on the dividends of using operational business tools and whether enterprises and farms have developed different procedures, policies and codes. Without going into details here, it will be stated that the data that the identified links provide make it clear that: in the enterprises and farms in which procedures, policies and codes are applied to ensure safety at the workplace; prevention of discrimination and harassment; control of supply chains; documented food safety management system; certification related to environmental protection, social or business ethics, etc. to a significantly greater extent, it is considered that the use of operational business tools can bring benefits to the companies in which the respondents are situated. To the extent that this is a characteristic of more complex structured enterprises and farms, it can be said that it is precisely for them it is most characteristic that they consider that the use of operational business tools can provide direct benefits in the context of their economic activity.

One of the most significant points of the current analysis is to analyze the hierarchical status of the various problems of the Bulgarian enterprises and farms from the agri-food sector, which are located in the cross-border


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region, where the closer to the value 1 is a problem area, the more it is considered to be treated as the most significant, and the closer the value gets to 8, the more the significance decreases. The average scores make it possible to clearly see that among the most serious problems experienced by companies are those in the field of financial management (score 2.08), which is mainly associated with securing sources of capital and other sources of financing.

Another significant problem is operational business management, including strategic planning, business expansion, etc., whose average score (3.90) also treats the area as problematic. To a greater extent, the area related to human resources is identified as a problem area (3.05 and second place) are also the areas "Human Resources" and "Marketing", respectively with average scores of 3.05, while the remaining problem areas are rather minor in terms of the presence of problems. The average marks are presented as follows: marketing 4.27; access to free markets – 4.71; education and training – 5.16; problems as a result of changes in the environment 5.60 and difficulties in accessing information and communication technologies - 7.21.

These data support the hypotheses that the enterprises and farms represented in the study are generally not optimally managed. The main problems are related to financial and organizational management, but at the same time trends show that business entities do not develop their own strategic management plans.

On the other hand, one of the problem areas of enterprises and farms from the agri-food sector in the cross-border region is marketing (fourth place), and at the same time, the analysis of the extent to which the same market actors have a marketing plan indicates that they predominantly do not develop such. This shows that solutions are not sought for the identified problems, which leads to enterprises and farms not being able to develop their potential.


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*Figure 16: The Problems in the Companies from the most to the least serious (1 most - 8 less serious)*

Another interesting fact that does not remain hidden to the researcher is that, unlike the average ratings, the data on the most serious problems indicated gives a different perspective. For example, it becomes visible that the most significant problem facing farms and enterprises from the Agro-Food Sector in the cross-border region is financial management. It is the most important problem for 45.2%, but the second most important issue is human resources, which as a problem area. In fact, more than 31% of respondents say that this is the most important problem for their organization. All other problem areas are overwhelmingly not treated as the most problematic, as less than 10% of respondents do not consider these to be the most significant problems they experience.

On the other hand, the concentration of answers for the least significant problems is striking, where over 83% of respondents indicate that these are



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those related to access to information and communication technologies and environmental problems, respectively with 70.4% relative share and 13% relative share.

The analysis devoted to the existence and explanation of the statistically significant relationships observed in the study found that with regard to the problem "Management of finances (sources of capital, access to capital, etc.)" no statistically significant relationships, which meets the reliability criteria can be found, which can be attributed to the distribution of responses and the sample size, and also to the combination of the two factors.

On the other hand, treating marketing as a problem area in enterprises allows statistically significant relationships to be found. The first one is objectified in the fact that the oldest companies least consider marketing as a problem area in their development (Approx. Sign. = 0.033; Cramer's V = 0.302; Phi = 0.302), and the strength of the relationship is moderate. It can be assumed that this can be attributed to the permanent market presence and the confirmation of the various brands on the market, the development of management processes and culture, the economic base for the implementation of marketing policy, etc. factors. This hypothesis can be partially confirmed by the data that for smaller companies (up to 10 people), which are most likely to experience such problems and where, as a rule, the economic results, recognition of the company brands are weaker (the most this already applies to start-ups).


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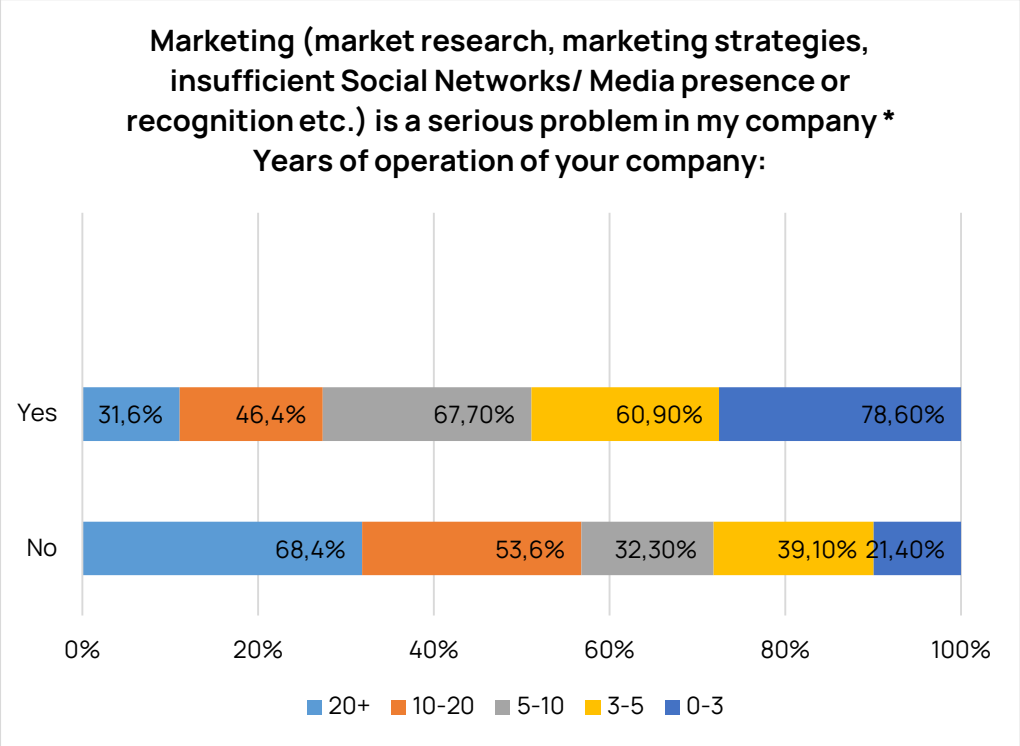


*Figure 16.1: Marketing*years of operation*

Concerning the lack of marketing strategy/instruments as a potentially problematic in the development of enterprises and farms from the Agri-Food Sector in the Cross-Border Region, where many statistically significant relationships are observed with other variables (weak relationships in which the differences in responses caused by a specific characteristic are not so strongly expressed), will be marked without going into details. In this sense, it should be noted that the observed weak statistically significant relationships give reason to conclude that the enterprises and farms not working in the manufacture to a greater extent consider that marketing is a significant problem for them, and those who work their experience similar problems to a lesser extent. Another relationship shows that companies that are not open to synergy have a higher tendency to indicate that marketing is a serious problem for them, and the next weak relationship consists in the fact that where business management is a significant problem in to a greater extent, marketing is also



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declared to be one. Another weak relationship gives reason to consider that enterprises and farms in which there are no significant problems related to access to a foreign market to a greater extent claim that marketing is a problematic area for them. The latter weak relationship indicates the fact that where there are no procedures, policies and codes in place to control and reduce pollution from transport marketing is considered a significant problem.

The first more key statistically significant relationship for the study comes to illustrate the fact that the enterprises and farms from the agri-food sector that participated in the study, and that introduced green practices and technologies to the least extent, that marketing is significant for them problem (Approx. Sign. = 0.005; Cramer's V = 0.334; Phi = 0.334). The strength of the relationship is moderate, which means that the difference in respondents' responses to whether they have implemented green practices and technologies varies to a higher degree. In the figure below, the text beautifully explains how the culture of green practices and technologies and reticence about them directly corresponds to treating marketing as a problem. It is precisely in the enterprises where there is no knowledge and/or introduced green practices and technologies that it is extremely characteristic to a large extent of the cases to declare that marketing is a problem area for them.



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*Figure 16.2: Marketing*integrated green practices*

On the other hand, the next statistically significant relationship that was registered in the study gives reason to state that those respondents who are skeptical that the use of operational business tools can bring benefits to the structures in which they work to the least extent consider marketing to be a significant issue for their company/farm. (Approx. Sign. = 0.004; Cramer's V = 0.307; Phi = 0.307). The strength of the relationship is moderate, indicating that respondents are more likely to treat the importance of marketing as a problem differently than whether they believe that the use of operational business tools can bring benefits to the enterprises in which they are located. On the other hand, where no clear assessment can be given regarding the benefits of using business operations, the probability of indicating that marketing is a problem area for enterprises and farms is highest.



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*Figure 16.3: Marketing*operational business tools*

One of the very important relationships that emerges in this part of the analysis is observed between attitudes towards marketing as a problem and labor costs. (Approx. Sign. = 0.000; Cramer's V = 0.488; Phi = 0.488). The relationship is important because it shows that as the specifics of the burden of labor costs increase/decrease, the differences in responses to whether marketing is a significant issue for the enterprises and farms participating in the study also increase/decrease. The strength of the connection is moderate, but it is almost on the border of being strong. In this sense, it should be noted that this is precisely what is observed in Figure 16.4, which comes to illustrate that companies whose labor costs are the most significant are the most likely to declare that marketing represents a significant problem for them. To the extent that the difference in answers between those companies for which the wage costs are serious in terms of weight and size and the rest is large (more than 3 times), this comes to show that marketing precisely for them is characteristic of treating marketing as a problem, since for a very small part of the rest it may be that they experience problems in this area.



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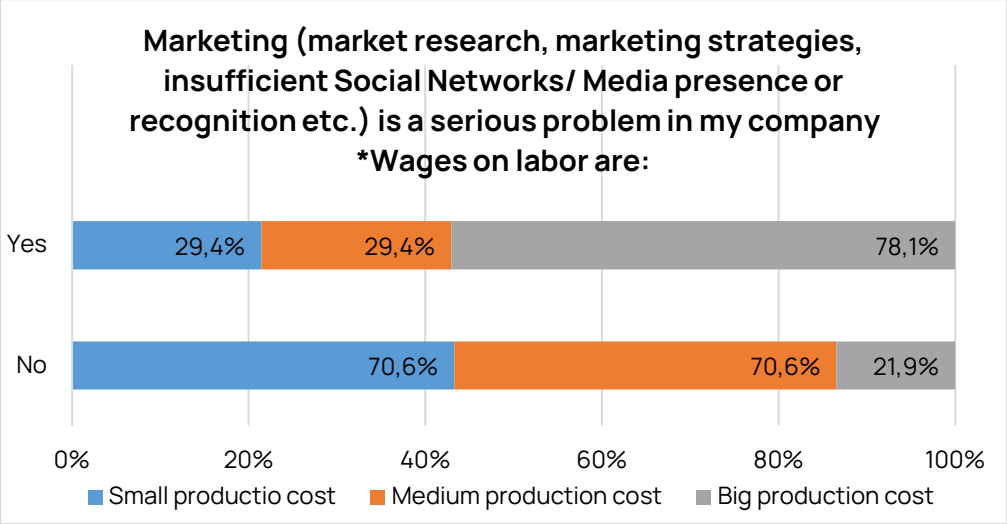


*Figure 16.4: Marketing*wages*

Another extremely strong statistically significant relationship is registered in the current analysis, which gives reason to claim that enterprises and farms that do not experience serious problems in the field of human resources more than 96% of the time state that they experience significant and serious problems with marketing as a problem area, which makes it a characteristic feature for them. (Approx. Sign. = 0.000; Cramer's V = 0.493; Phi = -0.493).

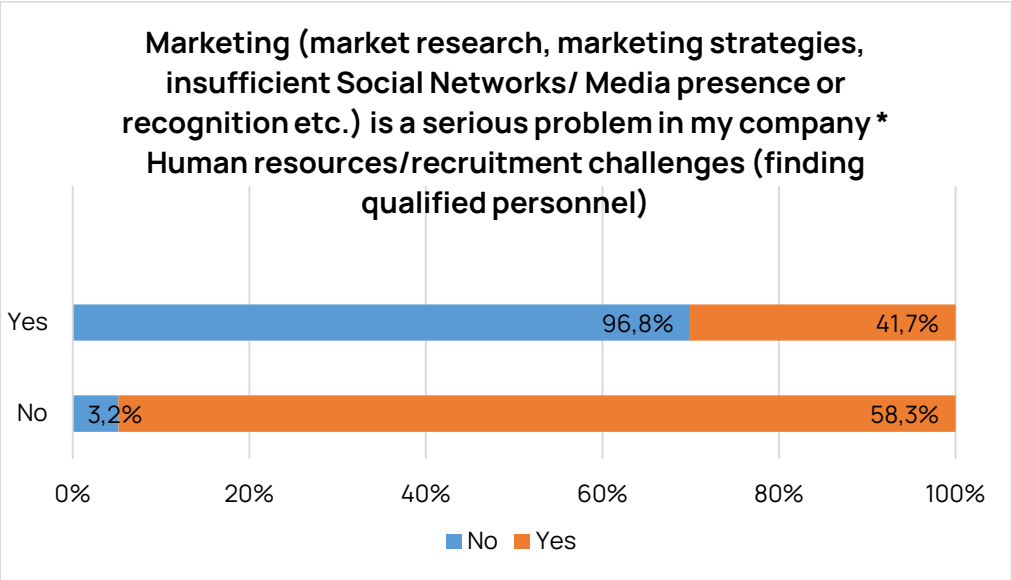


*Figure 16.5: Marketing*Human Resources*



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The strength of the next relationship established in the analysis is already significant, and its interpretation allows us to conclude that the enterprises and farms that consider environmental issues to be the least important to them are the least likely to point to marketing as a problem area in the context of its functioning. (Approx. Sign. = 0.000; Cramer's V = 0.597; Phi = -0.597).

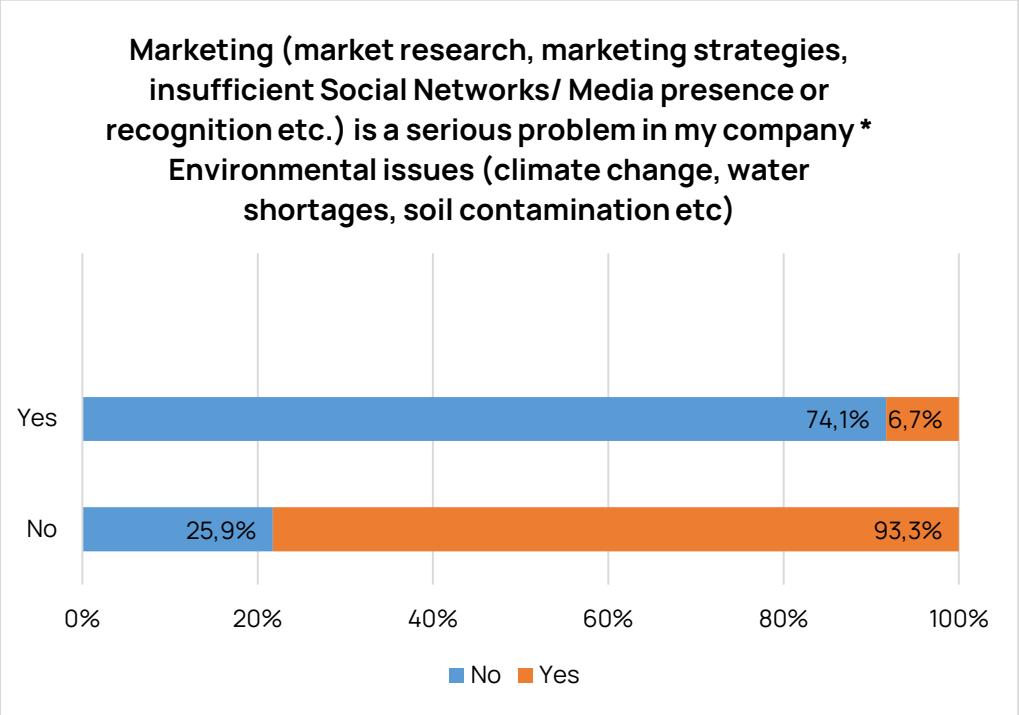


*Figure 16.6: Marketing*environmental issues*

Another statistically significant relationship gives reason to conclude that in enterprises and farms where inflation costs are high, marketing is the least significant problem (Approx. Sign. = 0.005; Cramer's V = 0.304; Phi = 0.304).

The penultimate statistically significant relationship, the subject of the present analysis regarding marketing as a problem area for enterprises and farms from the Agro-Food Sector in the Cross-Border Region, is objectified in that the significance of their problems in relation to the considered



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sphere is manifested as the most characteristic of those business entities that state that energy costs represent a small share of total production costs (Approx. Sign. = 0.004; Cramer's V = 0.312; Phi = 0.312).

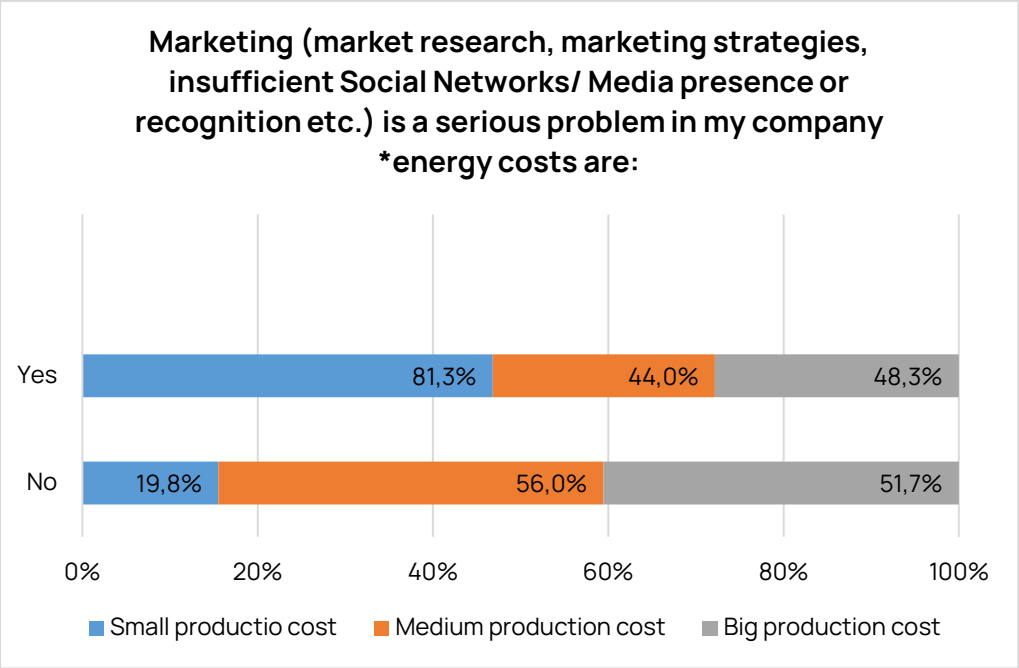


*Figure 16.7: Marketing*energy costs*

And the last point of the analysis regarding marketing as a specific issue ends with the identification of a statistically significant moderate relationship, which is expressed in the fact that those implementing procedures, policies and codes for the prevention of discrimination and harassment in the workplace are significantly more likely to declare , that marketing is a significant problem for them, while those for whom this cannot be confirmed are not characteristic of treating marketing as a serious problem (Approx. Sign. = 0.000; Cramer's V = 0.337; Phi = 0.337).



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*Figure 16.8: Marketing* procedures, policies and codes for diversity, discrimination & harassment in the workplace*

The analysis of business management as a problem area in the functioning of enterprises and farms from the Agro-Food Sector in the Cross-Border Region makes it possible to achieve a large-scale volume of knowledge on the problem. There were multiple weak and moderate statistically significant relationships that met the criteria for reliability when conducting a chi-square test. In this sense, the focus of the analysis will fall on the more significant (i.e. stronger relationships). Regarding the weaker ones, it should be noted that they are expressed in the fact that women, enterprises operating in the field of trade, people without an opinion on the benefits of operational business tools, enterprises that do not receive advisory assistance, enterprises that do not participate in industry organizations, enterprises that treat marketing as a significant issue for them and enterprises that claim that access to foreign markets is not a significant issue for them tend to declare that business management is a significant issue, as it their characteristic.



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The strength of the relationship between the assessment of the business management problem and the period of economic activity of the companies is significantly higher. The relationship between them is moderate and shows a higher degree of differentiation of the answers about how business management is treated compared to the period of existence of the enterprises and farms from the agri-food sector in the cross-border region that took part in the research (Approx. Sign. = 0.011; Cramer's V = 0.338; Phi = 0.338). As can be seen from the figure below in the text, the period of activity of a company is at the core of the observed difference in responses. The oldest companies and enterprises to the highest degree do not declare that they have significant problems in the field of business management, and the more the period of activity and market presence decreases, the more the presence of serious problems in the field of business management is declared. This conclusion allows to believe that the size of the company can be a factor influencing the answers of the respondents.

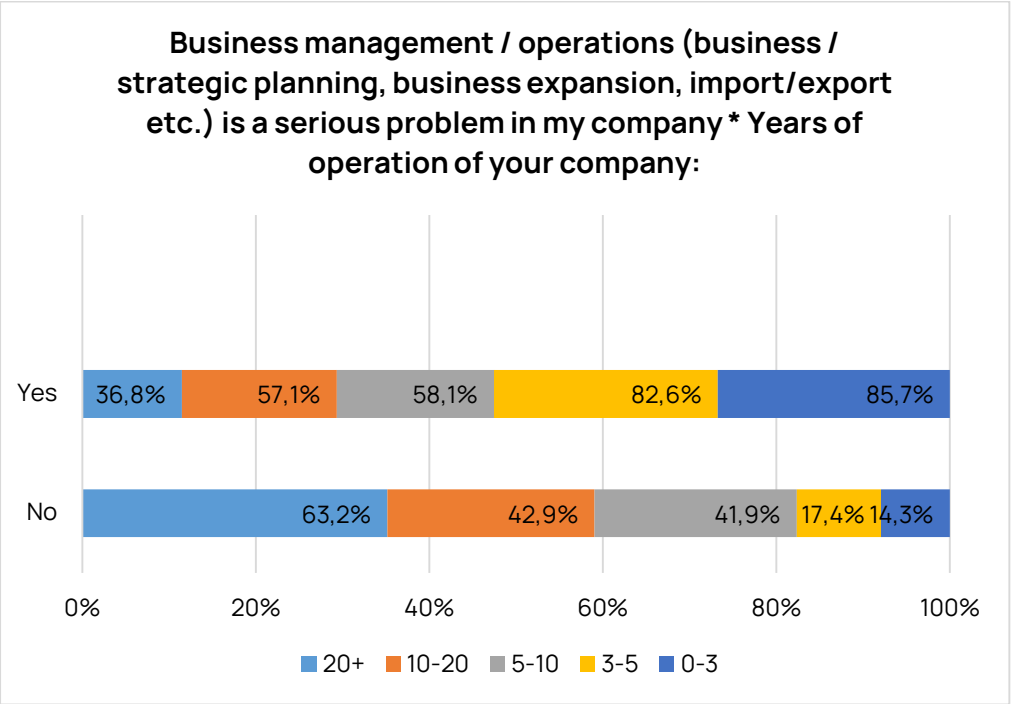


*Figure 16.9: Business management*years of operation*



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Another moderately statistically significant relationship gives reason to understand that in enterprises and farms open to synergy, to the smallest extent, they declare that the area of business management is problematic for them (Approx. Sign. = 0.003; Cramer's V = 0.315; Phi = 0.315).

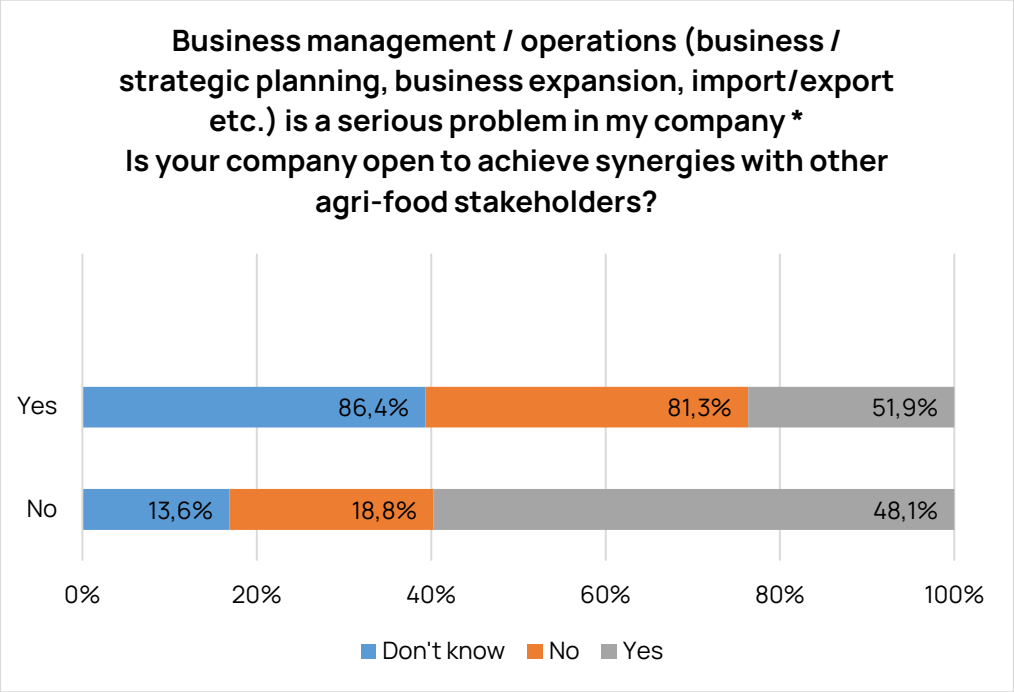


*Figure 16.10: Business management*synergies*

The next statistically significant relationship that will be examined is much stronger, and is objectified in the fact that for enterprises and farms that have introduced green practices and technologies in their activity, it is least characteristic to claim that business management represents a significant problem for them compared to those who have not introduced such practices and/or who have but do not apply them or who do not know them (Approx. Sign. = 0.000; Cramer's V = 0.435; Phi = 0.435). On the other hand, it can be said that it is most typical for research participants who do not recognize the essence of green practices to experience significant problems in the field of business management. Another thing that can be concluded is that as the implementation of green practices and



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technologies decreases, there is an increase in the importance of business management as an issue for the respondents.


*Figure 16.11: Business management*green practices*

The relationship observed between the assessment of the importance of business management as a problem for the organizations participating in the research and the assessment of the size of the costs caused by inflation is interesting. In this sense, it is observed that the people who put inflation as the lowest cost compared to all 7 that are considered in the research to the greatest extent (90% of them) declare that business management is a problem area for them. (Approx. Sign. = 0.001; Cramer's V = 0.453; Phi = 0.455). The thresholds are the lowest for respondents who put inflation in third place - 29.4%.

A moderately statistically significant relationship was registered regarding the differentiation of the responses of the respondents who evaluated



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human resources as a significant problem for their organization. (Approx. Sign. = 0.000; Cramer's V = 0.348; Phi = -0.348). The data show that where they do not represent a significant problem there is a higher tendency (over 90% of all enterprises that do not treat human resources as a significantly problematic) to declare that business management appears as a problem for enterprises and farms, in which the respondents are situated.

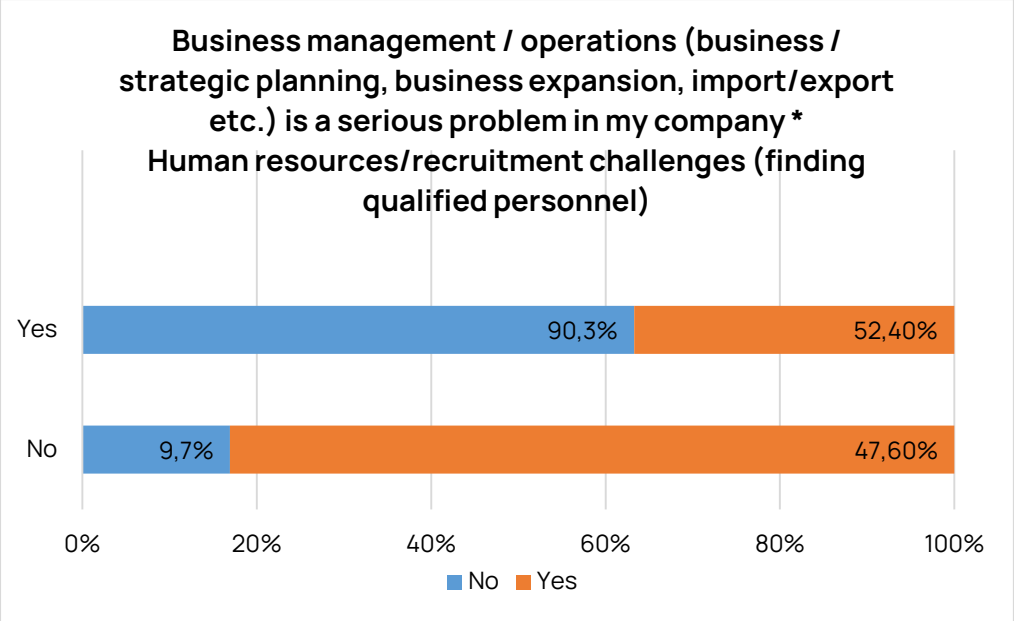


*Figure 16.12: Business management*human resources*

The relationship between the attitude towards the importance of business management as a problem area and the attitude towards the importance of environmental problems is quite strongly expressed, and what can be noted is that companies that do not experience significant problems in this area declare in more - a high degree of experiencing significant problems in the field of business management. (Approx. Sign. = 0.000; Cramer's V = 0.441; Phi = -0.441).



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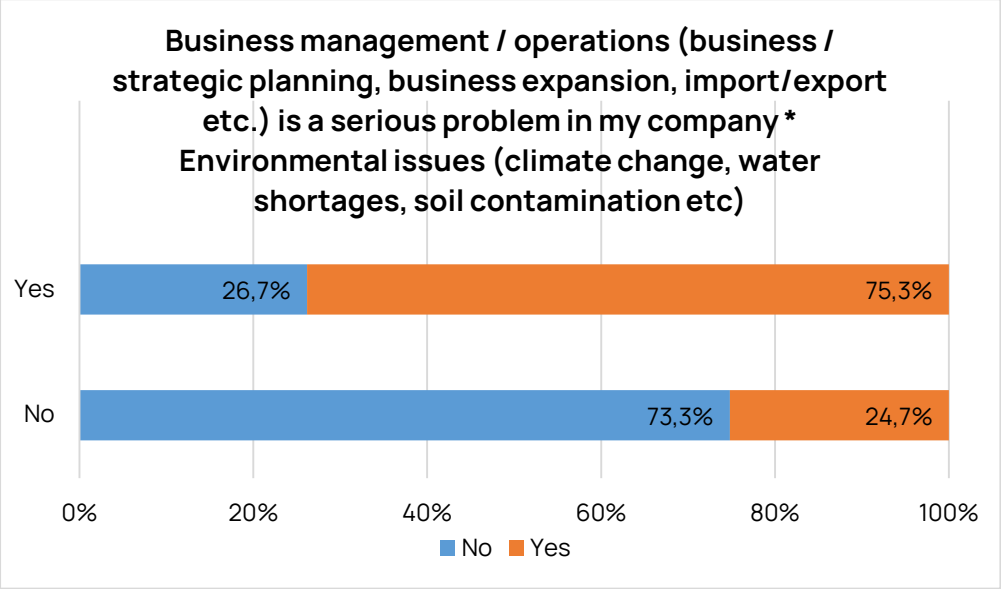


*Figure 16.13: Business management*environmental issues*

Another statistically significant difference reveals that in enterprises where maintenance costs are considered to be the smallest, business management is treated as a significant issue to the least extent. (Approx. Sign. = 0.000; Cramer's V = 0.388; Phi = 0.388), unlike where these costs are considered more significant. It is in this type of enterprises and farms that the fact that business management is a serious problem for them (more than 80%) is taken into account.

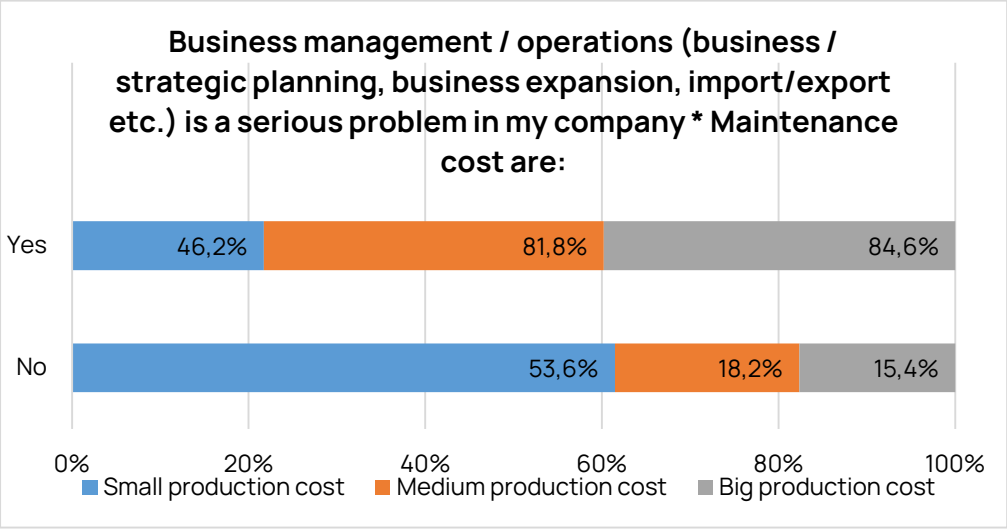


*Figure 16.14: Business management*maintenance cost*



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The next statistically significant relationship is again moderate and gives reason to understand that in the companies where the costs caused by inflation are the lowest, is declared to the greatest extent that business management is a serious problem. (Approx. Sign. = 0.000; Cramer's V = 0.427; Phi = 0.427). The other important thing that can be said is that as the cost burden of inflation increases, the importance of business management as an issue decreases.

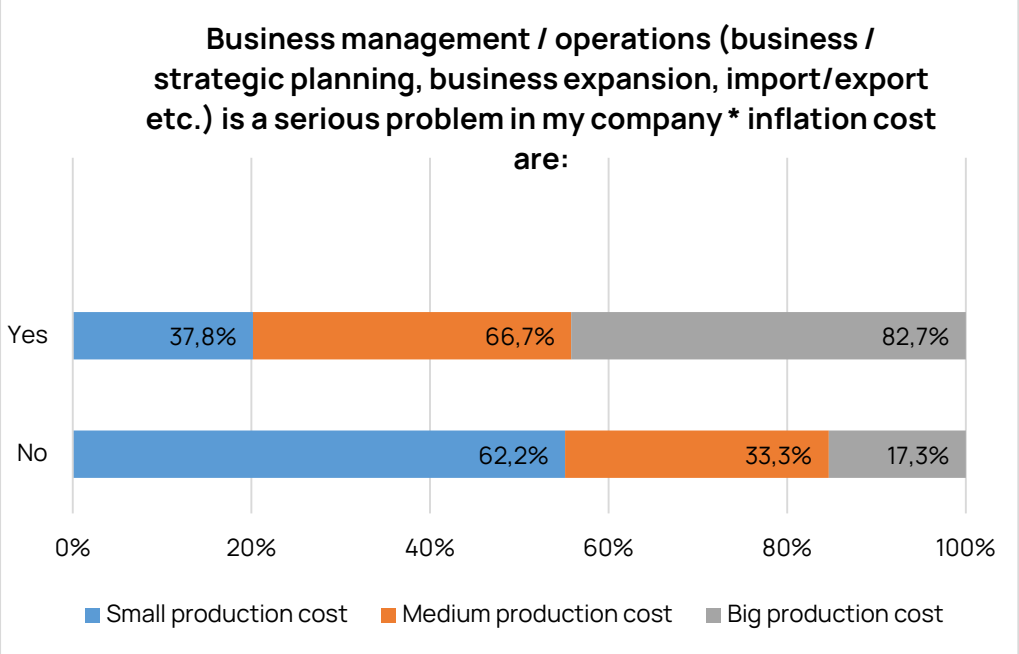


*Figure 16.15: Business management*green practices*

The last statistically significant relationship observed with respect to business management is the fact that businesses that have not implemented procedures, policies and codes to ensure safe working conditions for their employees are more likely to state that there are significant problems in the field of business management, compared to those who have not introduced such tools. Over 90% declared such deficits, while those who apply such regulations to ensure the security of personnel during work have declared almost twice as low that business management



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is a serious problem for them. (Approx. Sign. = 0.000; Cramer's V = 0.332; Phi = -0.332).

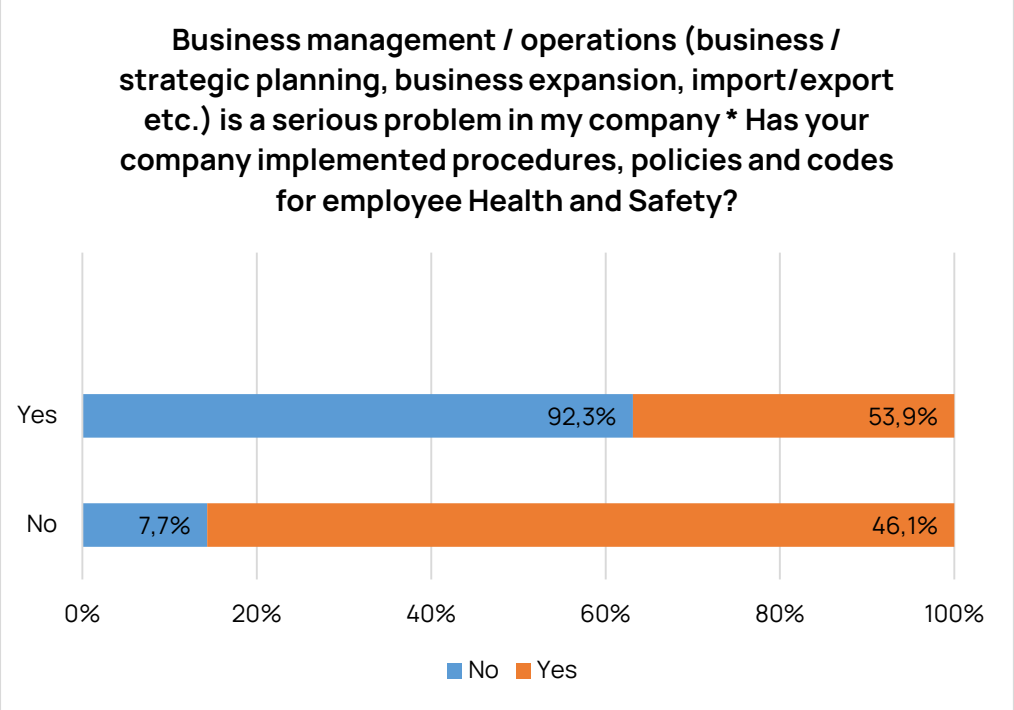


*Figure 16.16: Business management*health & safety*

The analysis of education and training in enterprises as a specific problem area reveals the fact that it begins with the statement that the ways in which the respondents classify this type of problem is found in relation to the way in which they answer other questions. Among the weaker links can be noted the one with the answers to the questions about whether economic entities fall into the field of packaging. This top link expresses the fact that those of them who do not operate in this area of economic life are more likely to treat it as a problem than those who operate there.

Regarding the treatment of human resources as a problem area, it can be concluded that companies that do not consider themselves to have problems with human capital are more likely to indicate the presence of significant problems related to education and training.



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Another weak link is expressed in the fact that in companies where transport and logistics costs are large, to the greatest extent, they declare that education and training are a problem, compared to those that give the same costs a smaller share.

The last two weak links come to show that economic agents who have developed procedures, rules and codes against discrimination and harassment and those who have not developed such in the field of documented food management system tend to state, education and training represents a problematic area.

Three are the stronger statistically significant relationships here. The first shows that men are more likely than women to state that education and training is a problem in their workplace (Approx. Sign. = 0.001; Cramer's V = 0.319; Phi = -0.319). This fact comes to confirm the thesis of gender differentiation of responses.

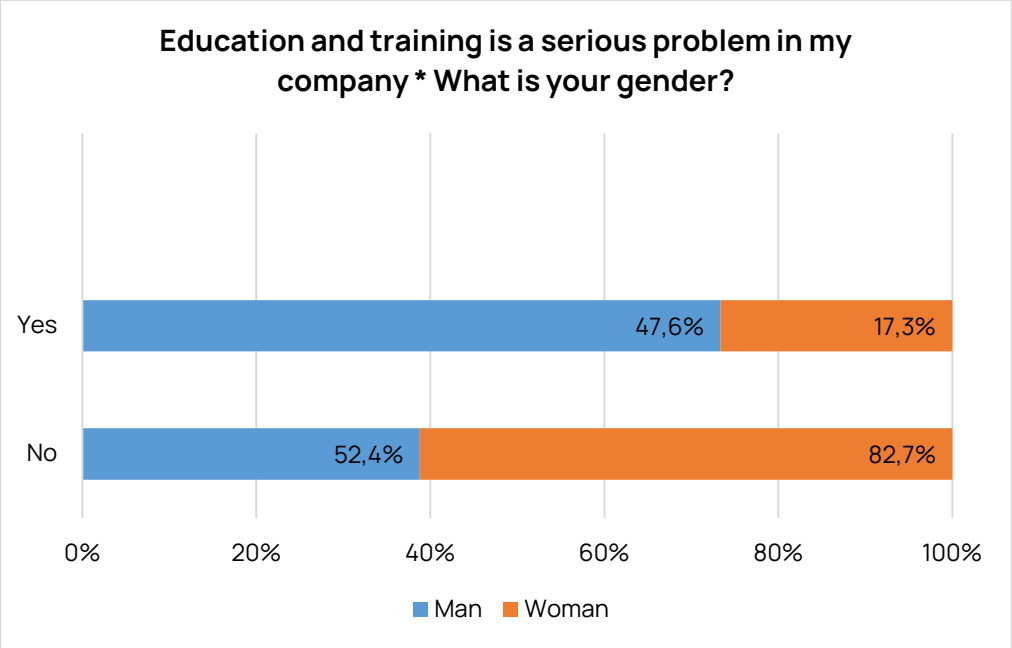


*Figure 16.17: Education*gender*



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The second moderate relationship, which is the subject of analysis, is stronger than the first (Approx. Sign. = 0.001; Cramer's V = 0.375; Phi = 0.375) and makes it possible to conclude that for respondents whose enterprises have not introduced green practices and technologies are the least likely to treat education and training as a specific corporate problem, compared to those who introduced, who introduce others. On the other hand, respondents who cannot determine which practices and technologies are green most often declare that education and training is a significant problem for their companies.

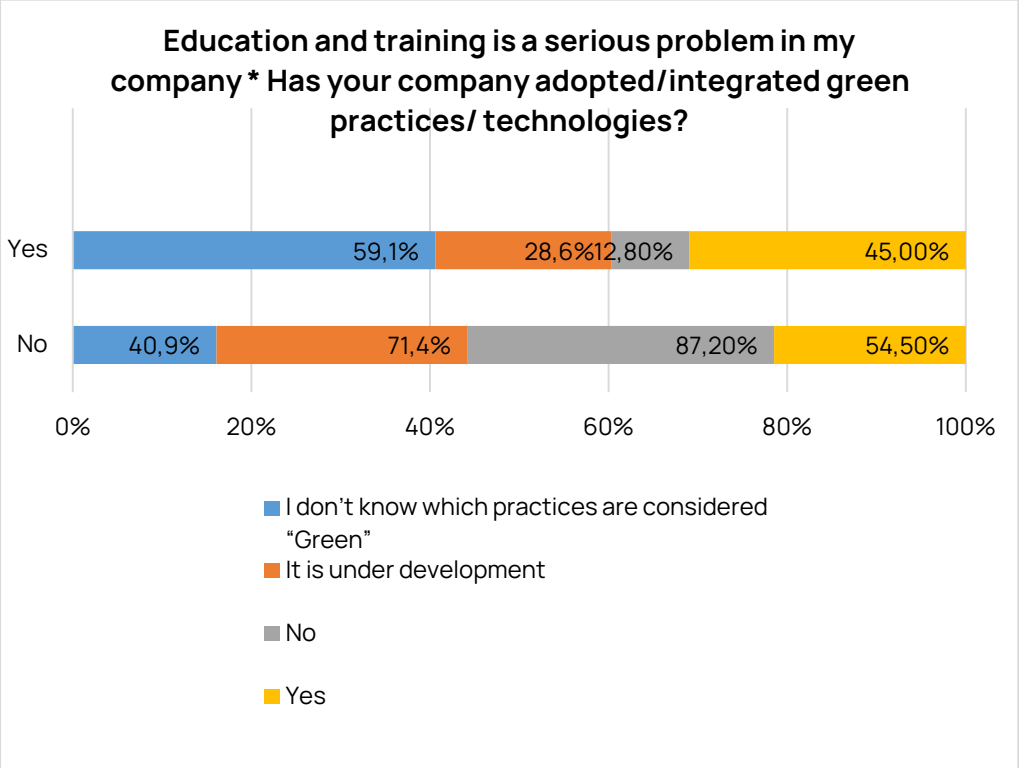


*Figure 16.18: Education*green practices*

The last moderate relationship revealed reflects the fact that where access to foreign markets is not rated as a significant issue, education and training are more likely to be rated as such (Approx. Sign. = 0.000; Cramer's V = 0.381; Phi = -0.381).



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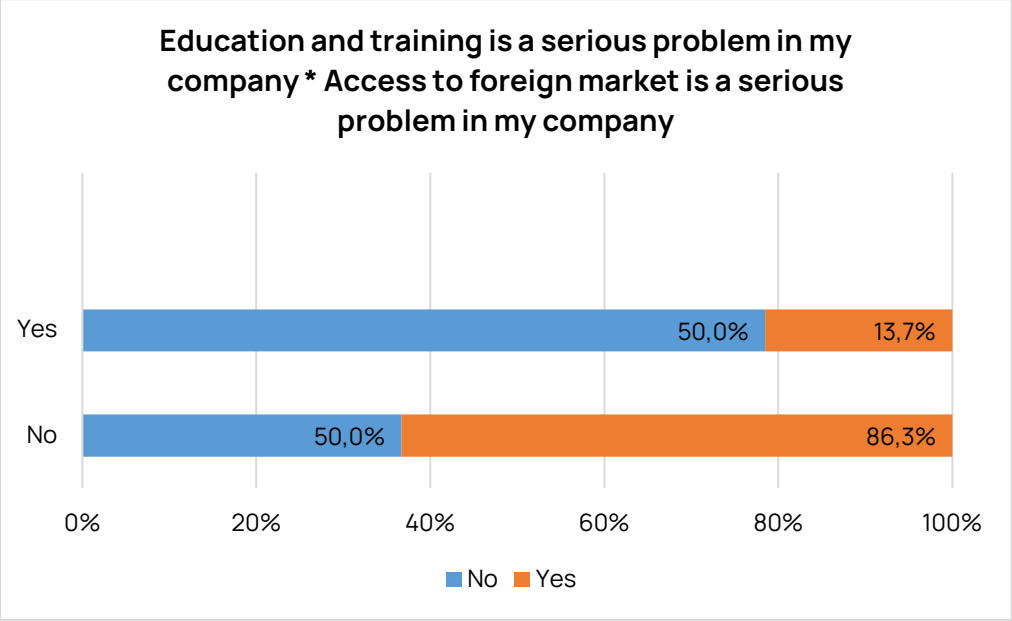


*Figure 16.19: Education*foreign market*

In the analysis of access to a foreign market, which examines the relationship between the importance of this problem compared to the answers to the other questions in the survey, it becomes clear that typically (albeit to a lesser extent) for the enterprises receiving consulting services; those participating in branch organizations; enterprises open to synergy with stakeholders, enterprises that do not consider marketing and business management as significant issues for them; companies implementing procedures, policies and codes in the area of supply chain control and more educated respondents is to consider the problem of access to foreign markets as a significant one. Stronger relationships are observed in three other dimensions.

The analysis of the first more significant relationship indicates that access to a foreign market is least seen as a significant problem by respondents who cannot judge whether certain practices and technologies are considered green, compared to those whose enterprises already have implemented, are currently implementing, or have not implemented. On the other hand, in view of the even distribution of respondents who treat access



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to a foreign market as a significant problem, it can be said that the importance of the problem is not affected by the lack of introduction of green practices and technologies (Approx. Sign. = 0.014; Cramer's V = 0.304; Phi = 0.304).

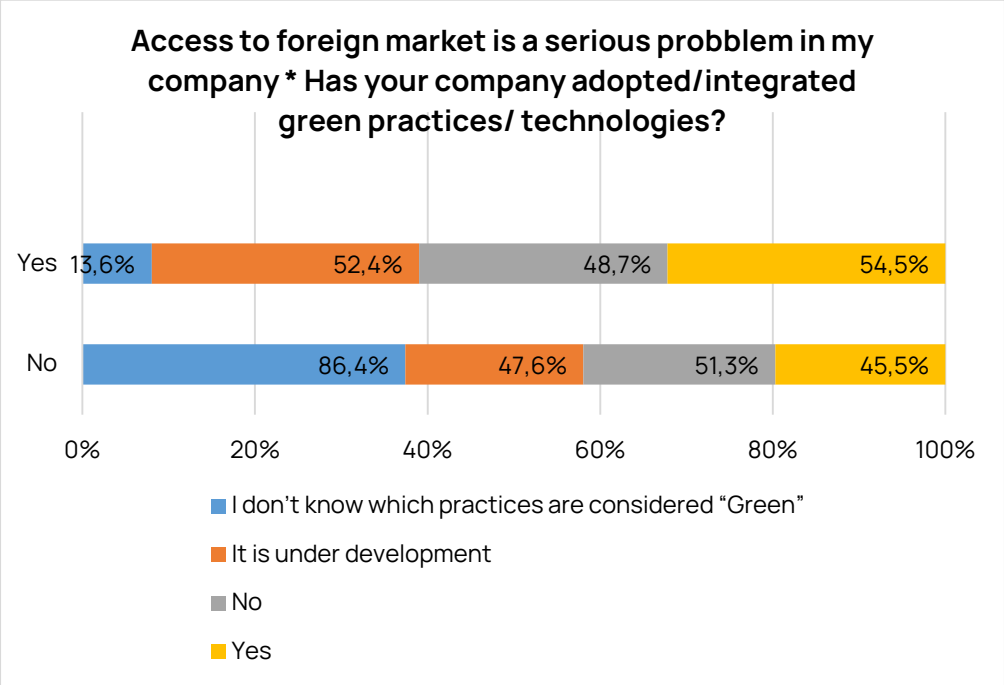


*Figure 16.20: Foreign market*integrated green practices*

The next statistically significant relationship is again moderate (Approx. Sign. = 0.004; Cramer's V = 0.310; Phi = 0.310) and allows to make the conclusion that they are the least inclined to treat as a significant problem for their company the one related to access to foreign on the market are the enterprises that consider wage costs to be a major production cost, compared to those that state that the same cost is of medium or low importance to them. Against this background, the fact that the most prone to claim that access to foreign markets is a significant problem among the three groups of enterprises is those that treat labor costs as medium in severity is also striking.



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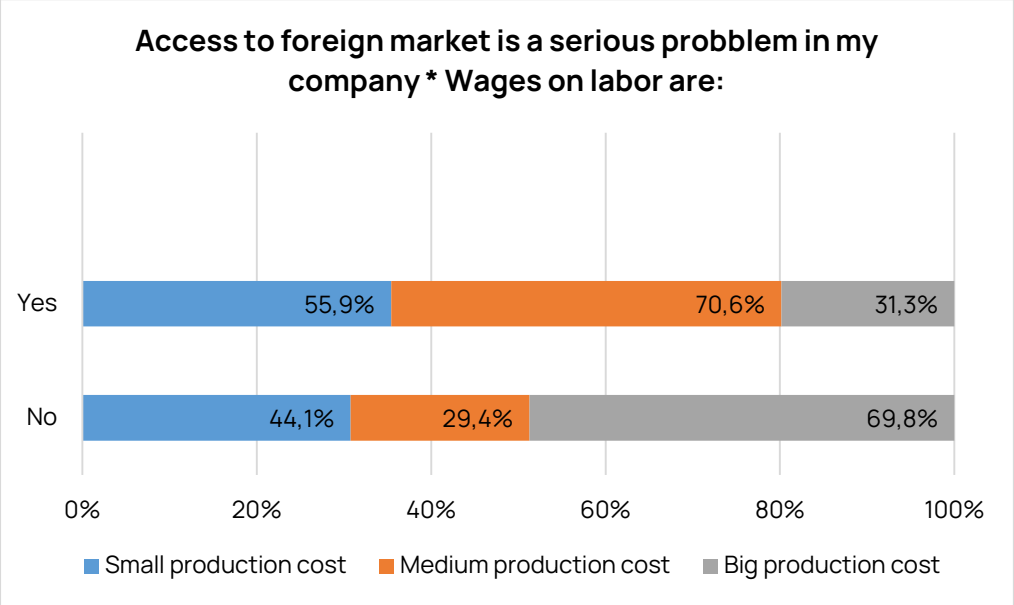


*Figure 16.21: Foreign market*wages*

The strongest relationship observed regarding access to foreign markets as a problem area is moderate (Approx. Sign. = 0.000; Cramer's V = 0.381; Phi = -0.381) and comes to illustrate that enterprises that do not experience problems in the field of education and training are more likely to claim to have those in the field of access to external markets.

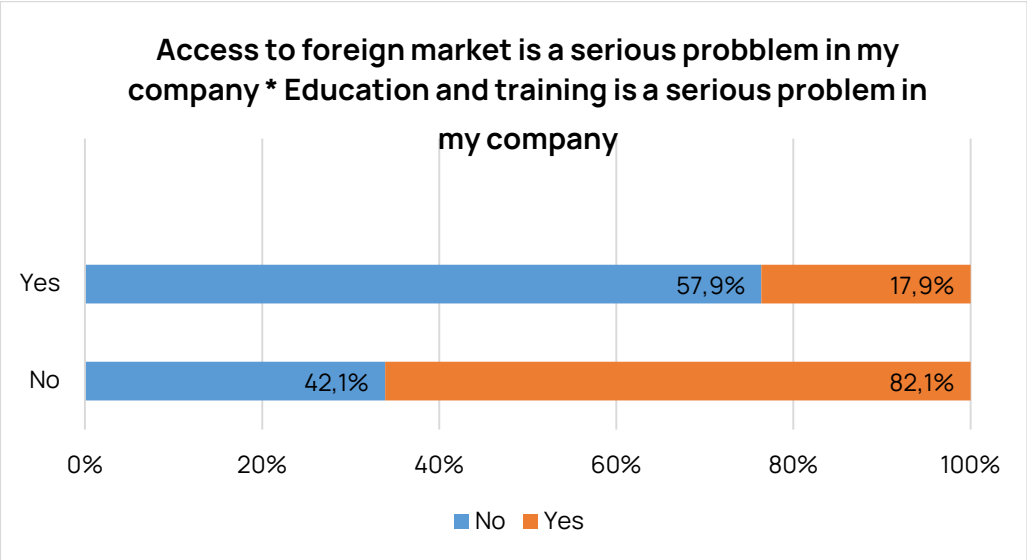


*Figure 16.22: Foreign market*education*



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The treatment of human resources as a problem area for the enterprises and farms of the agri-food sector in the cross-border region that participated in the study comes to show that there are many connections and specificities between the variables that are included in the study. In this sense, it can be noted that although to a weak degree for the enterprises that work in the field of packaging; which are open to synergy, enterprises and farms in which labor costs are medium and low, those in which education and training do not represent a significant problem; those for whom environmental issues are a problem typically state that human resources is a problem area for them. In addition to this, the same can be said for the enterprises in which maintenance costs are the smallest and where the costs of materials are the largest, it can be said that a higher degree of declaration is observed, the presence of significant problems in the field of human resources, while where labor costs are the highest, the presence of problems in the field of human resources is reported to the smallest extent.

The first of the more significant relationships for the study comes to show that there is a serious difference in the treatment of human resources as a problem area for enterprises and farms according to whether the respondents work in enterprises and farms that introduce green practices or technologies (Approx. Sign. = 0.000; Cramer's V = 0.424; Phi = 0.424). The relationship makes it possible to establish two facts important for the research - on the one hand, the least inclined to treat human resources as a significant problem area are the enterprises and farms that do not know the essence and specifics of green practices and technologies, while all other groups (those who have/have not and those who are developing such practices and technologies) largely respond in a way that makes it clear that HR is a problem area for them.


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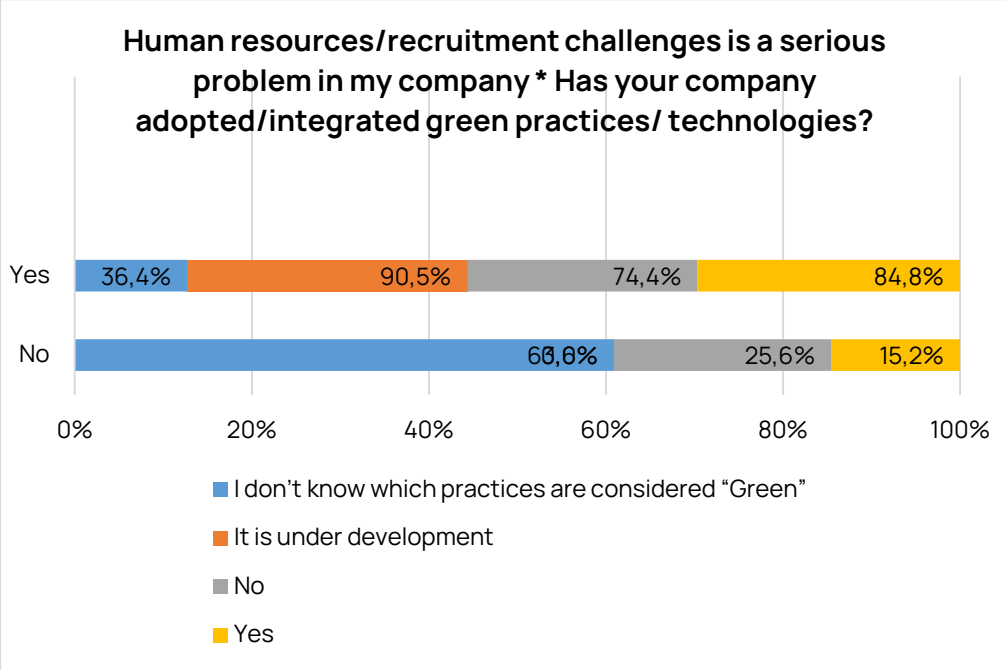


*Figure 16.23: Human Resources*integrated green practices*

The next moderate relationship, revealed in the present analysis allows to register the fact that companies that do not implement a strategic development plan are experiencing greater problems in the area of human resources compared to those that do have strategic development plan. (Approx. Sign. = 0.001; Cramer's V = 0.310; Phi = -0.310).

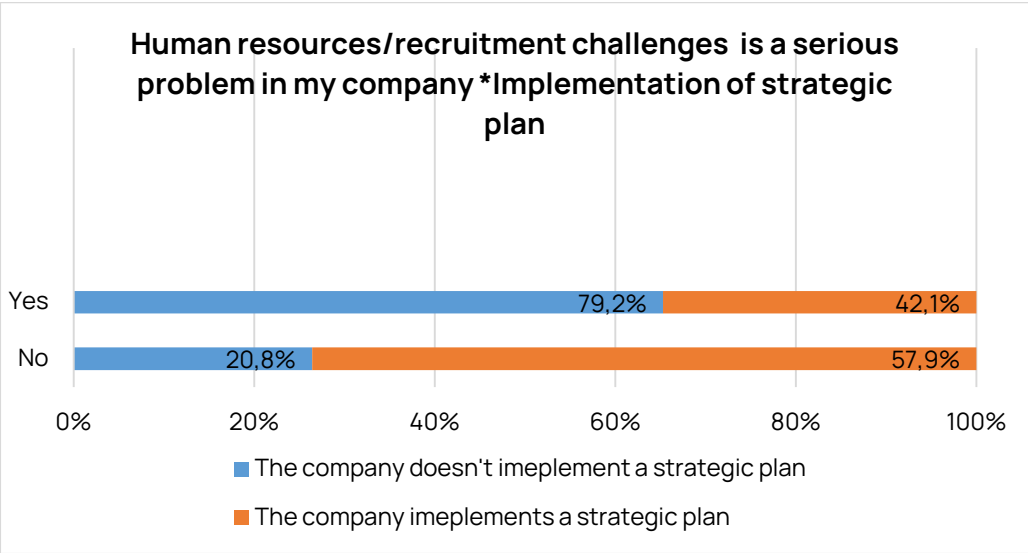


*Figure 16.24: Human Resources*strategic plan*



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On the verge of being defined as "significant" is the next statistically significant relationship, which comes to reveal that in enterprises and farms where marketing is not considered a significant issue, they tend to treat HR as such in extremely high degree. (Approx. Sign. = 0.000; Cramer's V = 0.493; Phi = -0.493).

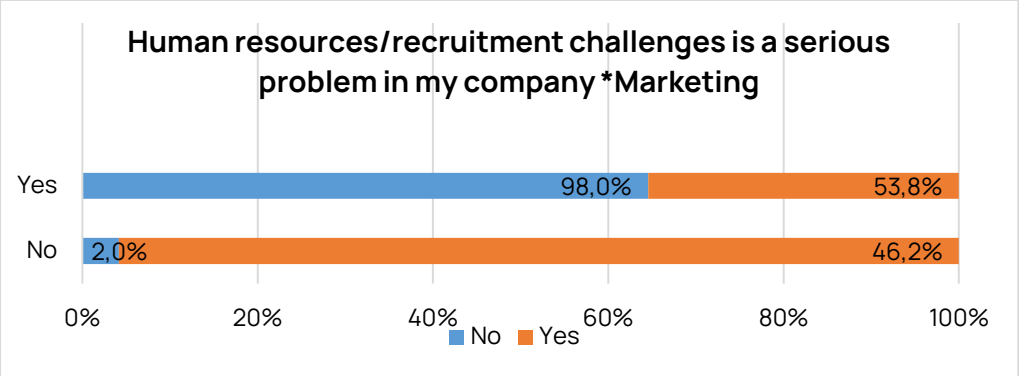


*Figure 16.25: Human Resources*marketing*

The same, albeit to a lesser extent, can be said in relation to business management as a problem area (Approx. Sign. = 0.000; Cramer's V = 0.348; Phi = -0.348). It is typical for enterprises and farms that do not experience problems in the field of business management to experience serious ones in the field of human resources.

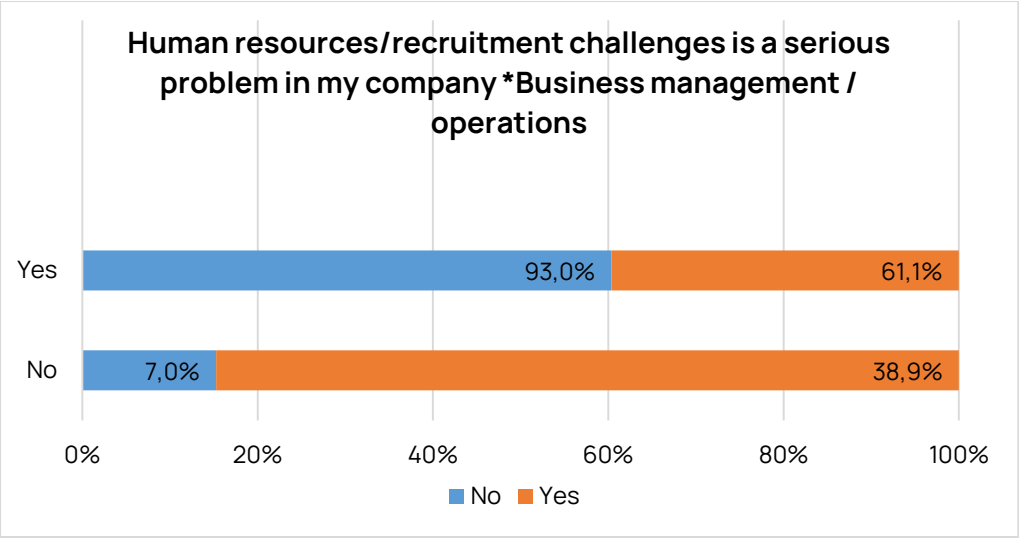


*Figure 16.26: Human Resources*business management*



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Analysis of the data reveals another moderate statistically significant relationship, this time in terms of the burden of costs caused by inflation (Approx. Sign. = 0.003; Cramer's V = 0.315; Phi = 0.315). In this sense, it can be concluded that the least inclined to consider human resources as a problem area are those enterprises and farms for which the costs caused by high inflation are the smallest. The figure below in the text illustrates the fact that the other two groups are far more likely to experience HR problems.

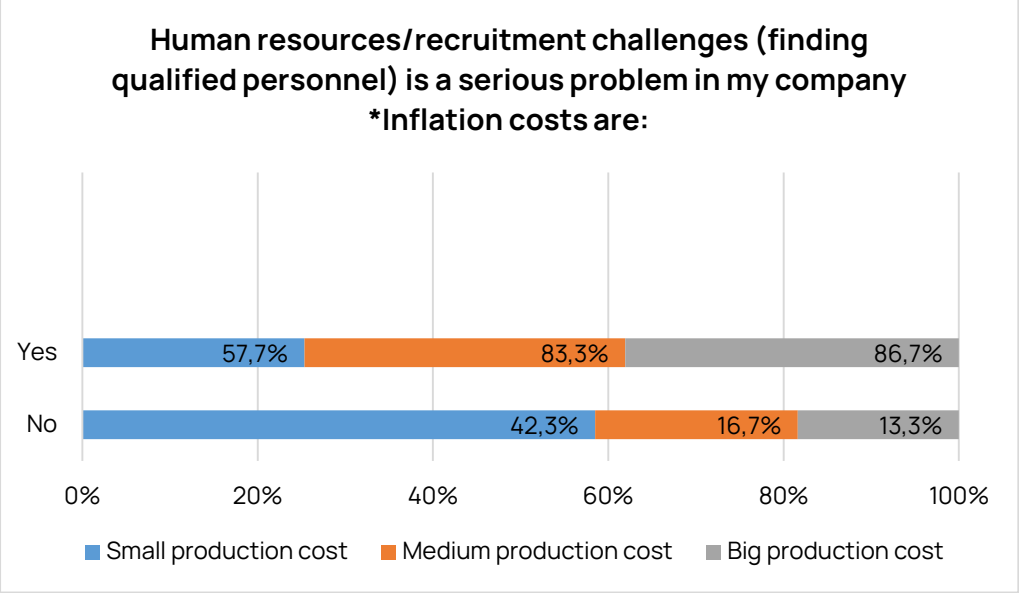


*Figure 16.27: Human Resources*inflation cost*

The last statistically significant relationship regarding the treatment of human resources as a problem area (Approx. Sign. = 0.000; Cramer's V = 0.352; Phi = -0.352) is objectified in the fact that enterprises and farms from the agri-food sector in the cross-border region, who participated in this study and who do not implement procedures, policies and codes for the prevention of discrimination and harassment in the workplace are significantly more exposed to problems in the field of human resources.



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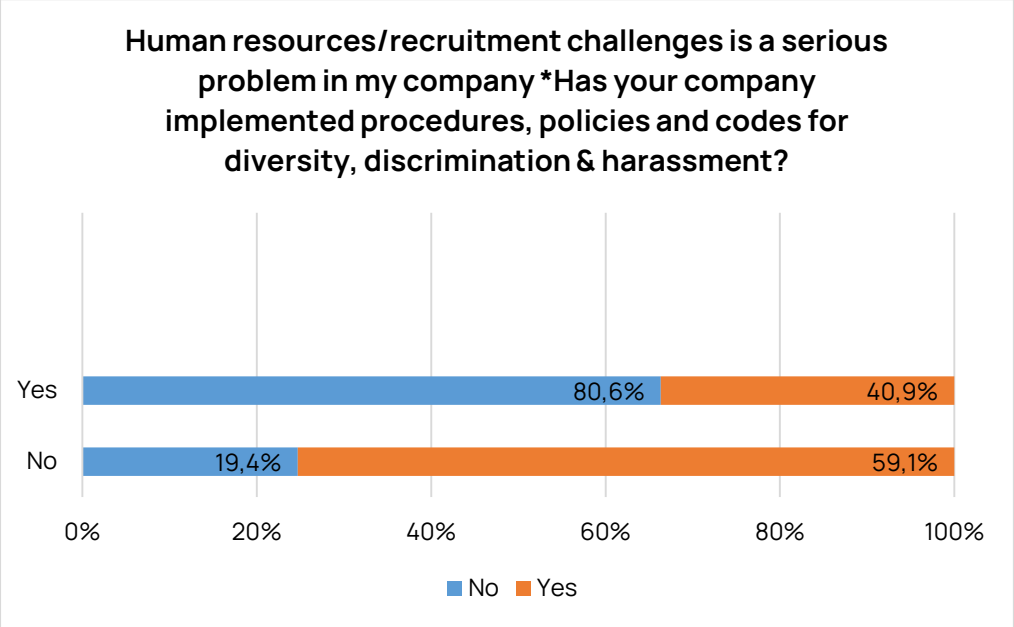


*Figure 16.28: Human Resources* procedures, policies and codes for diversity, discrimination & harassment*

In the penultimate point of the analysis of the importance of the various problems in the enterprises in the cross-border region, the problems in the environment are considered, and it can be noted that there are several weak links that need to be explained. Enterprises and farms that work in the field of production to a greater extent than those that do not work believe that environmental problems are significant for them compared to those that do not work in this field, and for companies that are open to synergy, things are in an identical way. On the other hand, it is more typical for economic subjects not working in the field of trade and logistics to admit that environmental problems are a serious problem for them, compared to the enterprises and farms that operate in these fields. In addition, it can be noted that enterprises and farms that do not implement procedures, policies and codes in the field of discrimination and harassment in the workplace and reducing harmful emissions from transport are more likely to claim that environmental problems environment are a serious problem for them. The latter weak link in relation to this problem area comes to show



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that in enterprises and farms where there are problems in the area of human resources, there are undoubtedly also those in the area of the environment.

The analysis of moderated relationships begins with the identification of the relationship between the treatment of environmental problems and those in the field of marketing. (Approx. Sign. = 0.000; Cramer's V = 0.597; Phi = -0.597). The strength of the relationship is strong, which highlights that there is a wide variation in responses regarding whether environmental issues are significant to a business/farm, which is based on whether the same is the case for marketing issues. The same difference is illustrated below in the text, which shows that firms that do not experience significant marketing problems are extremely likely to experience significant environmental problems. The difference between the two groups is almost 20 times, which shows the strength of the relationship and the fact that for enterprises and farms that do not experience problems in the field of marketing, they experience problems in the field of the environment.

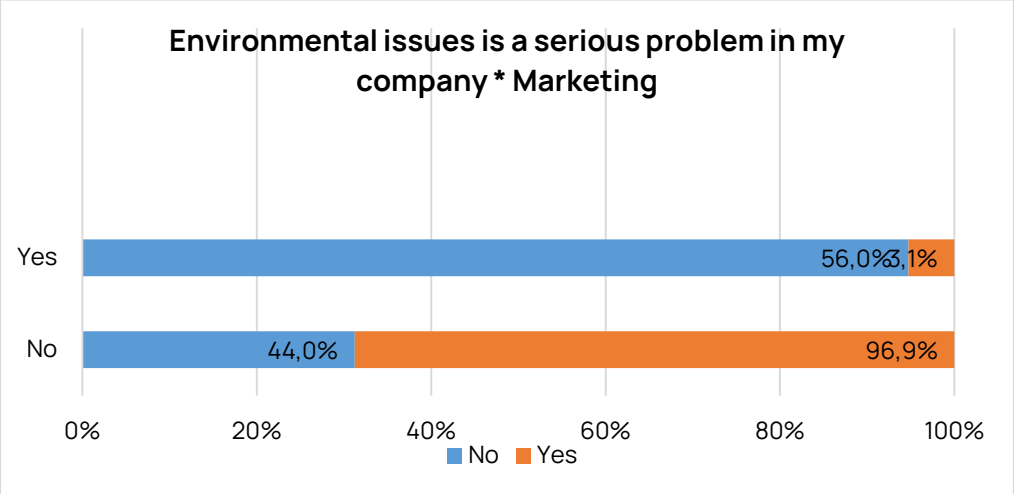


*Figure 16.29: Environmental issues*marketing*

Another very important relationship for the analysis is that between the significance of the problems in the environment and the period of economic activity of an enterprise/farm. (Approx. Sign. = 0.007; Cramer's V = 0.349; Phi = 0.349). The connection between the two lies in the fact that the oldest



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enterprises and farms are to the greatest extent affected (i.e. they are the most significant problem for them) by the problems in the environment, in contrast to the young ones. which does not treat environmental problems as a significant problem for them With one small exception (the group of enterprises that have been on the market between 5 and 10 years) it can be concluded that with the increase in the period of economic activity of an enterprise/farm the importance of environmental problems is also increasing.

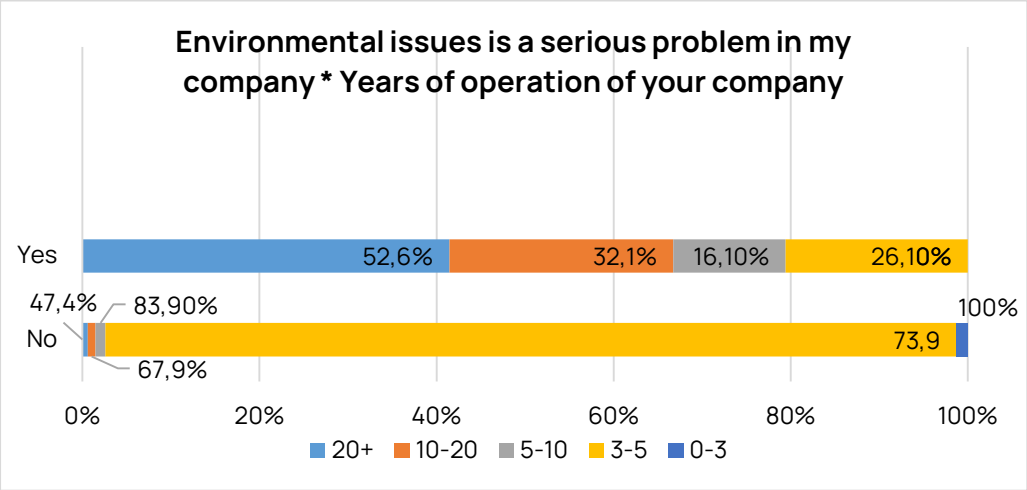


*Figure 16.30: Environmental issues* years of operation*

The next relationship, which is considered in the text, is again moderate and is objectified in the fact that enterprises and farms that have introduced green practices and technologies to the greatest extent consider that environmental problems are significant for them, compared to those that do not introduce, develop or cannot recognize which practices and technologies are considered "green" (Approx. Sign. = 0.007; Cramer's V = 0.411; Phi = 0.411). Moreover, only the enterprises and farms that have introduced green practices and technologies in their activity can be said to predominantly treat environmental problems as significant.



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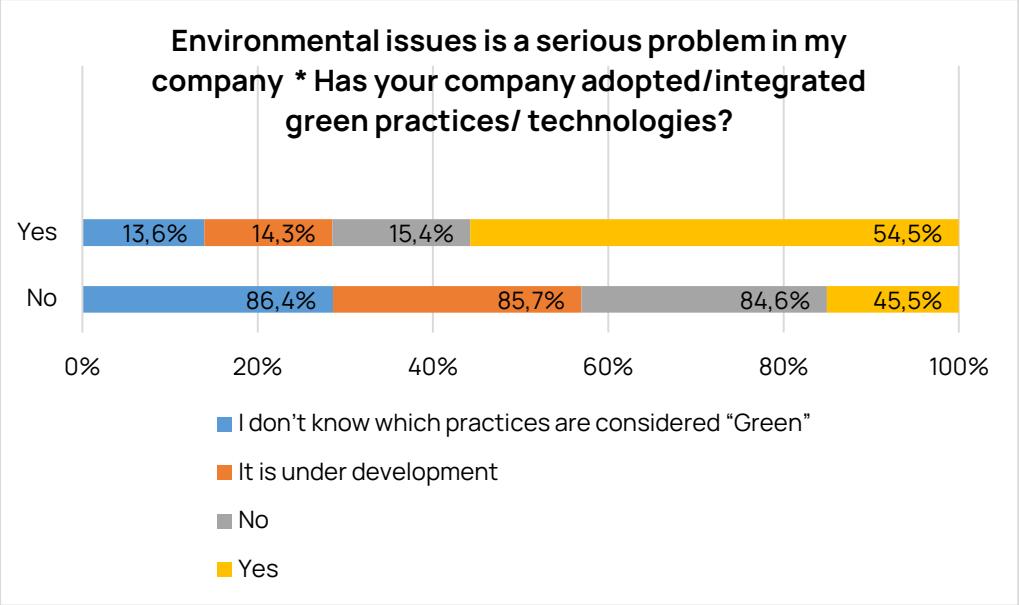


*Figure 16.31: Environmental issues* integrated green practices*

A moderately statistically significant relationship is also found for attitudes toward the benefits of operational business tools (Approx. Sign. = 0.000; Cramer's V = 0.371; Phi = 0.371). The characteristic in this case is that the respondents who are most skeptical about the topic, to the greatest extent, consider that environmental problems are significant ones in their company/farm.

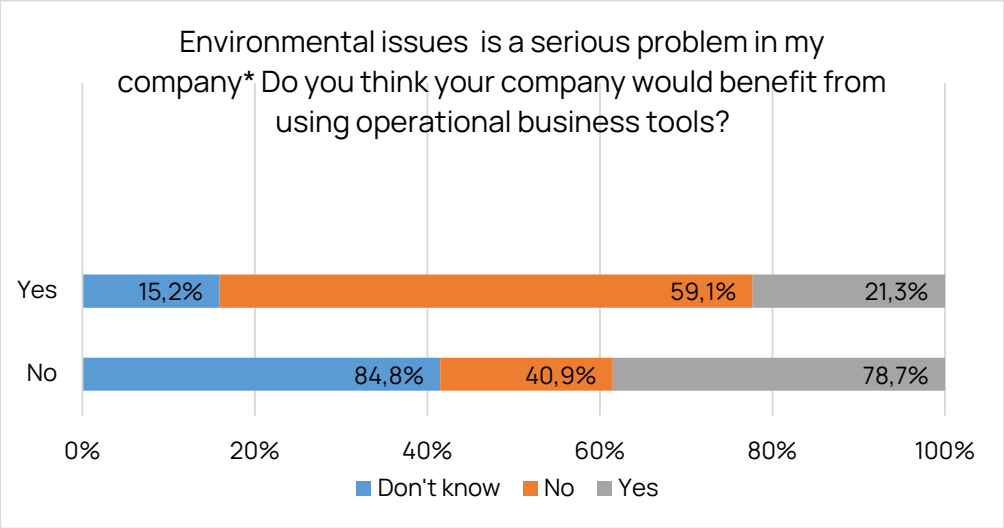


*Figure 16.32: Environmental issues*operational business tools*



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The penultimate relationship, which will be presented in more detail, shows that there are statistically significant differences in terms of the opinion about the importance of environmental problems compared to the importance of business management problems for the studied companies (Approx. Sign. = 0.000; Cramer's V = 0.371; Phi = 0.371). The connection established in the course of the analysis consists in the fact that in enterprises and farms where business management is not a significant problem, environmental problems appear to be precisely such a problem.

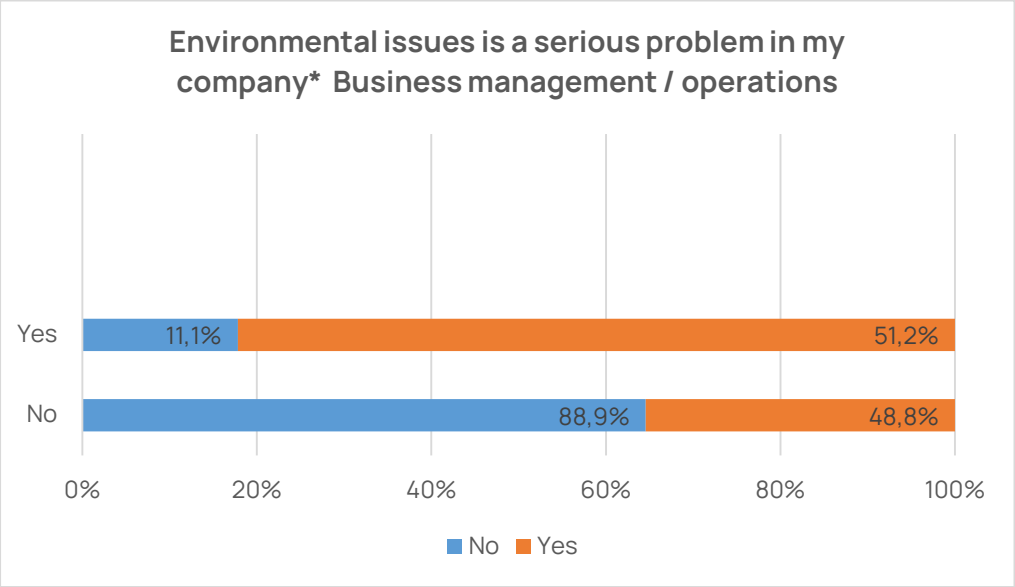


*Figure 16.33: Environmental issues* business management*

At the end of the analysis, three more moderate relationships will be underlined between the treatment of the importance of environmental problems and the costs of labor, maintenance and costs caused by inflation in the enterprises and farms that participated in the study. The data give reason to conclude that where labor and maintenance costs are the least, environmental problems are to the greatest extent considered a problem (compared to where they are medium and high), and in enterprises and farms where to the highest degree it is declared that the costs caused by inflation are high and environmental problems to the greatest extent are treated as significant.



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The analysis to establish statistically significant relationships with regard to the last problem area - access to information and communication technologies could not find such relationships that could be validated as reliable, which could be attributed to both the homogeneity of the responses, the sample, and as well as the combination of the two factors.

Another very important point for the analysis in the present study aims to establish the opinion about the most significant production costs of the respondents. They in turn rate each of the seven possible answers, and for each they must mark a different value between "1" and "7", where "1" indicates that the problem is significant and "7" that it is "minor". In this sense, it can be stated that the average estimates of each of the production costs are significantly closer to the problem areas of the companies that were reviewed earlier. This shows that respondents find it more difficult to determine the burden of production costs for their companies.

Undoubtedly, it must be stated that the average estimate of the costs of labor remuneration of the staff are characterized as the biggest burden on the budget of the enterprises and farms in the cross-border region, closely followed by the costs of transport and logistics; costs of supply of raw materials and energy costs. As lighter for the budget, they estimate the costs caused by inflation and maintenance, and the lightest are those for administrative needs. Figure 17 shows the average ratings for each type of expenditure.

Beyond that, the data shows that staff salary costs were cited as the biggest item (i.e., the most significant expense) by 33% of respondents. 20% of respondents stated that the biggest problem with 20% is transport and logistics costs, and 14.8% that the most significant expense for their enterprise/farm is directed to the purchase of raw materials and auxiliary materials.


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On the other hand, the largest is the group of persons who consider that administrative costs are the least significant compared to their budget. This opinion is shared by 40.9% of the respondents, while 17.4% of the respondents claim that the most insignificant costs for their companies are the costs caused by inflation. The remaining types of expenses are at levels below 10%.

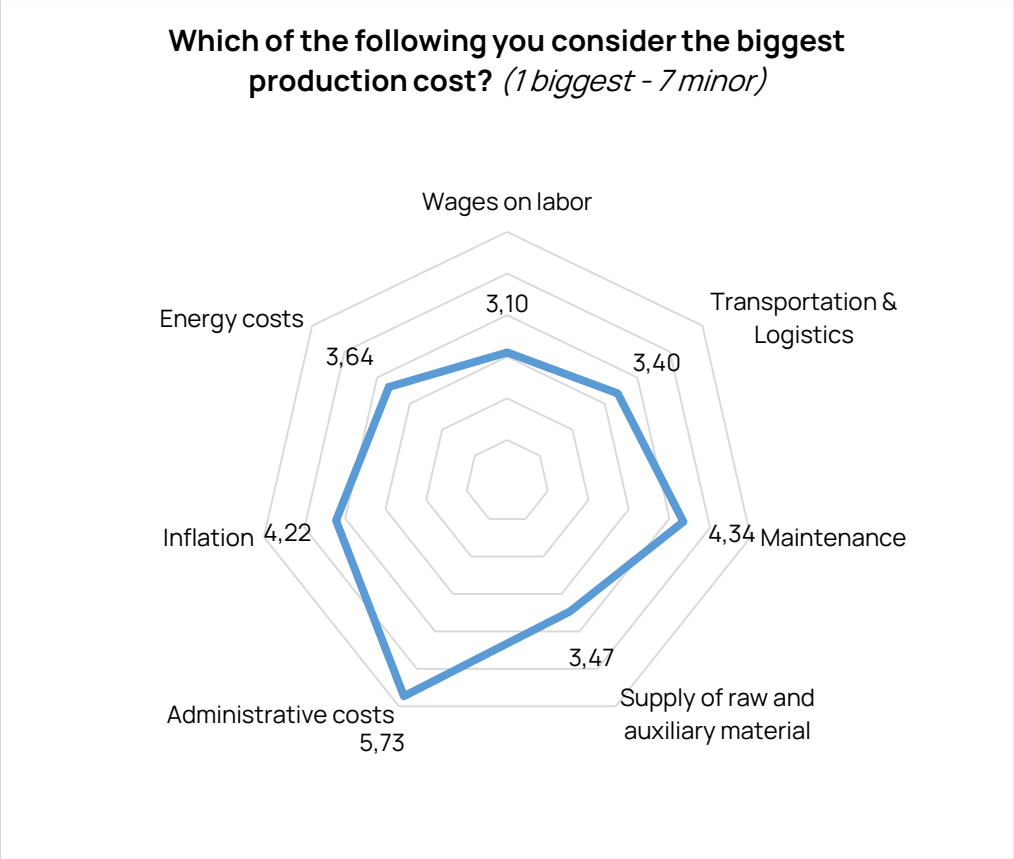


*Figure 17: The Biggest Production Cost (1 biggest - 7 minor)*

The analysis devoted to establishing the statistically significant relationships shows that the way respondents define the burden of wage costs functions in relation to how they answer the other questions. Against this background, several weaker links and several moderate ones can be identified, with the focus of attention in the analysis falling on the stronger links.



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For those in the first group, it can be said that respondents without an opinion about the use of operational business to a higher degree (compared to those with a positive or negative mood about this practice) consider labor costs as a major production cost, while skeptical respondents treated it as a small production cost. On the other hand, it can be said that companies that implement a strategic plan and companies that do not experience significant problems in the field of human resources also tend to treat labor costs as major production costs.

There is another weak link, which is objectified in the fact that where inflation is considered a large expense, labor costs are at least considered a large expense. Where costs that are caused by inflation are treated as medium and low cost to a much greater extent (more than 2 times) it is considered to be a large cost for the enterprises in which the respondents work.

The first statistically significant relationship that is subject to analysis regarding labor costs shows that the attitude towards marketing as a problem area in enterprises and farms from the agri-food sector in the cross-border region implies disproportionality (Approx. Sign. = 0.000; Cramer's V = 0.488; Phi = 0.488). The relationship is moderate and comes to show that in enterprises where marketing is considered a problem, labor costs are the most significant. However, where marketing is not considered a significant problem, personnel costs are not a major concern.


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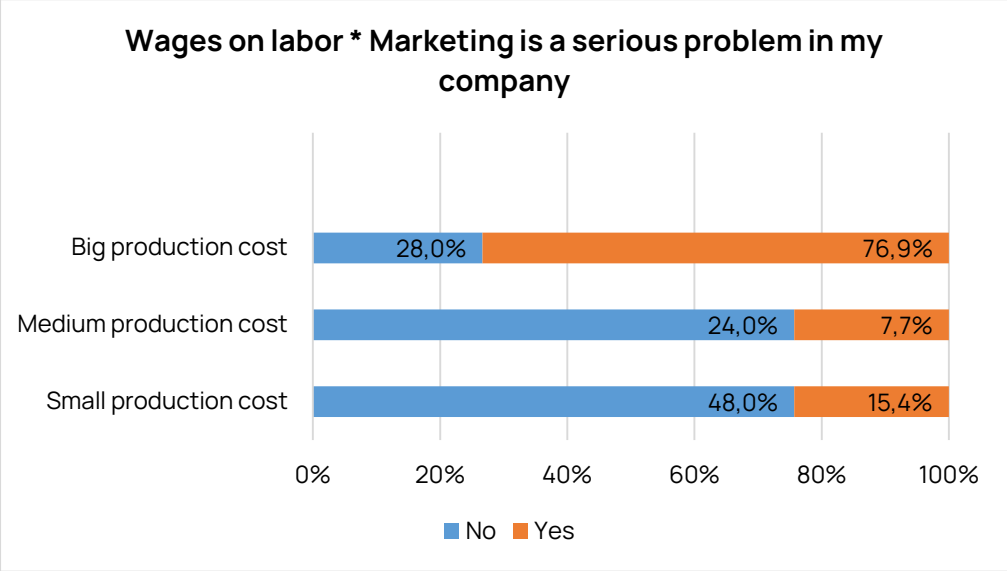


*Figure 17.1: Wages*marketing*

On the other hand, although a much weaker relationship is observed between labor costs and attitudes towards the difficulties to access a foreign market (Approx. Sign. = 0.004; Cramer's V = 0.310; Phi = 0.310), it can be said, that where firms do not experience problems accessing foreign markets, labor costs are more likely to be a major feature of their operations.

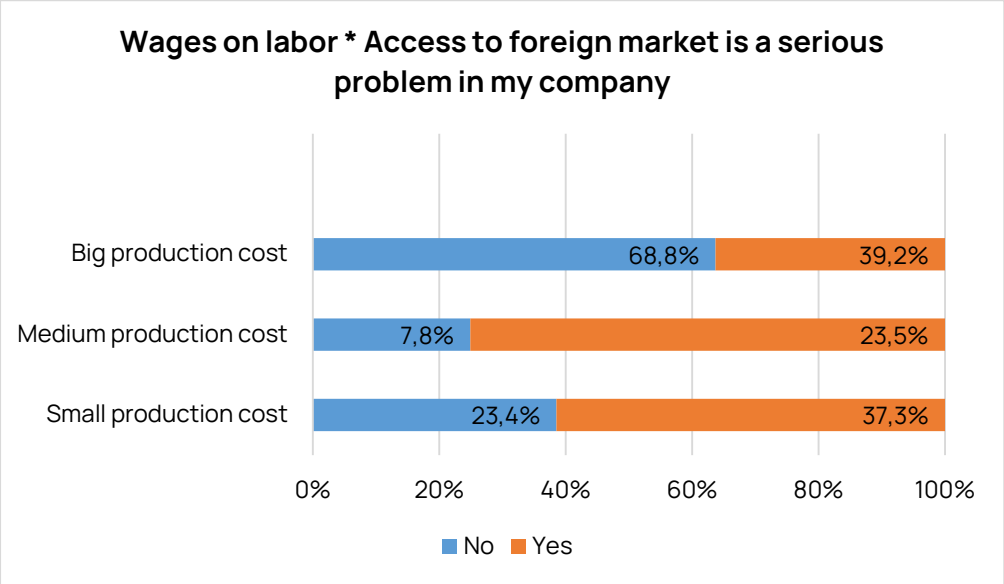


*Figure 17.2: Wages*foreign market*



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Another stronger relationship can be identified. Her interpretation states that enterprises and farms in which environmental problems are not considered significant are more likely to treat personnel costs as high and far less likely to be low, while in enterprises and farms where such problems are present the trend is reversed (Approx. Sign. = 0.000; Cramer's V = 0.441; Phi = 0.441).

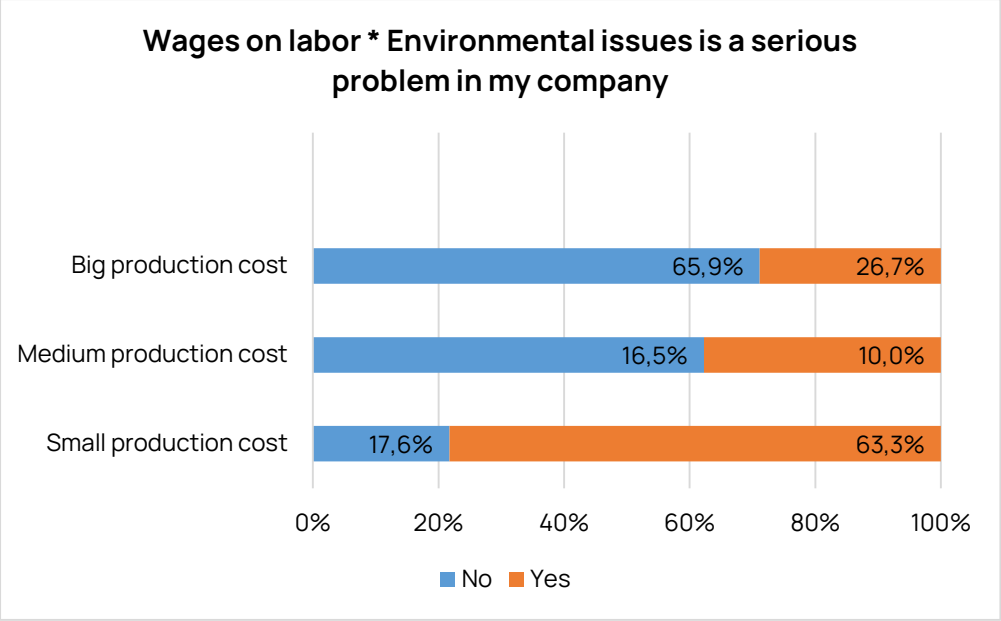


*Figure 17.3: Wages*environmental issues*

Another statistically significant relationship of importance to the study is the fact that businesses that can be said to have procedures, policies and codes in place to prevent discrimination and harassment in the workplace are more likely to treat labor costs as a large production cost and less likely as a small one, in contrast to economic entities that do not apply such prevention regulations (Approx. Sign. = 0.000; Cramer's V = 0.441; Phi = 0.441).



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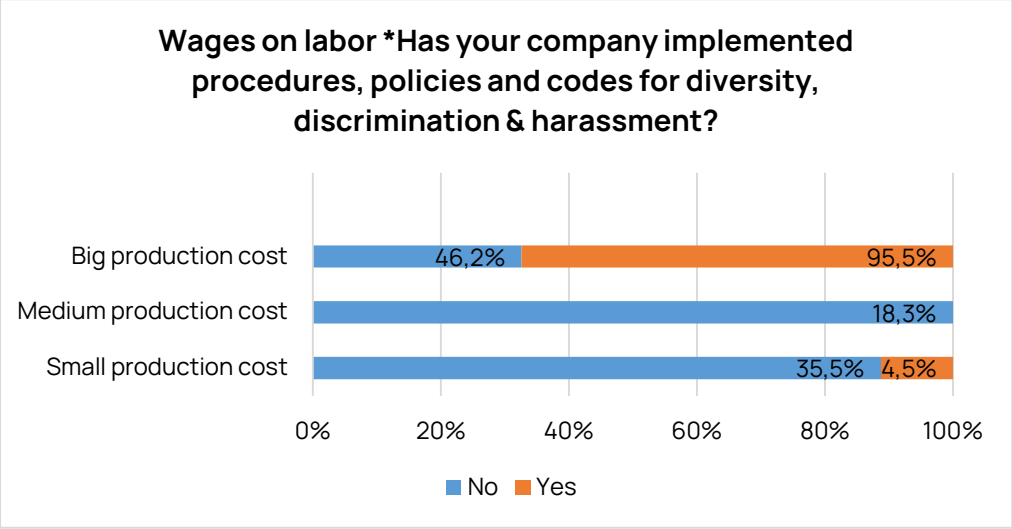


*Figure 17.4: Wages* procedures, policies and codes for diversity, discrimination &harassment*

The last relationship identified is again moderate in strength and is objectified in that businesses and farms that do not implement procedures, policies and codes to control and reduce pollutants from transport are more likely to consider labor costs to be high for them and to a lesser extent define them as low, while in the case of economic entities applying such instruments, to a greater extent, these costs are considered low and to a much lesser extent as high (Approx. Sign. = 0.000; Cramer's V = 0.393; Phi = 0.393).

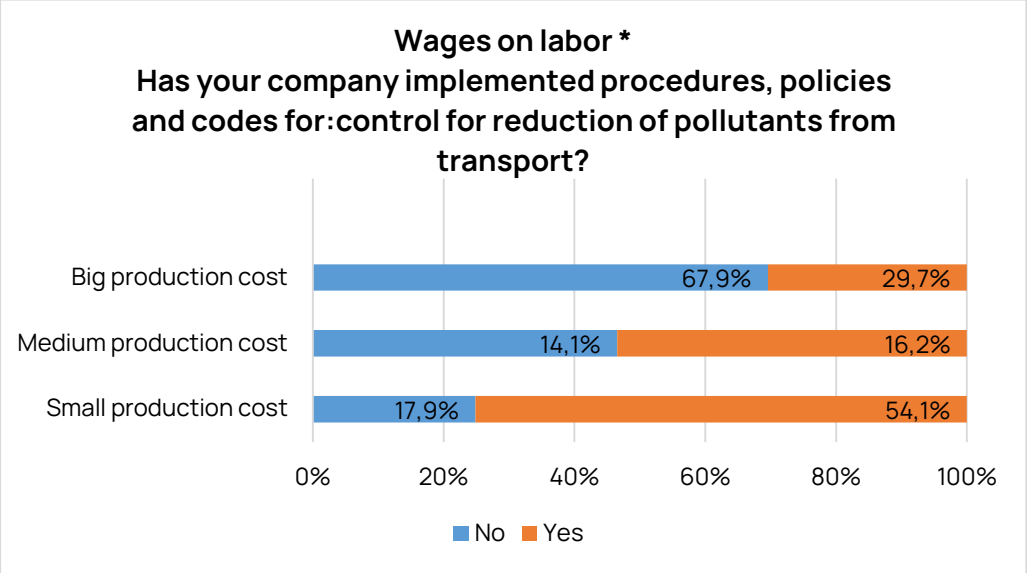


*Figure 17.5: Wages* procedures, policies and codes for reduction of pollutants from transport*



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The analysis of the data regarding whether the Bulgarian enterprises and agricultural holdings received consulting help indicate that this practice is not widespread, but nevertheless it is advocated and known. 55.7% of the respondents declared that they did not use consulting services, while the remaining 44.3% stated that the companies they were a part of used such services.

With regard to the costs of transport and logistics, it can be stated that the presence of weak statistically significant relationships is dominant. They explain the facts that enterprises and farms that do not operate in the field of packaging and trade declare that the costs of transport and logistics are high in the context of their functioning, unlike economic agents that fall precisely in these spheres of economic life. On the other hand, there is also a correlation with inflation costs. The identified relationship comes to show that where costs incurred by inflation are classified as "low" to the least extent and transport and logistics costs are declared as such. Another weak link comes to illustrate the fact that in enterprises and farms where problems related to education and training are reported, the costs of transport and logistics are thought to be high.

The level of education of the respondents also gives reason to conclude that there is a weak relationship between the variables. What is characteristic here is that among respondents with low education (i.e., less specialized spheres of economic life) the costs of transport and logistics are considered heavy, in contrast to respondents with higher education, who characterize to a lesser extent these costs as heavy.

The latter weak relationship comes to show that in businesses and farms where procedures, policies and codes are in place to take action to limit transport emissions to the smallest extent, costs are treated as low.


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The first moderate statistically significant relationship that is found regarding the burden of transport and logistics costs consists in the fact that the most likely to treat the costs as large are those of the respondents who do not know the nature of green practices, while the most likely to treat them as small/light are the respondents who are currently in the process of introducing green practices/technologies (Approx. Sign. = 0.001; Cramer's V = 0.318; Phi = 0.450). On the other hand, the most likely to treat transport and logistics costs as small are those respondents/enterprises in which they are currently developing green practices and technologies, compared to those who have/have not developed or those who do not have the competence to recognize them.

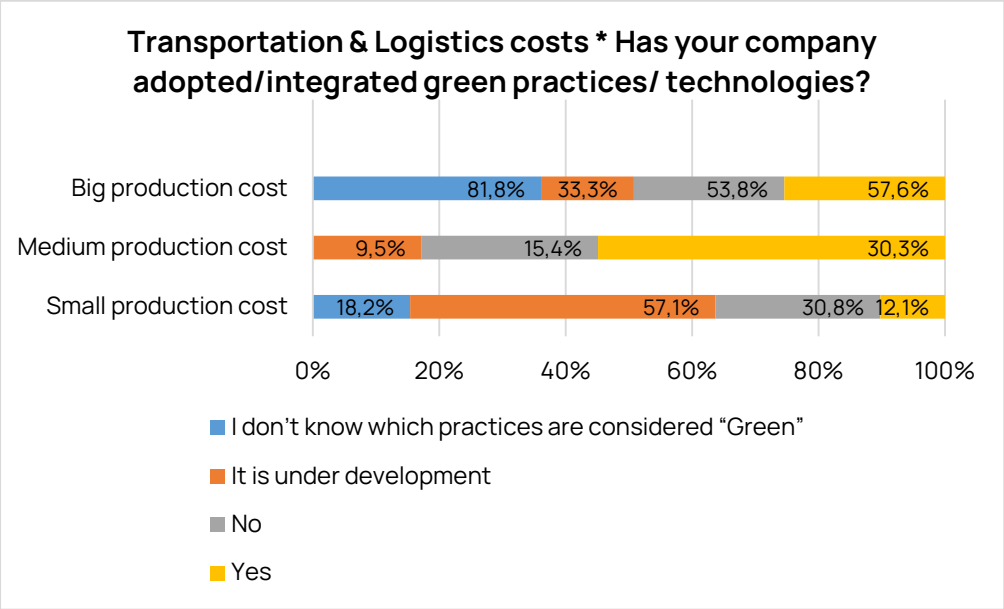


*Figure 17.6: Transportation & Logistics costs * integrated green practices*

The second more significant relationship for the research, due to its strength, gives the analysis reason to conclude that in the enterprises that consider energy costs to be high, to the smallest extent (compared to those that consider the same costs to be average or light) consider transport and logistics costs as heavy and mostly as low. On the other hand, in enterprises and farms where energy costs are medium and low, transport and logistics



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costs are considered high (Approx. Sign. = 0.000; Cramer's V = 0.347; Phi = 0.491).

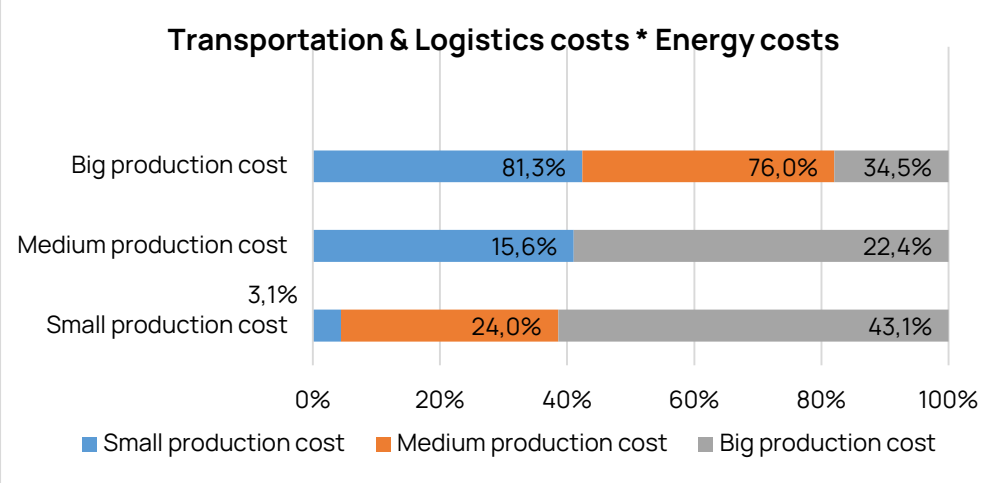


*Figure 17.7: Transportation & Logistics costs * energy costs*

The last link under analysis regarding transport costs comes to show that companies and farms that implement procedures, policies and codes for the prevention of discrimination and harassment in the workplace are more likely to rate transport and logistics costs as high and to a lesser extent as small (while those who do not apply such regulations (Approx. Sign. = 0.004; Cramer's V = 0.312; Phi = 0.312).

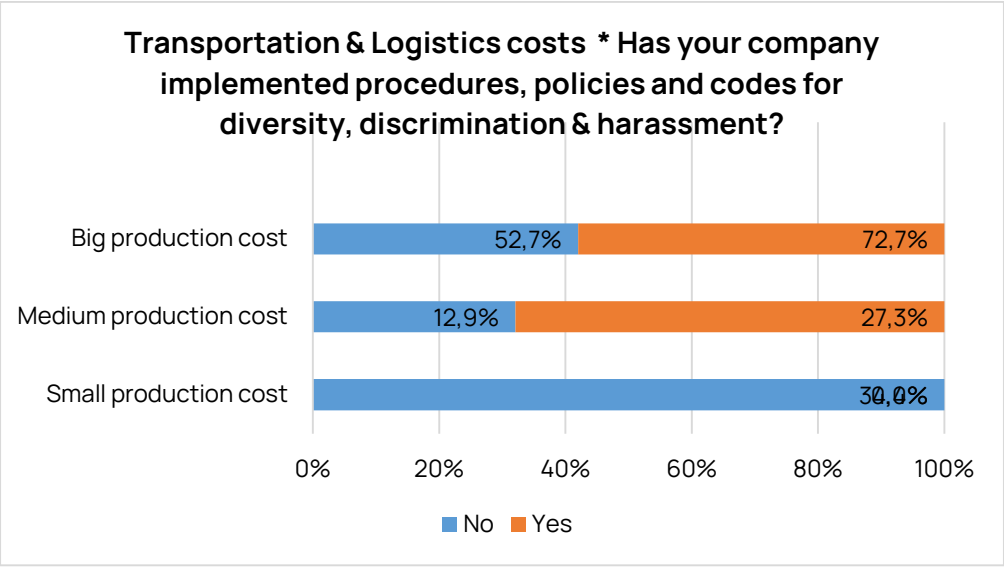


*Figure 17.8: Transportation & Logistics costs * procedures, policies and codes for diversity, discrimination & harassment*



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When analyzing the statistically significant relationships in terms of maintenance costs, parity between weak and stronger relationships can be observed. A statistically significant relationship is observed regarding membership in branch organizations. What is specific here is that in enterprises and farms in which participation is not found, the maintenance cost is considered to a greater extent significant and to a lesser extent insignificant, compared to the enterprises and farms that are members of such organizations.

The remaining two weak links are objectified in the fact that in enterprises and farms in which there are no problems with regard to human resources, maintenance costs are considered high, while where such problems are present, the same costs are predominantly considered low; and also that maintenance costs are preferentially treated as heavy by enterprises and farms where staff education is lower.

The first identified relationship gives reason to state that for enterprises that fall into the field of logistics, consider to a greater extent that maintenance costs are significant and to a lesser extent insignificant. For those who do not fall into this sphere of economic life, the opposite relationship is observed, the rest vice versa (Approx. Sign. = 0.004; Cramer's V = 0.312; Phi = 0.312).



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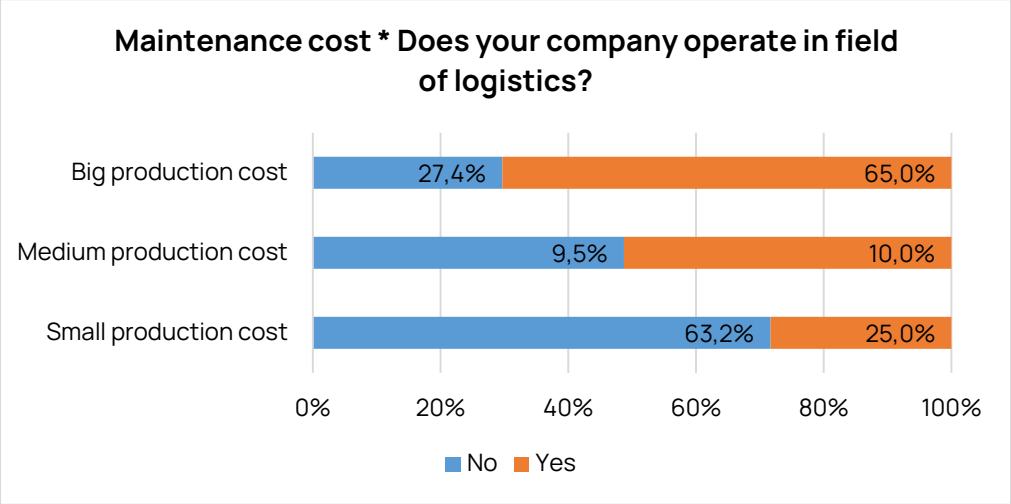


*Figure 17.9: Maintenance costs * logistics*

The second moderating relationship that is the subject of the analysis sheds light on how enterprises and farms implementing a strategic development plan treat maintenance costs. In this sense, it can be concluded that those of them who implement such plans to a greater extent believe that maintenance costs are a major production expense, while those business entities who do not implement such plans are more likely to consider, that it is a low production cost (Approx. Sign. = 0.002; Cramer's V = 0.324; Phi = 0.324).

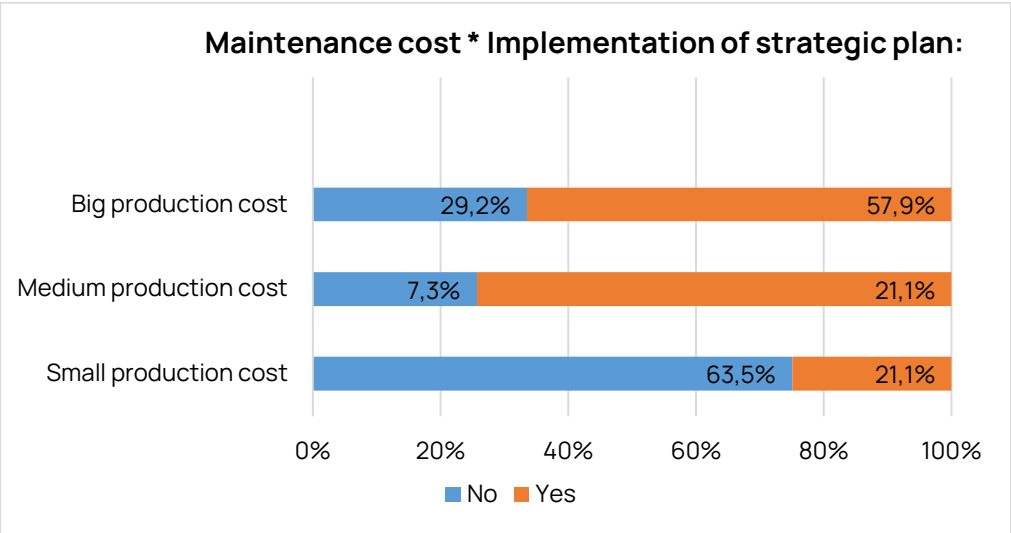


*Figure 17.9: Maintenance costs * strategic plan*



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The data in the figure below in the text suggests that the identified moderate statistical relationship between maintenance costs and willingness to realize synergy with stakeholders in the agri-food sector can be explained by the fact that enterprises and farms in the cross-border region that do not can confirm that they are open to synergy are more likely to treat maintenance costs as large and to a lesser extent as small compared to those who declare readiness for synergy (Approx. Sign. = 0.001; Cramer's V = 0.354; Phi = 0.354).

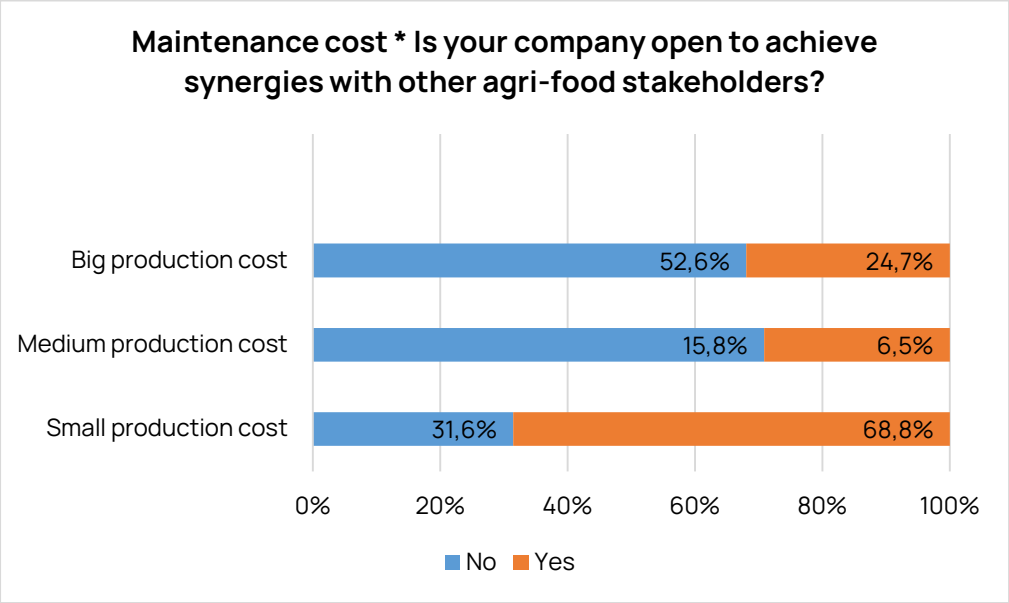


*Figure 17.10: Maintenance costs * synergies*

The penultimate moderating relationship under analysis is that enterprises and farms experiencing significant business management problems are more likely to perceive their maintenance costs as significant and to a lesser extent as insignificant, compared to those businesses that do not experience similar problems (Approx. Sign. = 0.000; Cramer's V = 0.388; Phi = 0.388).



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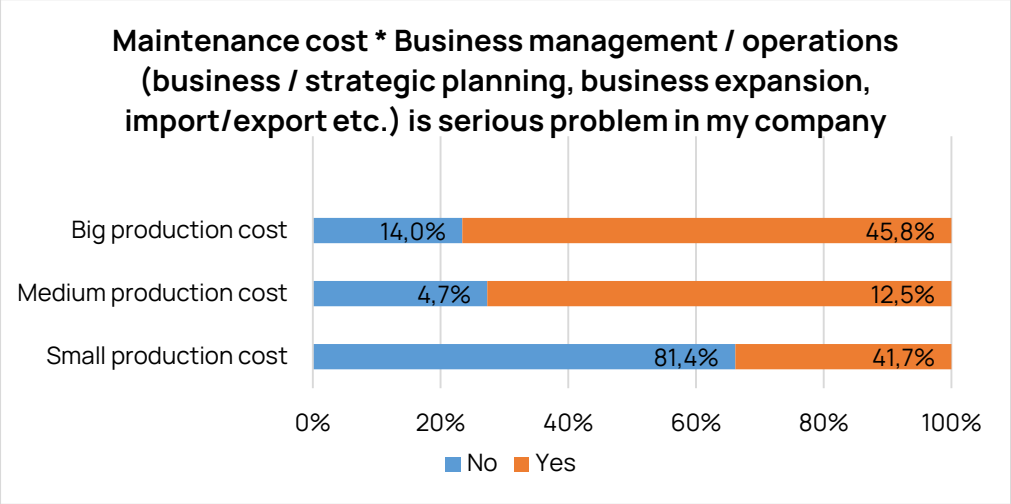


*Figure 17.11: Maintenance costs * business management*

The last statistically significant relationship discussed in the text allows the analysis to find that enterprises and farms that do not experience significant environmental problems are more likely to claim than economic entities that experience significant environmental problems , that maintenance costs represent a high proportion of production costs, while at the same time stating to a lesser extent that they are a light cost. (Approx. Sign. = 0.002; Cramer's V = 0.328; Phi = 0.328).

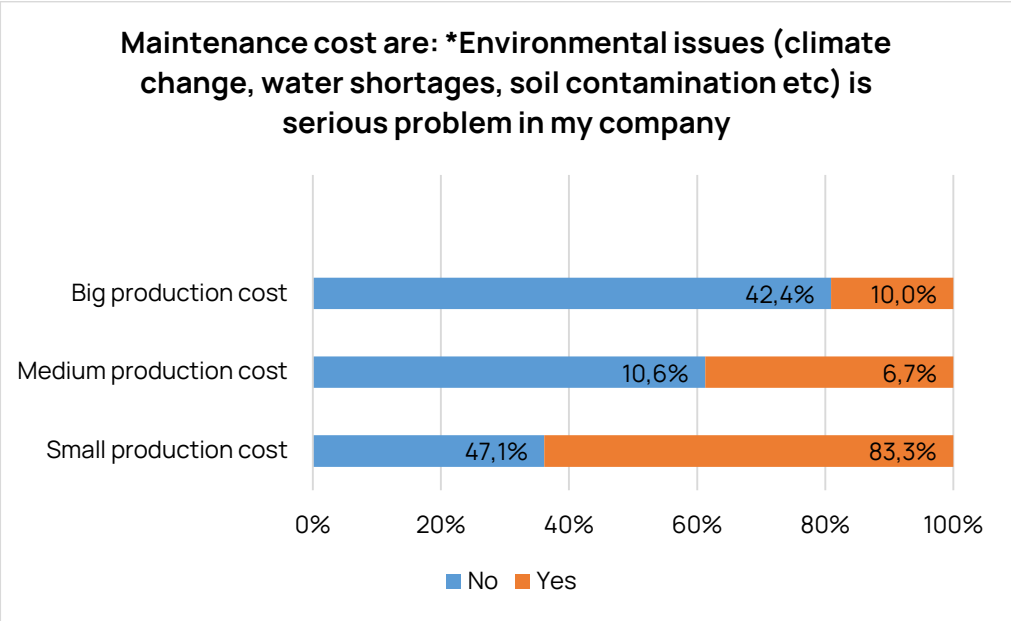


*Figure 17.12: Maintenance costs * environmental issues*



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The analysis of the attitude towards the costs of raw materials and auxiliary materials clearly shows that the responses of the respondents are generally more consistent despite the differences and the statistically significant relationships found are mostly weak. They, in turn, reflect the fact that enterprises and farms that carry out economic activity in the field of packaging consider the costs of raw materials and auxiliary materials to be heavier, while those that do not work in this area treat them as lighter. On the other hand, enterprises and farms not working in the field of logistics are more likely to state that these are large costs for them, while for economic agents operating in this field, this type of cost is not essential.

The continuation of the analysis shows that in the enterprises and farms that are open to synergy; in those where human resource issues are considered significant and where procedures, policies and/or codes are in place regarding a documented food management system, raw material costs are treated as major costs.

The last weak link, which is the subject of the present analysis, comes to explain the fact that in those enterprises and farms in which energy costs are considered low, the costs of raw materials and auxiliary materials are least likely to be considered high, and there where energy costs are treated as medium, the costs of raw materials and auxiliary materials are declared high.

The interpretation of the only statistically significant relationship regarding the costs of raw materials and materials gives reason to state (quite reasonably and expectedly) that enterprises and farms that work in the field of production treat this type of costs mainly as high, while for the other group of enterprises they are overwhelmingly low (Approx. Sign. = 0.000; Cramer's V = 0.447; Phi = 0.447). This gives reason to conclude that this high


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burden of these costs is characteristic of enterprises and farms that are oriented towards production, while for those outside this area it is most characteristic to consider that these are low costs in the context of the development of their companies.

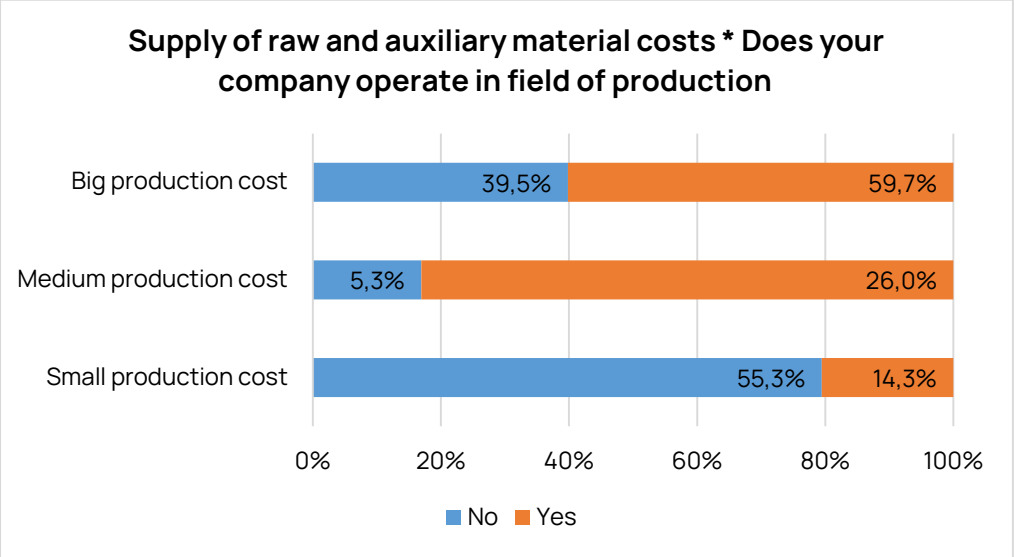


*Figure 17.13: Material costs * production*

The analysis of the data continues with the finding that in terms of administrative costs there are no statistically significant relationships that can be validated as reliable as the main hypothesis for this postulates that the factors for this are the structure of the responses, the sample size and/or the combination of the two factors.

In contrast to the previous few cases, when analyzing the costs that are caused by inflation, a great degree of differentiation is observed in terms of the answers of the respondents. There are many weak associations, but not a few moderate statistically significant associations. In terms of weak ties, it can generally be concluded that men; enterprises that have implemented green practices/technologies; the enterprises that received consulting services as a priority consider that the costs caused by inflation are high for them.



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On the other hand, statistically significant relationships are observed between the attitude towards inflation costs and the costs of labour, transport and logistics and energy. In this sense, it can be noted that in enterprises and farms in which labor costs are considered the smallest expense; transport and logistics costs are the smallest; energy costs are considered medium, the costs caused by inflation are considered high.

In addition to this, it should be noted that in enterprises and farms in which there are no implemented procedures, policies and codes for the prevention of discrimination and harassment in the workplace, priority consider that the costs caused by inflation are high for them, compared to those that who have not developed while people without opinion about the benefits of using operational business tools. They state that, for them, the costs that arise as a result of inflation are, at the very least, light.

The first moderated relationship that is considered in this part of the analysis shows that the attitude towards the costs caused by inflation is found depending on whether an organization is a member of an industry organization aimed at supporting business (Approx. Sign. = 0.003; Cramer's V = 0.314; Phi = 0.314). In this sense, it can be stated that for enterprises and farms that are members of branch organizations, it is far more typical to consider that the costs that arise as a result of inflation are large and, to a lesser extent, small to bear, while for non-members, the ratio is inversely proportional.


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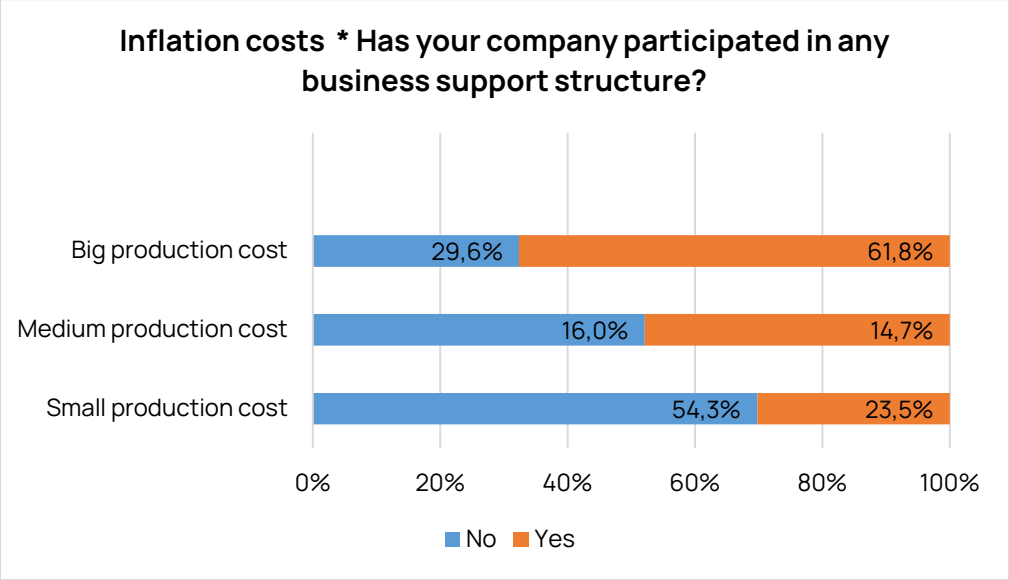


*Figure 17.14: Inflation costs * business support structure*

The following relationship, subject to analysis, gives reason to conclude that enterprises and farms open to synergy predominantly treat the costs that arise from inflation as large, while those that cannot be said to be open to synergy in more to a large extent, they believe that the costs incurred by inflation are low for them (Approx. Sign. = 0.000; Cramer's V = 0.368; Phi = 0.368).

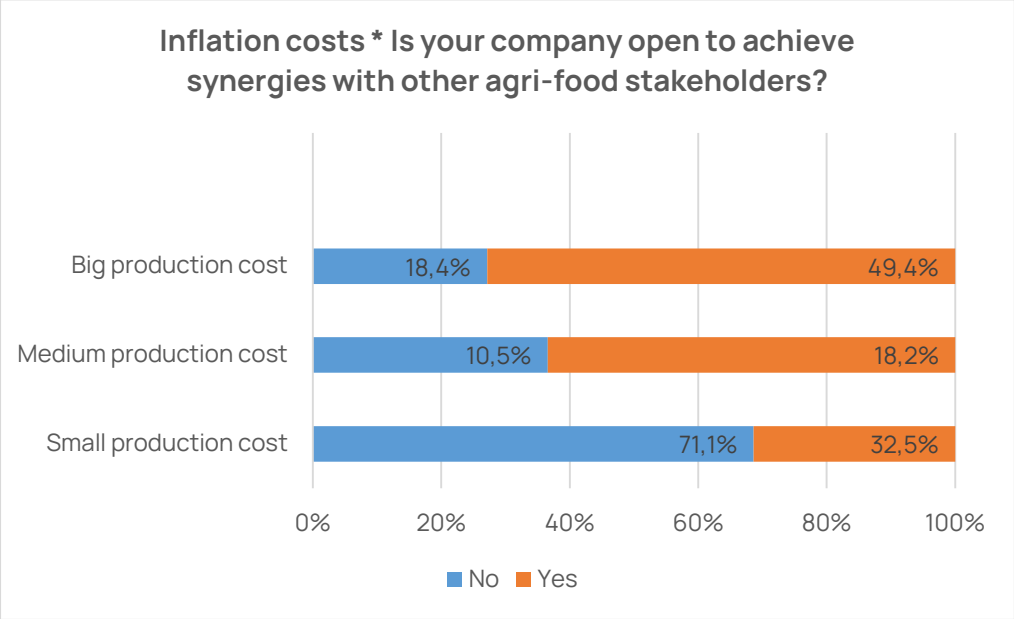


*Figure 17.15: Inflation costs * synergies*



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A moderately statistically significant relationship is also observed between the attitude towards the size of the costs resulting from inflation and the attitude towards marketing as a problem area for the enterprises and farms participating in the study (Approx. Sign. = 0.005; Cramer's V = 0.304; Phi = 0.304). In this sense, the data is unequivocal that enterprises that do not experience significant problems in the field of marketing are more likely to consider the costs that arise as a result of inflation as large, while enterprises and farms that experience significant problems in marketing are more likely to claim that costs incurred as a result of inflation are a small part of their total costs.

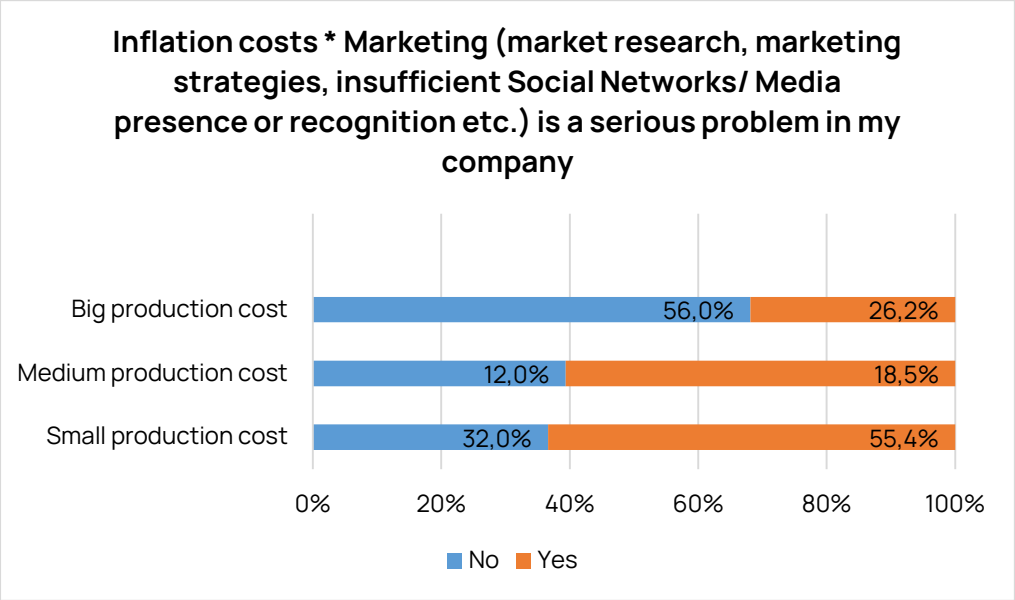


*Figure 17.16: Inflation costs * marketing*

The relationship between inflation costs and another problem area - that of human resources - is statistically significant (Approx. Sign. = 0.003; Cramer's V = 0.315; Phi = 0.315). The relationship is objectified in the fact that it is typical for the costs subject to the analysis to be defined as large for enterprises and farms in which human resources are defined as large. On the other hand, in enterprises and farms where there are no significant



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problems in the field of human resources, they overwhelmingly share that the costs incurred by inflation are low.

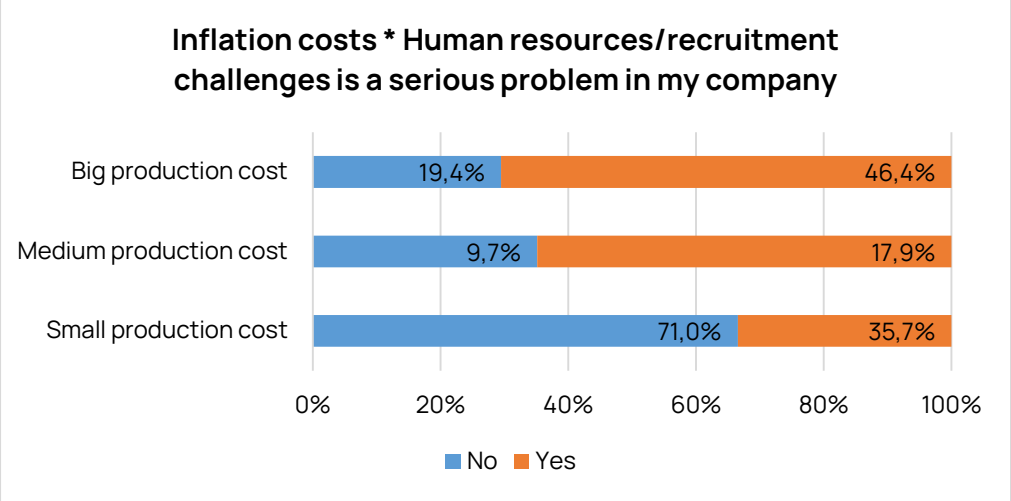


*Figure 17.17: Inflation costs * human resources*

The penultimate relationship identified in this part of the text illustrates the fact that in enterprises and farms in which environmental problems are considered significant (Approx. Sign. = 0.001; Cramer's V = 0.345; Phi = 0.345) are more likely to treat the costs arising from inflation as large, while those of them who did not consider the same problems to be significant were more likely to view the costs arising from inflation as small.

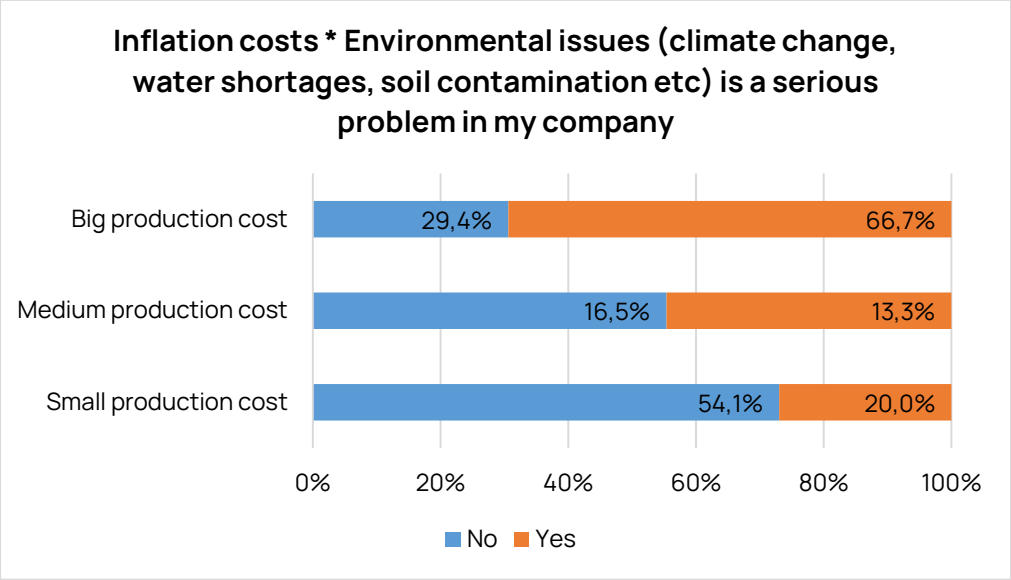


*Figure 17.18: Inflation costs * environmental issues*



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The last significant statistically significant relationship regarding the costs caused by inflation is objectified in the fact that for enterprises and farms in which business management does not represent a significant problem, it is more typical to answer that the costs subject to the analysis are heavy (Approx. Sign. = 0.000; Cramer's V = 0.427; Phi = 0.427).

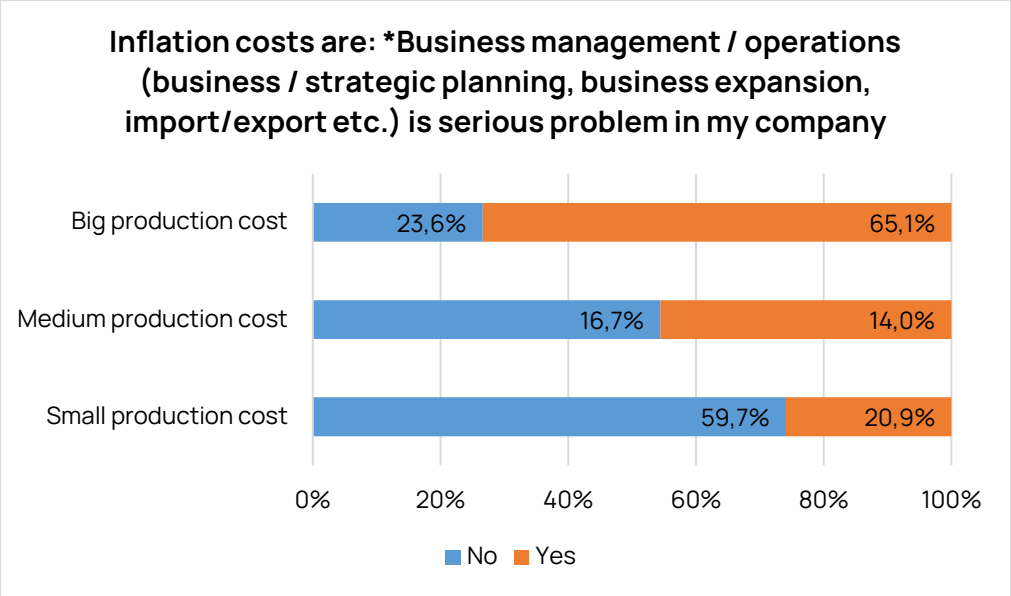


*Figure 17.19: Inflation costs * business management*

Regarding the answers on energy costs, it should be noted that they are differentiated from the answers on a number of other questions. The presence of weak links dominates, which is objectified in the fact that enterprises and farms working in the field of packaging and trade to a greater extent consider energy costs as high compared to those that do not operate in these fields.

Another aspect in which the weak links are revealed is objectified in that the enterprises and farms in which they are currently developing green practices and technologies to the greatest extent are considered to have high energy costs, while those that do not opinion to the least extent consider this type of expenditure to be large and to the greatest extent to be small.



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On the other hand, statistically significant relationships are observed between attitudes towards energy costs and costs of raw materials and those of inflation, showing that where material costs appear as a large expense, energy costs are indicated as low, while in terms of inflation, it can be concluded that where inflation costs are a large cost, energy costs are mostly reported as average. I.e. responses regarding energy being a high cost were not driven by the rate of input costs and/or inflation.

The last point of the analysis of the weak links comes to show that for this group of respondents, for whom the existing mechanisms are not sufficient to provide support to the enterprises in which they are located, they are the least likely to consider that energy costs are a large cost, unlike the others, where the percentages are slightly higher. On the other hand, it can be concluded that in enterprises and farms in which the implementation of a strategic plan is not observed to a greater extent, energy costs are treated as large costs and to a lesser extent as small costs, compared to those where it is observed implementation of a strategic plan.

Analysis of moderated relationships revealed three such. The first of them (Approx. Sign. = 0.004; Cramer's V = 0.312; Phi = 0.312) explains the fact that for enterprises and farms in which marketing is not a problem area, they are more likely to declare that energy costs are high, while it is typical for enterprises and farms where marketing is a problem to state that energy costs are low, but the more significant difference lies in the fact that for companies that do not declare significant problems in the field of marketing, the costs of energy are the smallest production costs compared to the other two groups.


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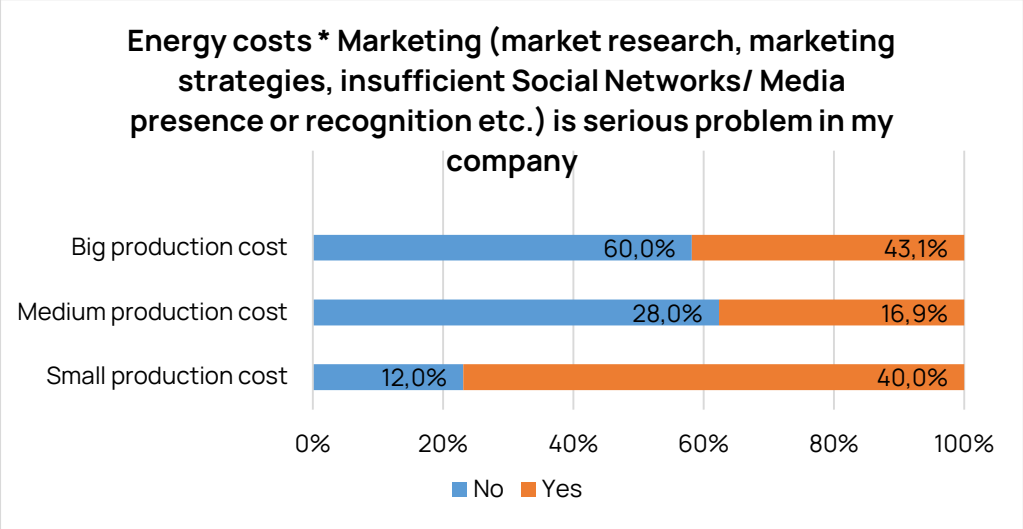


*Figure 17.20: Energy costs * marketing*

The second moderate relationship observed in the text highlights the fact that between the answers to the question dedicated to energy costs and the costs of transport and logistics are found in relations of connectivity (Approx. Sign. = 0.000; Cramer's V = 0.491; Phi = 0.347). The relationship is expressed in the fact that in the economic entities where the costs of transport and logistics represent a large share of the total costs, there is the least tendency to state that the costs of energy are a large share, while where the costs of transport are a negligible part of the total costs at the least, the energy costs are said to be small.

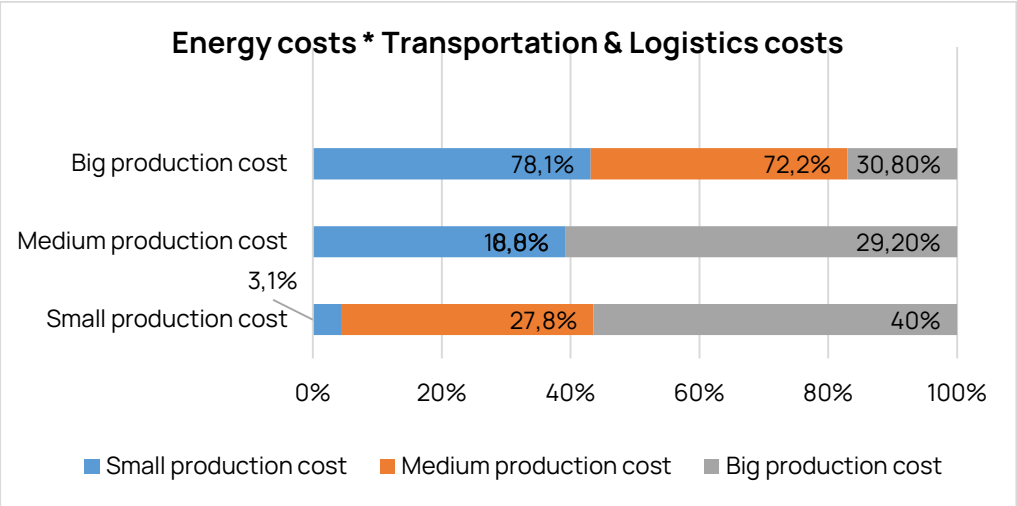


*Figure 17.21: Energy costs * logistics costs*



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The last link subject to the analysis of costs explains makes it possible to state that in enterprises and farms where procedures, policies and/or codes have not been developed for the prevention of discrimination and harassment in the workplace, they are more likely to answer that the costs for energy is a big expense for them (Approx. Sign. = 0.000; Cramer's V = 0.451; Phi = 0.451).

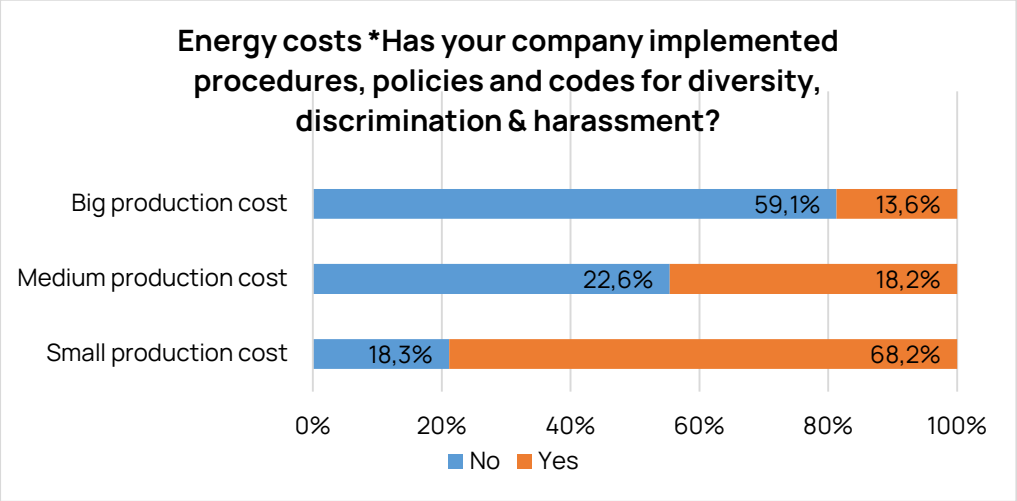


*Figure 17.22: Energy costs * procedures, policies and codes for diversity, discrimination & harassment*

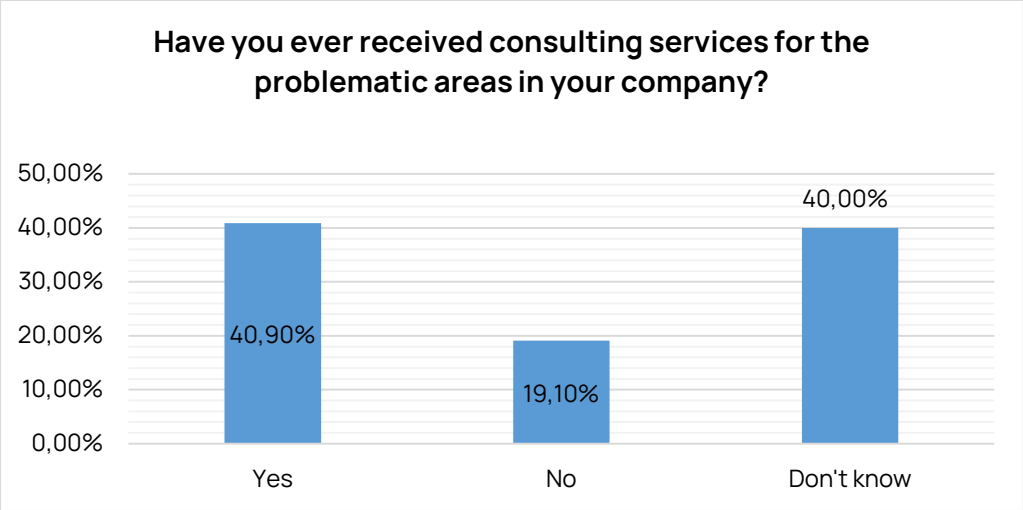


*Figure 18: Have you ever received consulting services for the problematic areas in your company?*



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The first statistically significant relationship that stands out is between receiving counseling support and gender of respondents (Approx. Sign. = 0.022; Cramer's V = 0.213; Phi = -0.213). The strength of the relationship between the two variables is weak. From the data in Figure 18.1, it is clear that the specificity of the relationship is that in companies where more men work, they are more likely to seek external expertise in the course of their operation. From the data in the figure below, it can be clearly seen that more than half of the men declare that the companies they work in use external expertise, while only 1/3 of the women can declare the same.

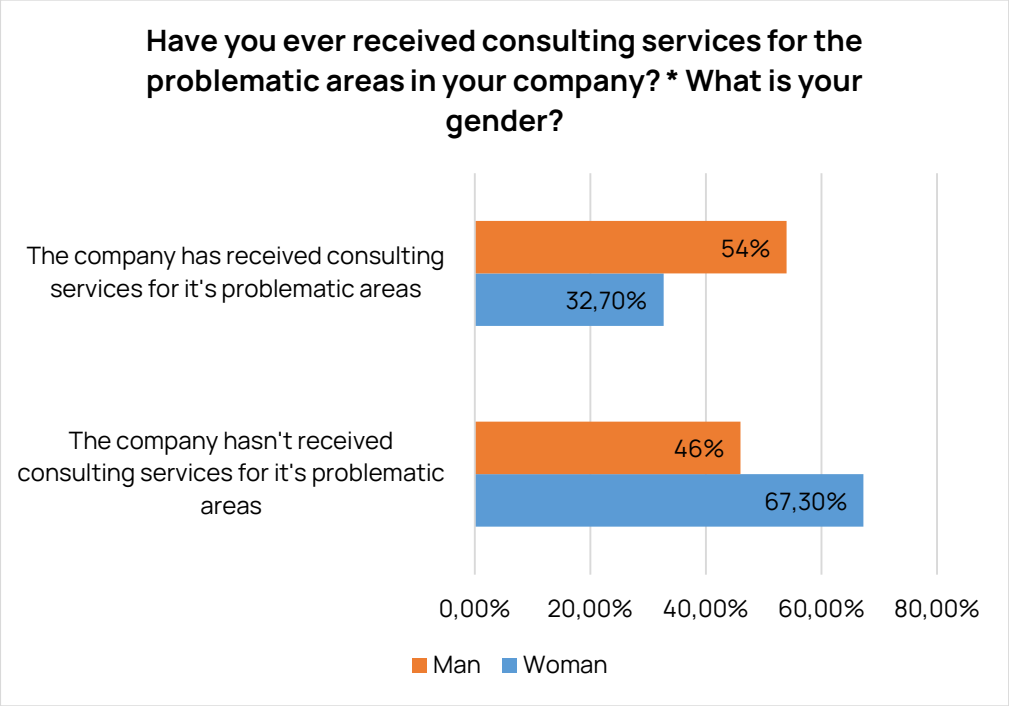


*Figure 18.1: Consulting services * gender*

Another identified statistically significant relationship is that between the variable "receipt of consulting services" and the period of operation of the companies (Approx. Sign. = 0.034; Cramer's V = 0.301; Phi = 0.301). Data on the strength of the association suggest a weak to moderate association between them. The data is conclusive that as the period of activity of a company increases, so does the use of external expertise. For example, only 14.3% of all companies that are in the first three years of their development



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received such services. The relative share of companies receiving consulting services shows (more than) double growth for companies that have been on the market between 3 and 5 years and reaches 30.40%, and for the next group - those that already have solid market positions (companies operating on the market between 5 and 10 years) almost half of them use consulting services. In the case of the most established companies on the market, in this case those that have been operating for between 10 and 20 years and those that have been present for more than 20 years, it can be seen that more than half of them already use consulting services. This gives reason to think that the period of activity is a fundamental factor in the use of consulting services.

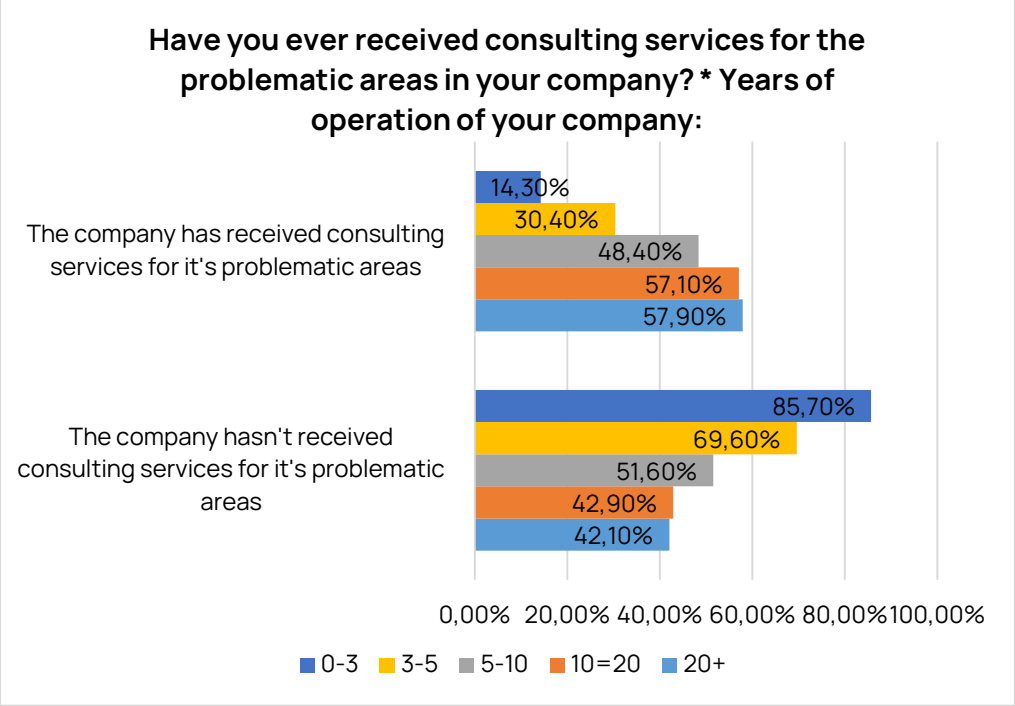


*Figure 18.2: Consulting services * years of operation*

The next statistically significant relationship is found when observing the answers to the receipt of consulting services and (Approx. Sign. = 0.000; Cramer's V = 0.381; Phi = 0.381) and whether the enterprises and farms participating in the research are members of branch organizations. The analysis of the data located in the figure below in the text unequivocally



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shows that it is more typical for enterprises and farms participating in branch organizations to receive consulting assistance.

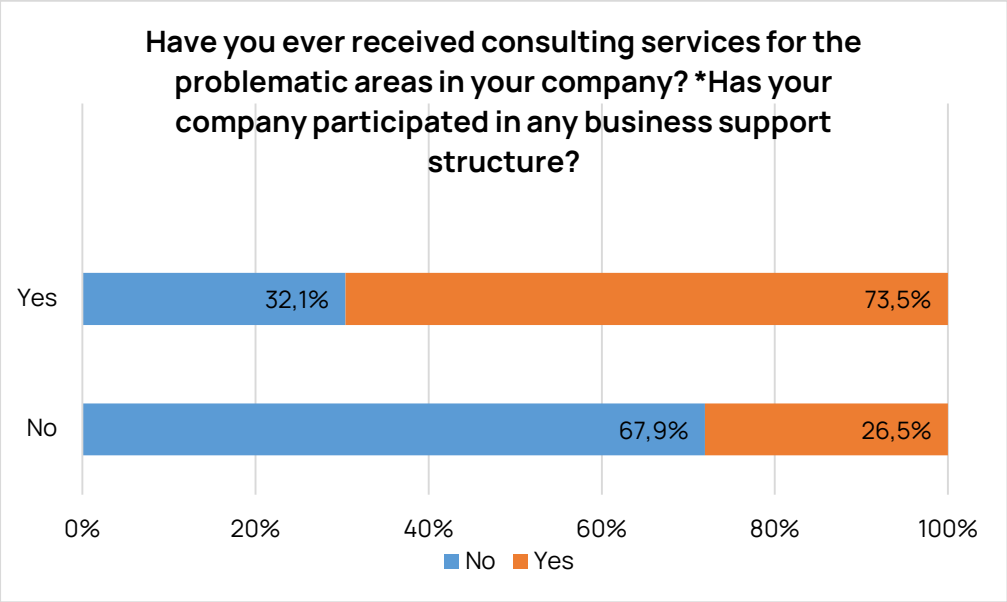


*Figure 18.3: Consulting services * business support structure*

Another important dependence that is revealed in the text comes to show that enterprises and farms that follow a strategic development plan are more likely to declare that they received consulting support and (Approx. Sign. = 0.000; Cramer's V = 0.404; Phi = 0.404).

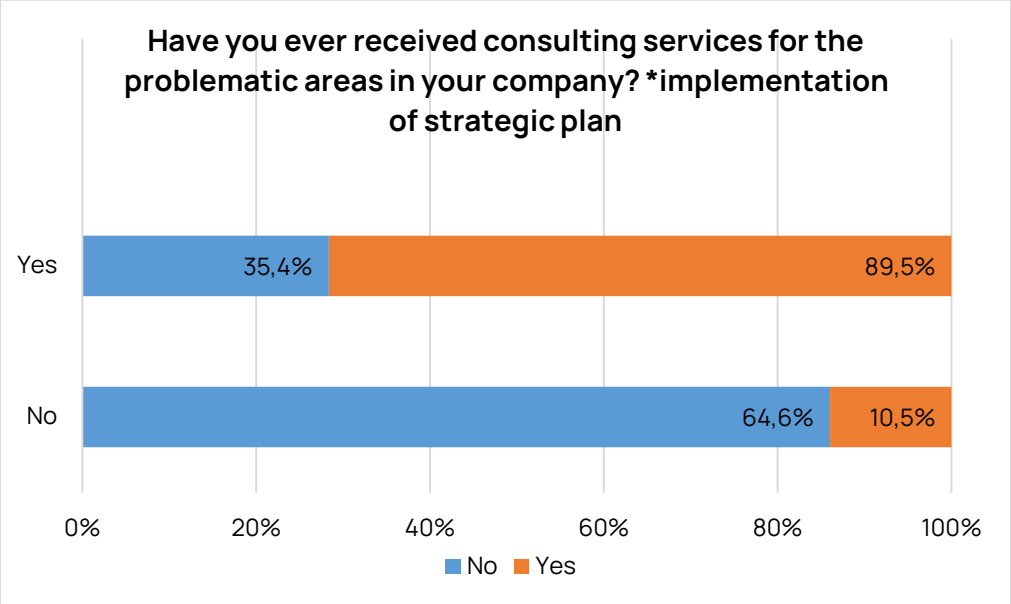




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*Figure 18.4: Consulting services * strategic plan*

The data from the research gives reasons to conclude that one of the main barriers that prevent enterprises and farms from the agri-food sector in the cross-border region from seeking help for consulting services is their cost. By asking what are the main barriers that prevent you from seeking help for your problems, 35.7% of those asked indicate that the price of consulting services is a main barrier. Apart from that, the analysis of the barriers found that the most serious one consists in the fact that the existing possibilities and support mechanisms do not provide a complete solution to the problems faced by companies and farms (42.6% of the respondents share this), and the smallest is the share of the group that believes that the lack of expert potential to identify problems is the most serious barrier, with the relative share of responses equaling 21.7%.

In addition to this, the presence of several weaker links can be found, which give reason to conclude that in enterprises and farms where business management is not a significant problem; who experience problems in accessing a foreign market; which treat costs for inflation and where supply chain control procedures, policies and codes are implemented are more likely to report having received consultancy assistance.

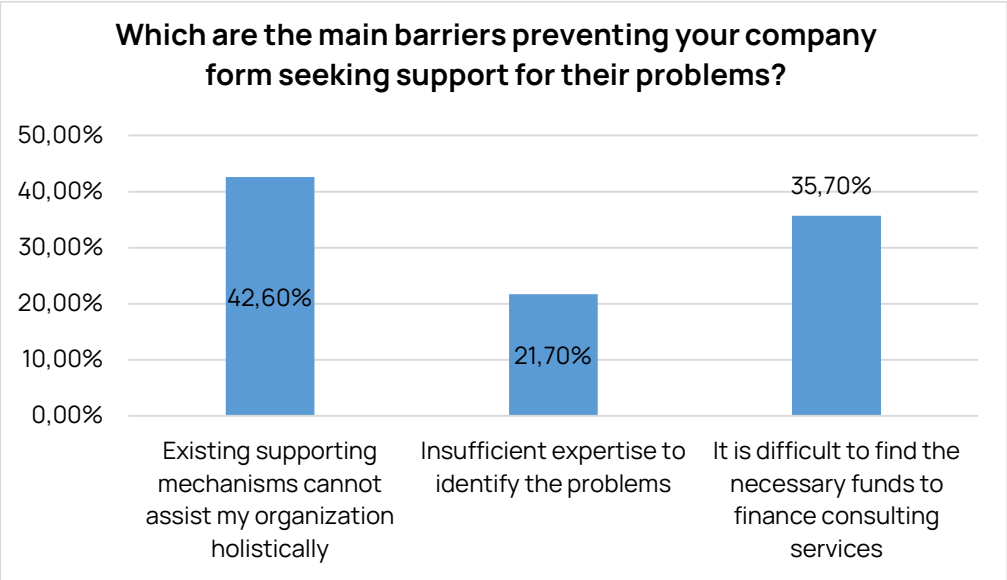




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*Figure 19: The main barriers preventing a company form seeking support for their problems*

The analysis for the presence of statistically significant relationships makes it possible to bring more clarity to the issue of the main barriers that prevent the enterprises and farms from the agri-food sector in the cross-border region that participated in the research to seek help for their problems. In this sense, it can be seen that the barriers are gender-determined, as far as the presence of a weak relationship between the barriers that hinder enterprises and farms from the agri-food sector and the gender of the respondents is found (Approx. Sign. = 0.036; Cramer's V = 0.240; Phi = 0.240). The data show that the answer that the existing mechanisms do not present a complete solution to the problems is not influenced by the gender of the respondents, but the others are influenced. In this sense, it is necessary to say that it is more typical for women to encounter barriers, which are objectified in the fact that there is no expert potential in the enterprises to detect and define the problems, while for men the bigger problem is lies in the fact that they can hardly provide funds for consultancy support. This is to a certain extent reasonable, logical and expected, since it was previously established that it is men who are more likely to receive (which implies also to seek) counseling help.

In view of the presence of the relationship, it can be hypothesized that the chances of finding barriers in terms of expertise deficits in terms of identifying organizational and other problems are higher in the enterprises that participated in the study, which are dominated by women , while where the presence of men predominates, the main barriers will be reduced to the provision of funds for counseling assistance, inasmuch as the definition of the main barrier is gender determined (albeit weakly), as shown.



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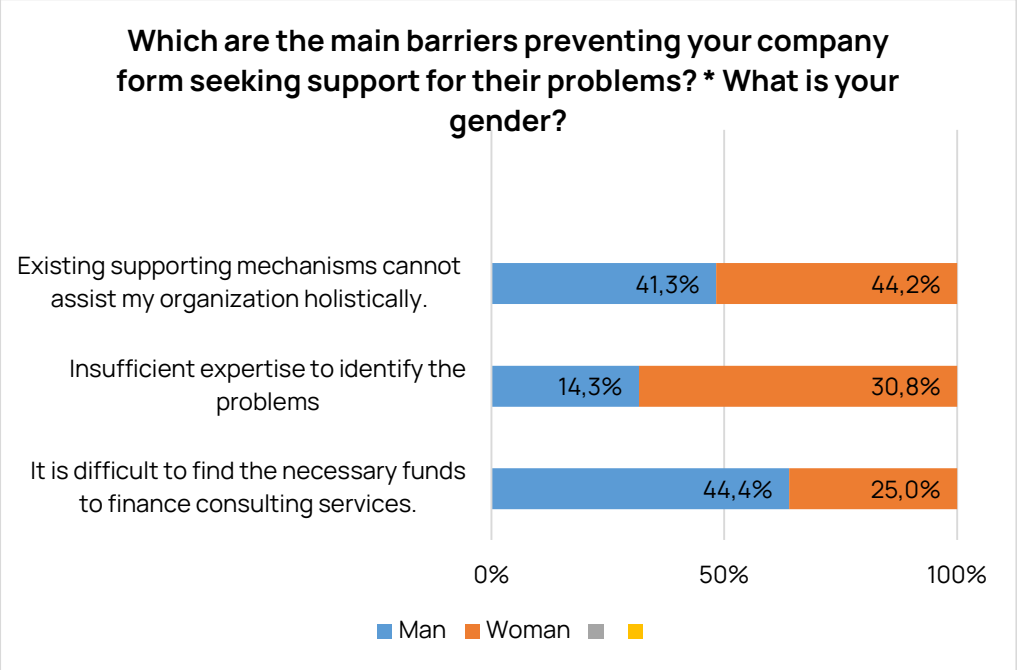


*Figure 19.1: Main barriers * gender*

The second identified statistically significant relationship on the topic of the main barriers preventing companies from the Agro-Food Sector in the Cross-Border Region, which can be considered reliable, is observed when crossing with the question of whether the companies operate in the field of logistics. In this sense, it can be concluded that whether a company carries out activities in the field of logistics predisposes the respondents to answer what are the main barriers it encounters (Approx. Sign. = 0.003; Cramer's V = 0.315; Phi = 0.315). In view of the levels of Phi and Kramer values, it can be said that the strength of the established relationship is moderate, i.e. whether an enterprise or farm operates in the field of logistics has a significant influence on which barrier is most specific to it.

Differences arising from the perspective from which the answer is given (i.e. whether business entities are involved in logistics) to the main barriers question are highlighted in Figure 19.2. From there it is clear that the indication of the insufficient expertise to identify the problems is to the smallest extent a characteristic response for the enterprises that



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participated in the research, which do not operate in the field of logistics, while for those that operate in this area, this is the most characteristic and a distinct barrier preventing them from seeking help for their development. In addition to this, it can be stated that other types of possible barriers are more typical for enterprises that do not operate in the field of logistics.

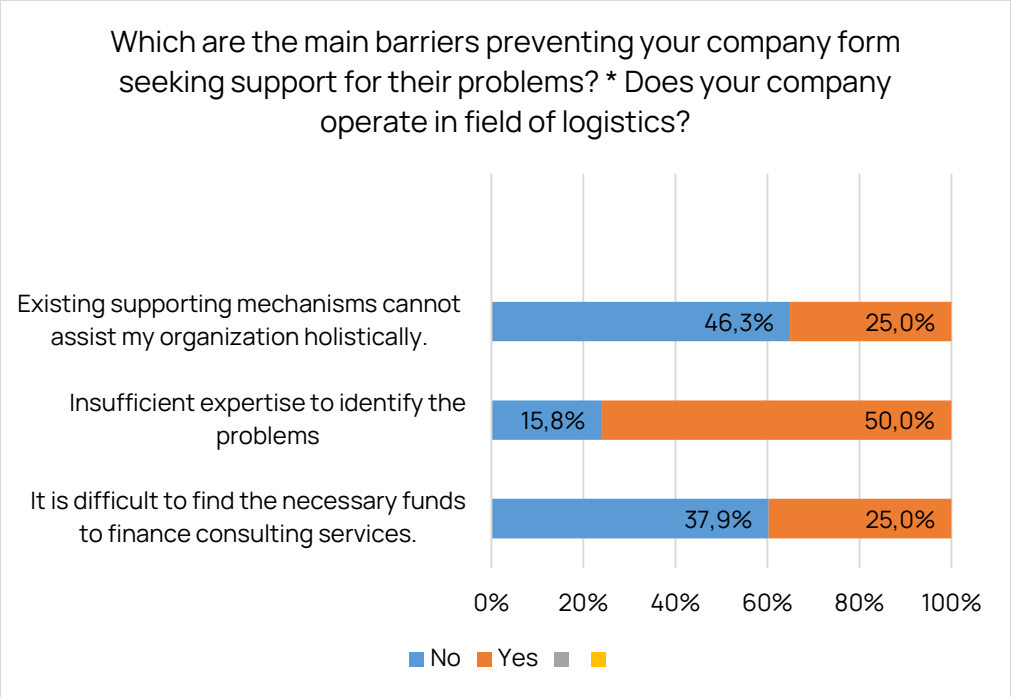


*Figure 19.2: Main barriers * logistics*

A similar statistically significant relationship is found between the answers to the question, what are the main barriers that stop the enterprises and farms from the agri-food sector, which participate in the research, from seeking help to solve their problems, and the answers to the question, whether the companies of which the respondents are a part perform economic activity in the field of trade. The statistically significant relationship recorded (Approx. Sign. = 0.002; Cramer's V = 0.327; Phi = 0.327) is moderate in strength.

And here, like the companies operating in the trade sphere, the biggest difference in the answers is registered regarding the lack of expertise to identify the problems facing the companies. As we can see in figure 19.3, it



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is least common for non-trading companies to indicate that the main barriers are related to deficits, not personnel. The difference in the relative shares between the two groups of respondents is almost 3 times, i.e. respondents working in enterprises in the field of trade are almost 3 times more likely to state that the inability of the staff to identify current problems in the enterprises, which comes to show that this choice is differentiated by whether the enterprises carry out activity in the field of trade.

The other identified difference is observed regarding the opinion that the existing mechanisms cannot fully help the enterprises and farms in the agri-food sector from the cross-border region that participated in the study. The data give reason to conclude that this barrier is to a very small extent more specific to business entities that do not fall into the trade sector. And as a final finding, the fact that the barriers related to the provision of advisory support are more characteristic of economic agents who do not carry out activity in the field of trade or not should be brought out.

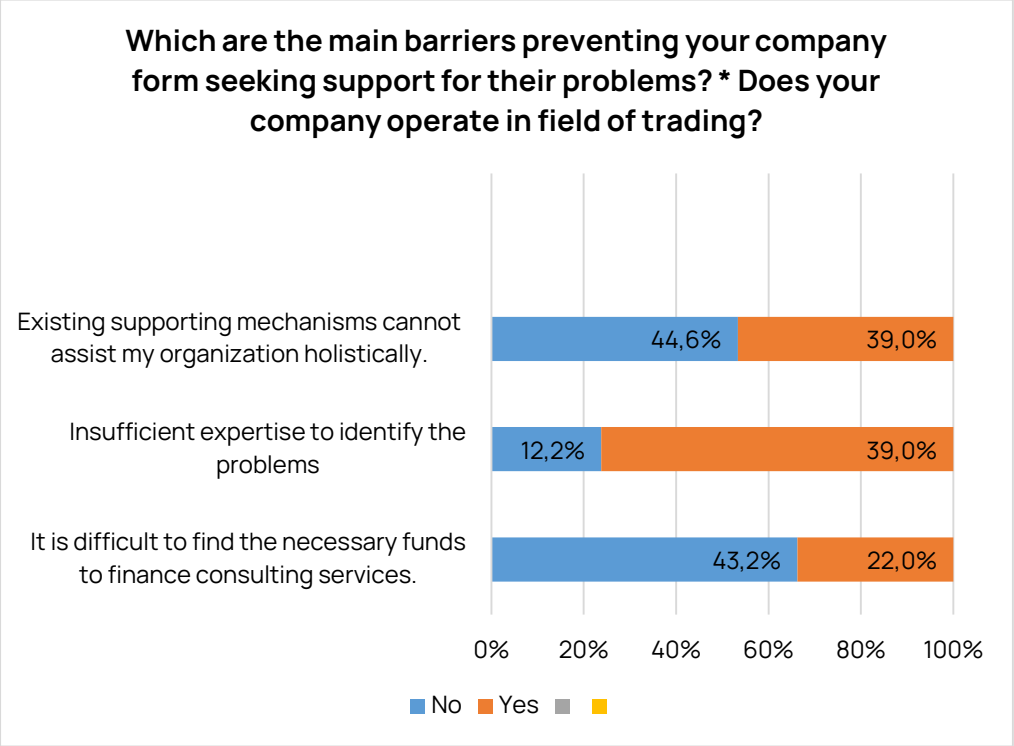


*Figure 19.3: Main barriers * trading*



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Although weak, statistically significant is the relationship that informs that in enterprises and farms where energy costs are low, they are most likely to declare that the existing support mechanisms cannot provide a complete solution, where the same costs are overwhelmingly treated as medium are the most likely to state that deficits in staff's inability to identify problems is a major barrier, while businesses and farms with low energy costs are the least likely to say the same. It is most typical for enterprises and farms where energy costs are high to indicate that it is difficult to secure funds for consulting services.

The last statistically significant relationship that is registered in the text comes to show that in enterprises and farms where procedures, policies and codes are applied in the area of the documented food safety management system, they are more likely to note that the existing mechanisms for support cannot provide a comprehensive solution to the problems of their enterprises and farms, while they are less likely to indicate that they experience difficulties in finding funds for consultancy services.

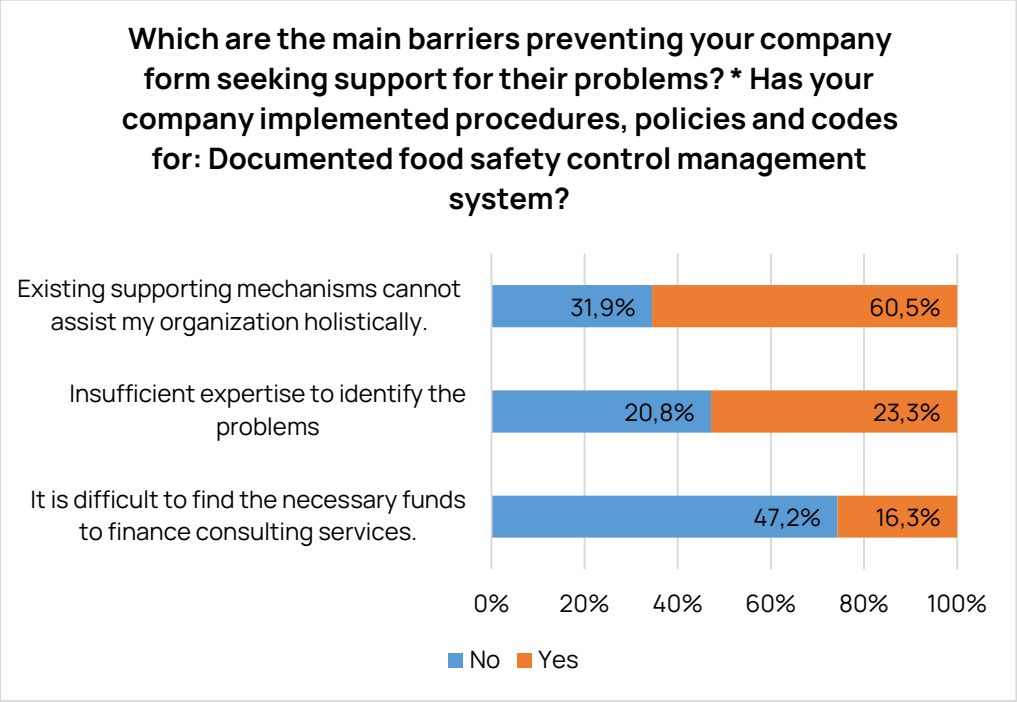


*Figure 19.4: Main barriers * food safety*



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The share of respondents who can declare participation in business support organizations is low and equals less than 1/3 of all participants. The conclusion that can be drawn is that the participation in such structures is a poorly represented practice, among the enterprises from the cross-border region that were included in the study, as only 29.6% of the respondents answered positively, and over 70% noted that they did not have such an experience. In this sense, it can be concluded that for a huge group of the enterprises and farms that participate in the research, the positives of inclusion in such organizations as creation of cooperation networks, increase of expert potential, representation, etc. remain unavailable. There are many possible factors that lead to this distribution. Among them may be those that are characteristic of the enterprises and farms themselves, such as the lack of organizational culture and/or ignorance of the activities of this type of organization, the low readiness for cooperation and participation; the judgment that the benefits may not be significant, etc. On the other hand, the problems can also be on the part of the branch organizations themselves, such as the inability to popularize their activities and explain the benefits of participating in them, etc.

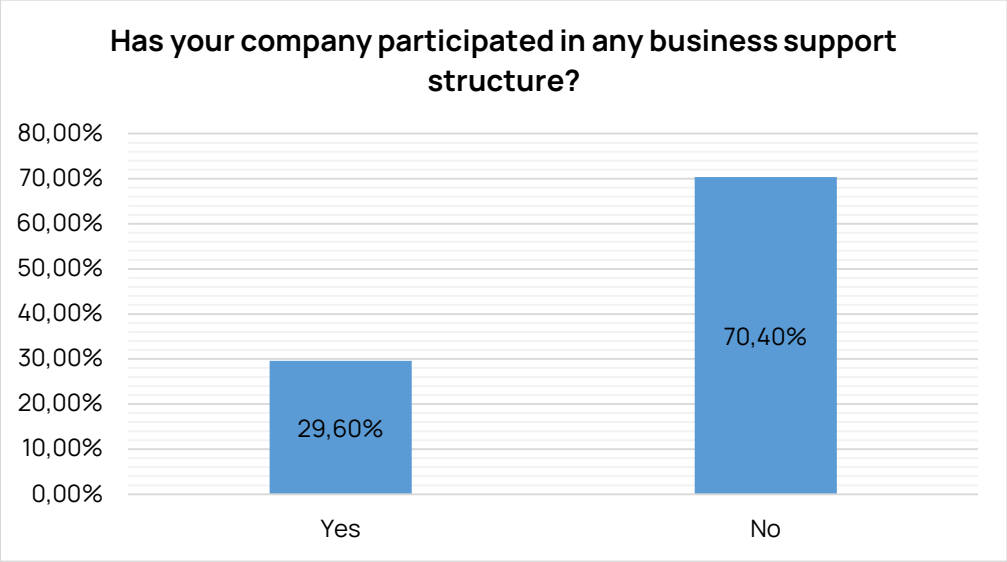


*Figure 20: Companies' Participation in any Business Support Structure*



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A moderately strong statistically significant relationship is found between participation in branch organizations and receiving advisory support (Approx. Sign. = 0.000; Cramer's V = 0.381; Phi = 0.381), The difference is that enterprises and farms that do not receive advisory support services are most significantly reserved for participation in business support organizations. Only 14.1% of them declared participation in an organization whose main activity is aimed at supporting business, while for the other group, almost half of the respondents stated the same. In other words, it can be concluded that the enterprises and farms of the agri-food sector in the cross-border region that participated in the study and that did not receive advisory support were far more likely not to participate in business support structures, than to participate, while for the remaining group there is no clear trend regarding participation in such organizations.

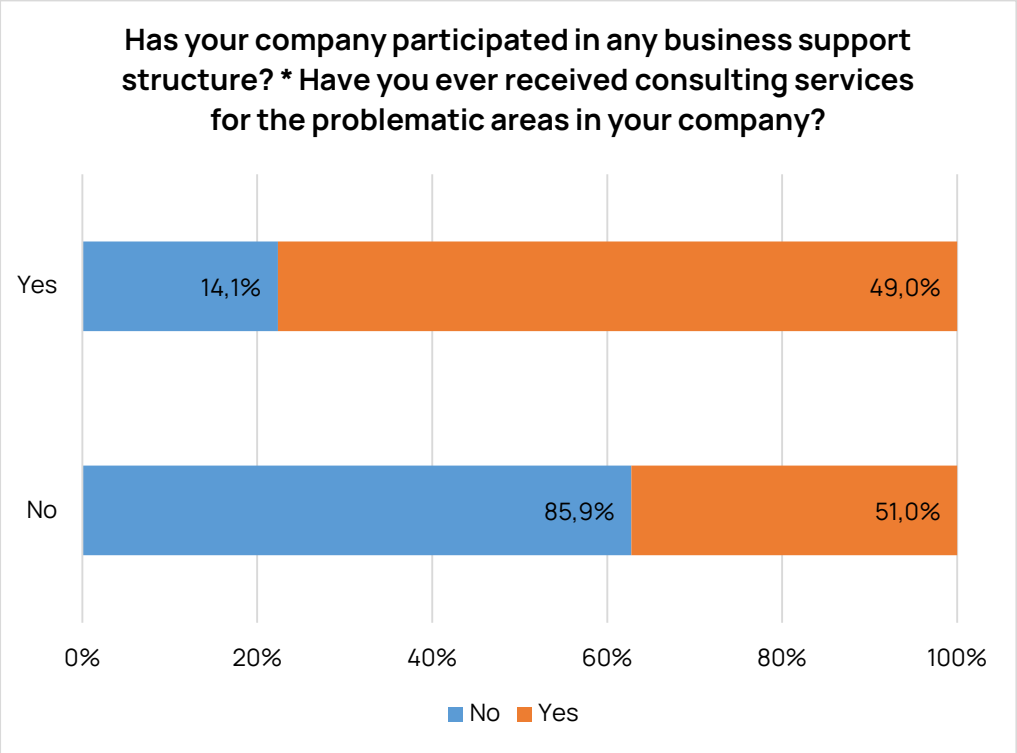


*Figure 20.1: Participation in any Business Support Structure*consulting services*



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The next statistically significant relationship found in the study is that between participation in a business support organization and treating business management as a serious issue (Approx. Sign. = 0.002; Cramer's V = 0.287; Phi = -0.287), and the strength of the relationship is weak. The data show that companies and farms that treat business management as a serious issue for their organization are far less likely to participate in branch organizations than other types of companies and farms. It is in this fact that the relationship between the two variables can be observed.

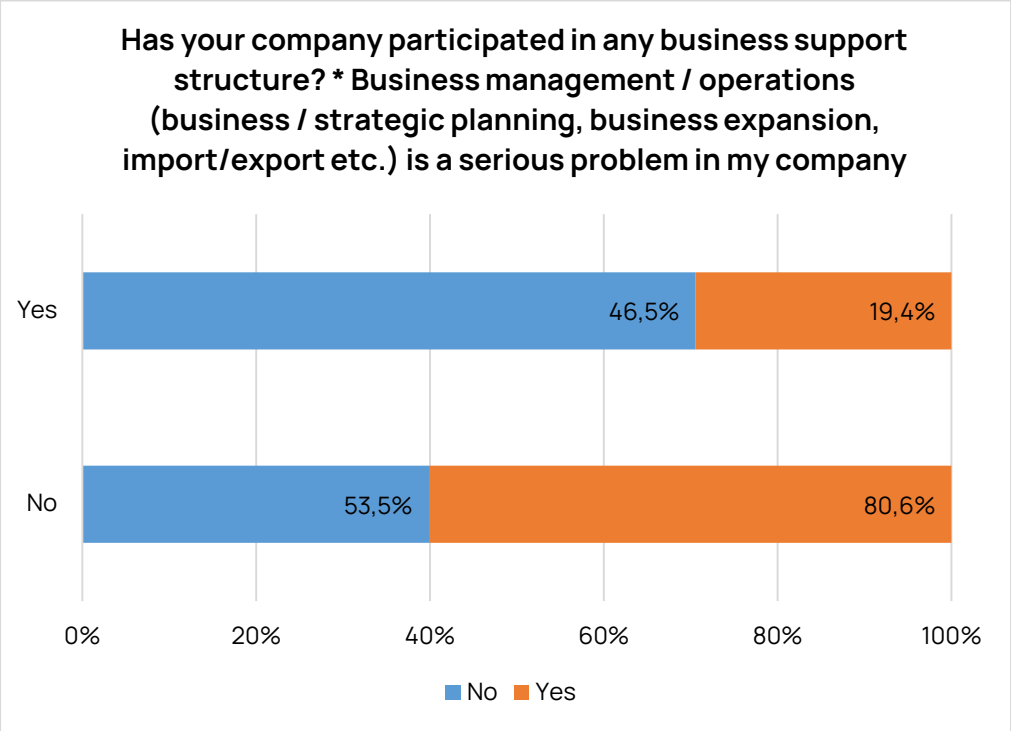


*Figure 20.2: Participation in any Business Support Structure*business management*

Another statistically significant relationship is observed in the answers to the question under consideration regarding the treatment of access to a foreign market as a serious problem. (Approx. Sign. = 0.004; Cramer's V = 0.265; Phi = 0.265). The strength of the relationship between the two variables is weak and is expressed in the fact that for the companies that access to the foreign market is treated as a serious problem, they declare a lower degree of participation in branch organizations and, respectively.



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Another important point of the analysis comes to show that they have a clearly expressed attitude of non-participation in branch organizations for business support, while for those enterprises and farms that consider that access to foreign markets cannot be ascertained.

A weak statistically significant relationship that can be confirmed can be found when examining the variables regarding the participation of agri-food enterprises and farms in the cross-border region and the magnitude of maintenance costs. (Approx. Sign. = 0.020; Cramer's V = 0.261; Phi = 0.261). As can be seen, the biggest difference in the answers is observed in relation to the participation in branch organizations on the part of those enterprises and farms in which maintenance costs are a small production cost. To the greatest extent, they declare participation in organizations supporting business. 40% of them declared participation in such an organization, while only less than 20% of all treated maintenance costs as medium or large. In this sense, it can be concluded that membership in branch organizations is most typical for these top enterprises and farms.

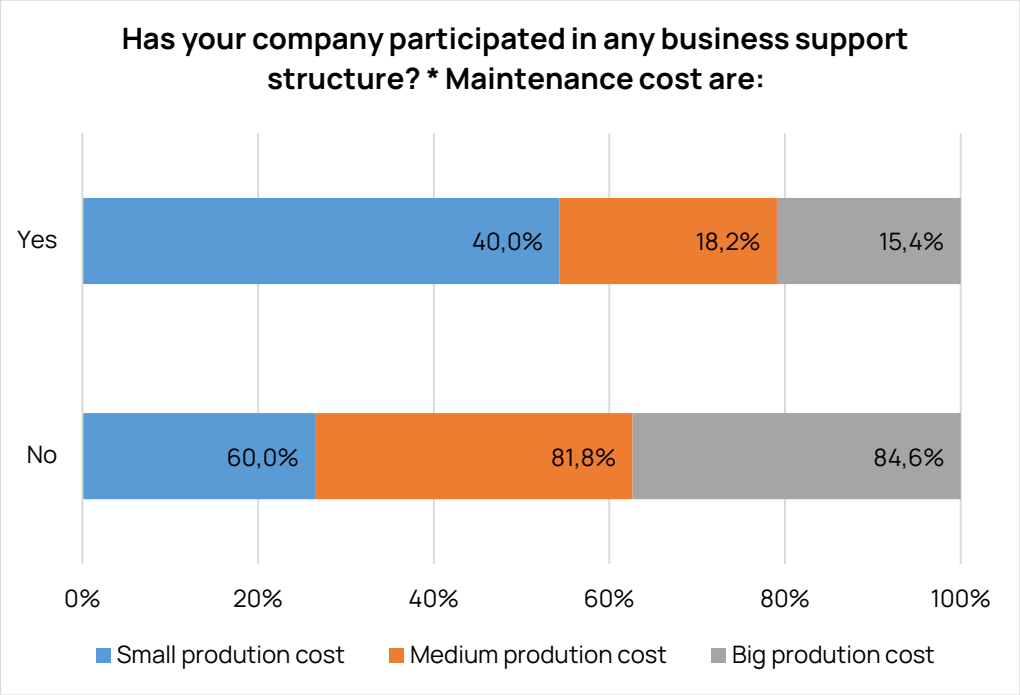


*Figure 20.3: Participation in any Business Support Structure*maintenance cost*



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Conducting the analysis to establish statistically significant relationships between the study variables comes across yet another such relationship that can be confirmed. This time, it was observed at the intersection of the questions about participation in an organization that works to support business and the question about the treatment of costs caused by inflation (Approx. Sign. = 0.003; Cramer's V = 0.314; Phi = 0.314). The strength of this relationship is moderate, which indicates its greater significance compared to the previous one, i.e. we can say that the greater heterogeneity in the responses of the respondents is manifested in how they treat the costs that have arisen as a result of rising inflation.

The data in Figure 20.5 allow us to see that companies that consider the costs caused by inflation to be light are least likely to declare participation in a branch organization. On the other hand, the most typical participation in such structures is the participation of those who consider that the costs incurred by them as a result of inflation are the greatest.

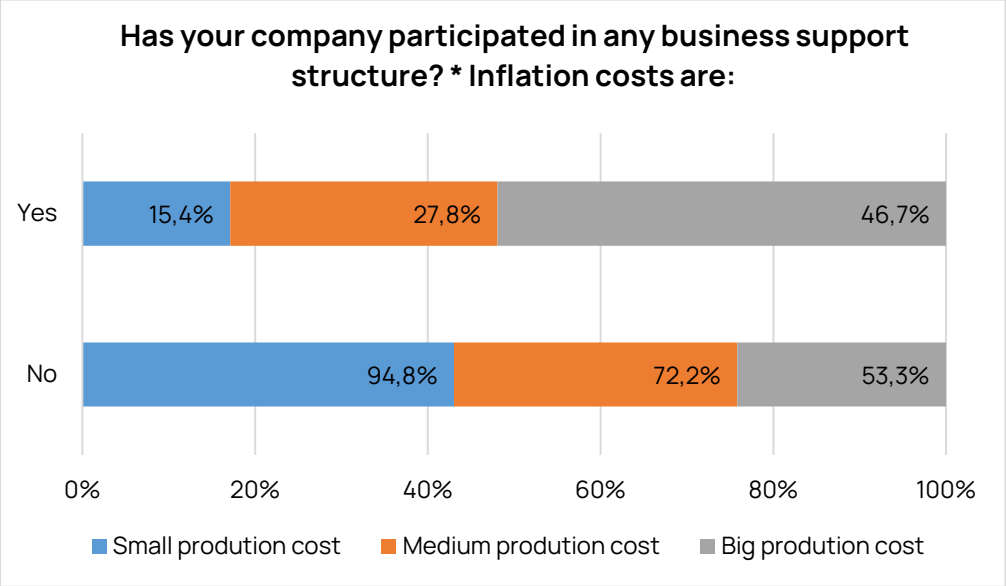


*Figure 20.4: Participation in any Business Support Structure*inflation costs*

Analysis of the data from the current study continues with another statistically significant relationship being revealed, albeit a very weak one.



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It is about the relationship between participation in trade organizations and level of education. (Approx. Sign. = 0.042; Cramer's V = 0.190; Phi = -0.190). The relationship is objectified in that respondents with lower education declare, to a greater extent, that the enterprises and farms of which they are a part participate in branch organizations. In this sense, it can be hypothesized that this type of enterprise (i.e., those that are dominated by the presence of less qualified personnel) will have a higher degree of membership in support-oriented organizations of business, while companies dominated by highly educated personnel will be less likely to observe this type of practice.

Here we will get a little ahead of the analysis and say that over 54% of the enterprises that received support from branch organizations received support for the improvement of staff qualifications, which shows that they are seen as a source of competence and expertise. Apart from that, the statistically significant relationship between participation in branch organizations and education gives reason to conclude that more educated respondents express that the enterprises and farms in which they are located participate to a greater extent in branch organizations.

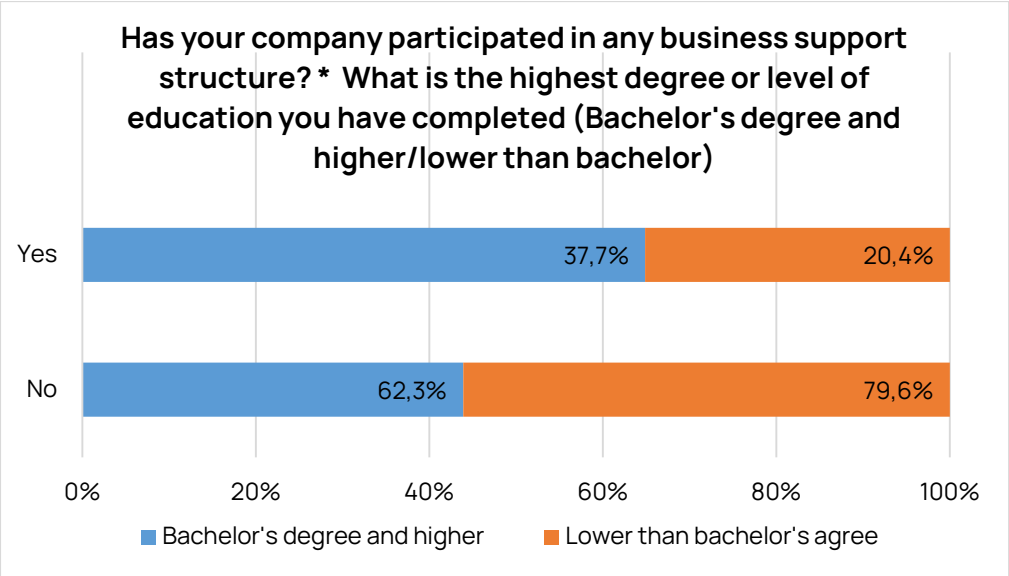


*Figure 20.5: Participation in any Business Support Structure*education*



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Of those who declared participation in organizations and structures that are oriented towards business support, the largest share is those who participate in chambers of commerce and industry. From the data, it can be concluded that this type of organization is recognized as the closest to the enterprises that participated in the research and to the greatest extent can help them to develop their activities. 45.5% of all registered valid cases of membership actually belong to such structures. Since the question is multiple and allows more than one answer, all cases exceed 100%. Membership in cooperatives is more than twice as low as a low value – only 21.2% are members of such organizations, while the lowest levels of membership are in the unions of agricultural enterprises and other organizations. Chambers of Agriculture are in the middle in terms of the preferred form of membership with 15.2%.

In view of the relationship between the questions in the survey, which relationship arises from the participation of companies in branch organizations and the number of respondents who confirmed, it should be noted that conducting an analysis to establish statistically significant relationships cannot give reliable values for the different types of organizations , (chambers of commerce and industry, cooperatives, agricultural unions, etc.), for the help provided by them, etc., due to the limitations of the method which assume at least 100 cases (although some researchers are inclined to allow samples of 50 cases), over which to perform an analysis.



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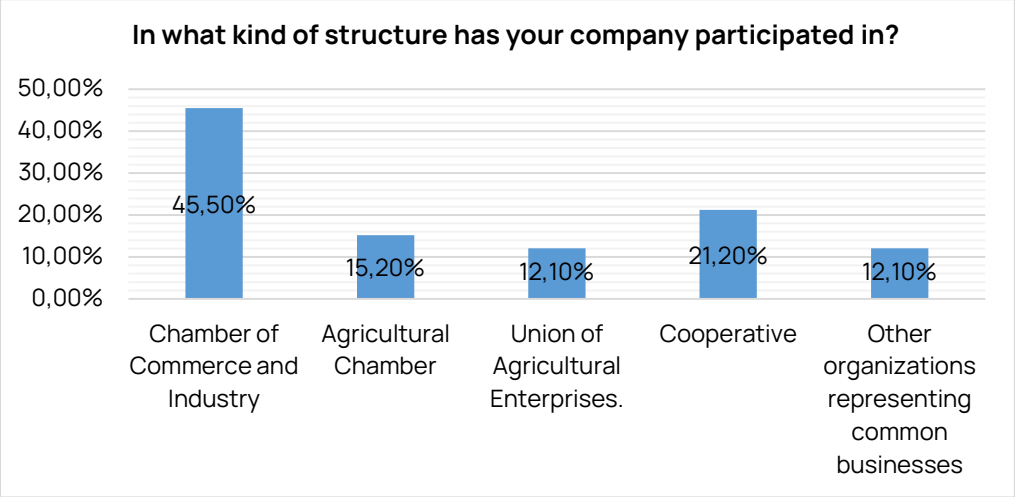


*Figure 21: In what kind of structure has a company participated in?*

Another question addressed in the research is the extent to which respondents who participated in business support organizations received help from them. The data show that 21.2% of all valid responses indicated that agri-food enterprises in the cross-border region participating in the survey received support from industry organizations, while just over 78.8% did not receive such support. This means that over 70% of those involved in branch organizations received support. In this sense, it can be concluded that membership in such organizations brings real benefits to business representatives in the agri-food sector, and the branch organizations themselves are open to providing support to their members.

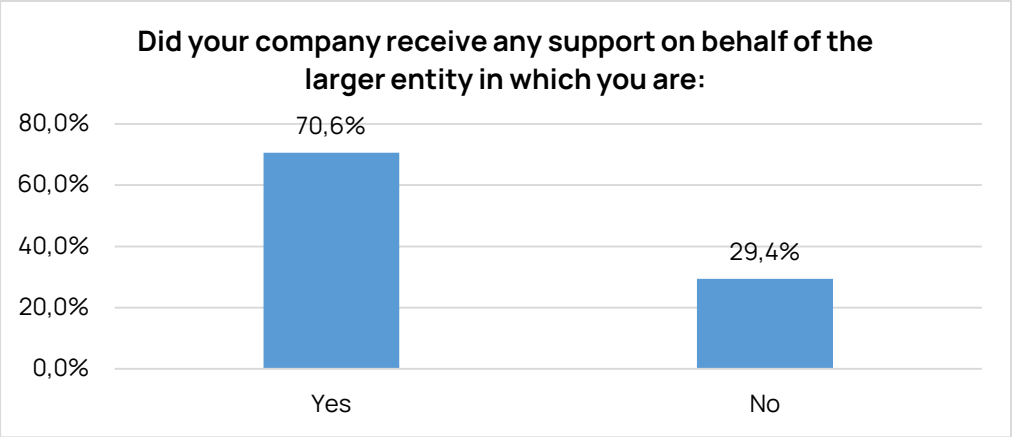


*Figure 22: Did your company receive any support on behalf of the larger entity in which you are member?*



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The most preferred form of support appears to be those that refer to the protection of the interests and support of the sector before regional and national authorities regarding regulations, taxes, local issues and other legislative initiatives, as well as support for specialized training , seminars and services to increase the qualification of the staff, as well as other services related to the staff. For both categories, it is valid that more than 50% (as for the first one reaches almost 60%) of the participants who received support (the question is multiple, which implies giving more than one answer to it and therefore receiving more of 100% when adding up all submitted answers). Just under 30% of the respondents who received support focused on administrative assistance, while under 10% provided support for the internationalization of companies (8.3%) and the development of social entrepreneurship (4.2%). On the other hand, support for the presentation of companies at fairs and exhibitions on a regional, national and transnational scale exceeds 10% and reaches 12.5% of the share of all aid recipients.



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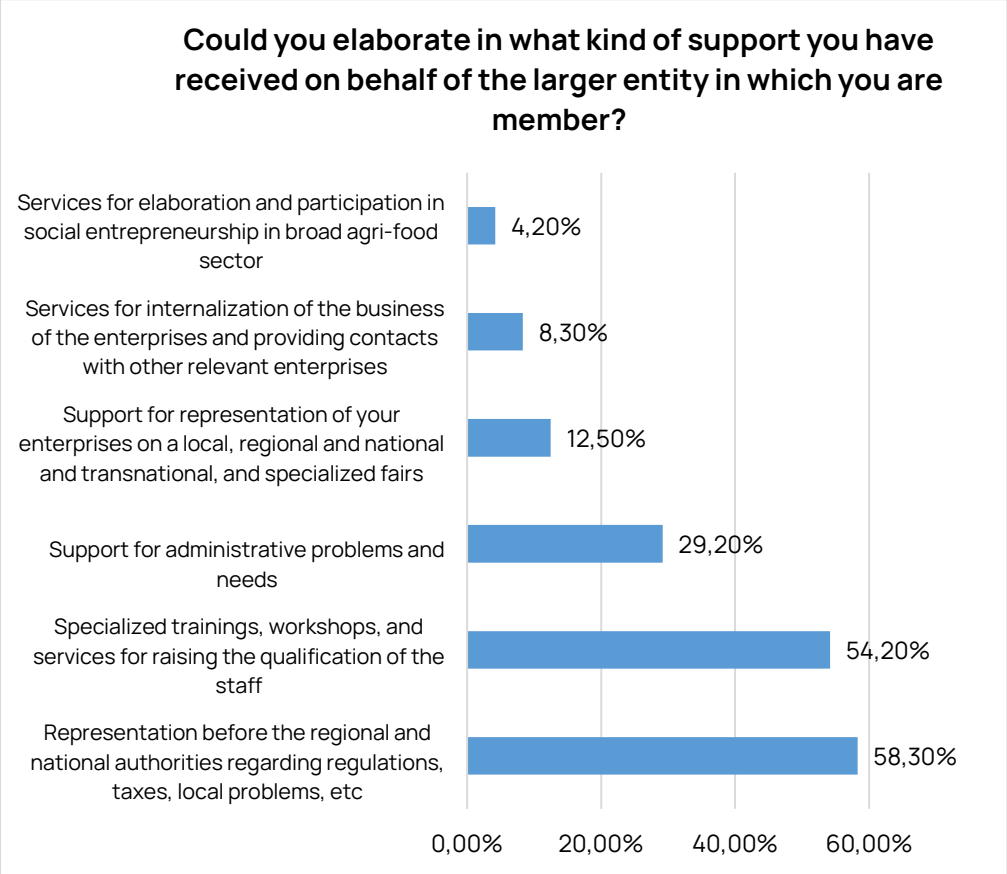


*Figure 23: What kind of support you have received on behalf of the larger entity in which you are member?*

The analysis can almost unequivocally conclude that the motivation of enterprises and farms for their inclusion in organizations representing business is motivated by the expert potential and capacity possessed by this type of organization, which is proven by the fact that the most offered forms of support are regarding the increase of the expert capacity of the enterprises, by conducting various educational activities (trainings, seminars, etc.) on the one hand, and also the support in complex legal, economic and other activities and cases.

The last question, which is considered within the framework of this section, aims to check whether the enterprises and farms in the territory of the cross-border region apply practices, procedures and/or codes in the various aspects of their functioning. 88.7% of all those who participated in



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the research stated that the companies they are a part of have implemented such mechanisms in at least 1 area.

The data from the research gives reason to conclude that companies in the cross-border region generally fail to cope with the introduction of specific procedures, policies and codes regarding the majority of the areas in which a certain policy could be defined. The only area secured from this point of view is that of the policy dedicated to ensuring safe working conditions, for which the national legislation in force in Bulgaria plays a major role. Regarding this area of corporate governance, 86.3% of respondents who actually implement certain procedures, policies and codes state that such procedures, practices and/or codes are implemented in their companies. In reality, there is no other area in which at least half of the respondents declare that the companies and farms of which they are a part have practices of implementing specific policies and codes. Close in this respect are the areas of Hazard Analysis and Critical Control Point (HACCP), for which 42.2%% claim that there is a practice to apply procedures, policies and codes. Over 40% (40.2%) of businesses and farms have policies, procedures and codes in the area of supply chain control, and 36.3% have procedures, policies and codes in place to limit harmful emissions from transport.

Realistically for all other areas of corporate governance that are subject to research, namely "reduction of energy consumption and greenhouse gas emissions" (e.g. CO2 emissions); "reduction of carbon footprint"; "prevention of discrimination (racial, ethnic , gender, religious, etc.) and workplace harassment"; "control and reduction of pollution from transport/mechanized activities" and "certification related to environmental protection, social or business ethics, etc. (e.g. ISO 14001, ISO 45001/OHSAS 18001)" less than 1/3 of enterprises and farms implement specific policies, procedures and codes. The level of implementation of


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such tools to control the carbon footprint is extremely low - only 4.9%, which can be attributed mainly to both the lack of a high environmental culture (which was already identified in the research) and the specificity of the sphere of activity of enterprises and farms.

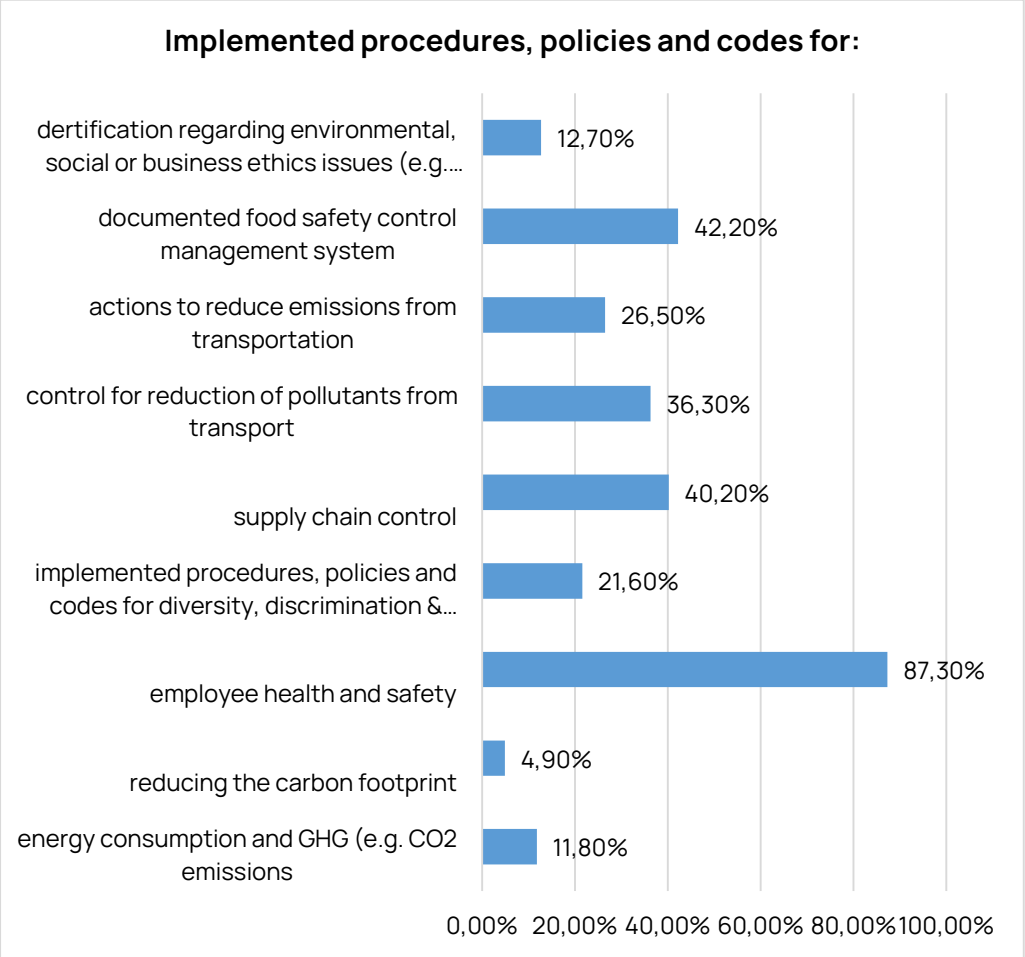


*Figure 24: Has your company implemented procedures, policies and codes for?*

On the other hand, 99.1% of all respondents share that there is at least 1 area in which they have not introduced procedures, policies and codes to regulate it. The most unregulated areas are in terms of carbon footprint reduction 93.9%, and an extremely high level of lack of regulation can be found in the areas dedicated to reducing energy consumption and greenhouse gas emissions (85.1%); and workplace discrimination and harassment (80.7%). All other aspects of the corporate policy of enterprises and farms from the cross-border region, which are active in the



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field of the Agro-Food Sector, and which were included in the research, are neglected in more than 50% of cases, with the only exception to this being the sphere of providing safe working conditions.

Only 10.4% of respondent's state that in the enterprises and farms in which they work have procedures, rules and codes that define a certain corporate policy and regulation, but they are not followed, while 17.4% of all respondents, state that at least 1 document is being developed in their organization to formulate and regulate a specific company policy and management model. In this sense, less attention has been observed in the sectors dedicated to reducing energy consumption and greenhouse gas emissions and reducing the carbon footprint, while for other areas there is increased attention in terms of creating policies, rules and codes to regulate the activity of the Agro-Food Sector companies in the Cross-Border Region.

The analysis of statistically significant relationships could not detect the existence of a reliable one with respect to the variables that have a relationship with the implementation of procedures, policies and codes in relation to energy consumption and emission of greenhouse gases; reducing the carbon footprint except for a weak relationship between the implementation of procedures, policies and codes related to energy consumption and the gender of the respondents, which states that men are more likely to declare that in the enterprises and farms of which they are a part such regulations have been introduced.

The first statistically significant relationship identified, which will be discussed in more detail in this part of the text, is with regard to the implementation of procedures, policies and codes revealed in the analysis of the implementation of those that correspond to the health and safety of workers. The observed relationship is precisely between this aspect of the implementation of various regulations in the field of employee health


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protection and ensuring their safety and the readiness of enterprises and farms for synergy (Approx. Sign. = 0.002; Cramer's V = 0.283; Phi = 0.283). Although the observed relationship is weak, it can be seen in Figure 24.1.1 that companies that we can consider to be open to synergy with stakeholders dominantly and to a greater extent have implemented procedures, practices and codes for workplace safety.

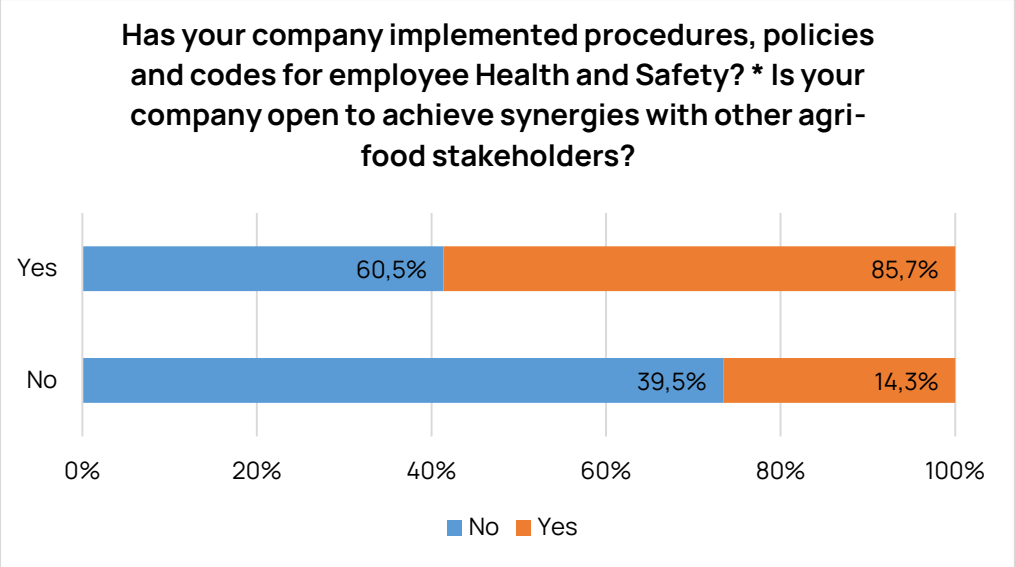


*Figure 24.1.1: Health & safety * synergies*

Another statistically significant relationship that is registered is between the treatment of business management as an issue for companies and the implementation of rules to ensure a safe working environment (Approx. Sign. = 0.000; Cramer's V = 0.332; Phi = -0.332). The strength of the relationship is moderate, suggesting greater disparity and therefore greater variation in responses. The picture that unfolds in Figure 24.2 clearly explains that it is highly characteristic of companies that do not experience business management problems to implement workplace safety procedures, policies and codes. Over 95% of all such enterprises declare that they apply such regulations, while for companies in which business management is a significant problem, the share of enterprises and farms implementing such regulations is 2/3.



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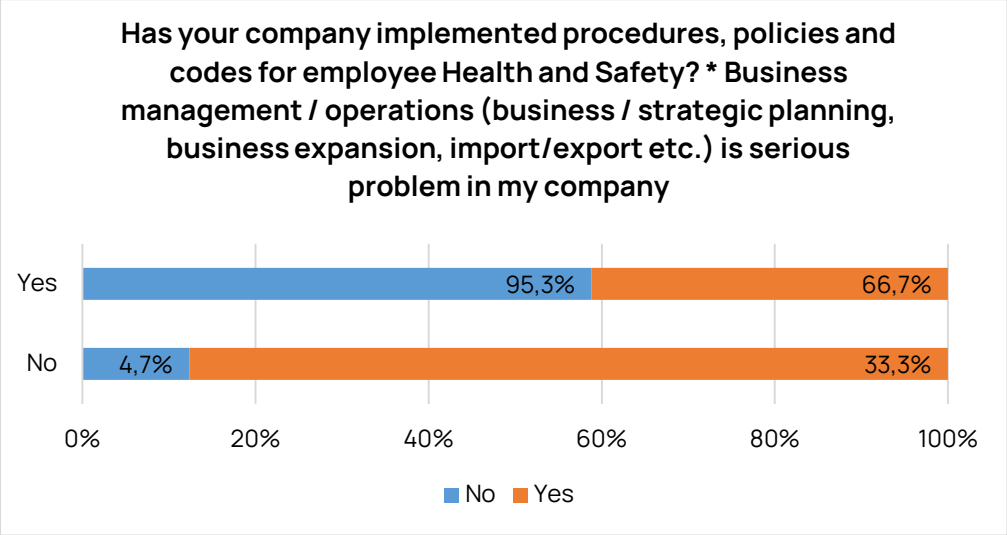


*Figure 24.1.2: Health & safety * business management*

A statistically significant relationship (albeit weak) is also found between the implementation of procedures, rules and codes related to the health of employees in the Agro-Food Sector enterprises in the Cross-Border Region that participated in the survey and the education of the respondents. (Approx. Sign. = 0.010; Cramer's V = 0.241; Phi = -0.241). The observed difference in the answers according to the level of education shows that the respondents with higher education state to a higher degree that developed procedures, policies and/or codes related to ensuring safe conditions are applied in the enterprises and companies of which they are a part at work.

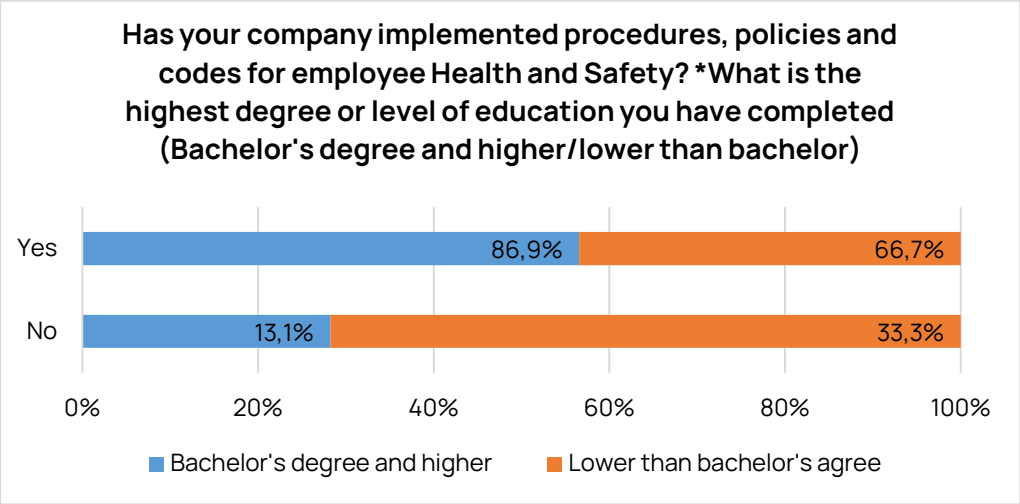


*Figure 24.1.3: Health & safety * education*



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The analysis of the data gives reason to conclude that another statistically significant relationship can be observed, which is related to the procedures, policies and regulations in the field of workplace safety and in this case the application of procedures, policies and codes in the field of control of the supply chain, (Approx. Sign. = 0.004; Cramer's V = 0.272; Phi = 0.272). The correlation is weak, indicating that the difference in responses is not very pronounced. A slight difference can be registered in Figure 24.4, where it is clear that companies that implement supply chain procedures, policies and codes are more likely to implement such in ensuring safe working conditions, compared to those that do not apply supply chain regulations.

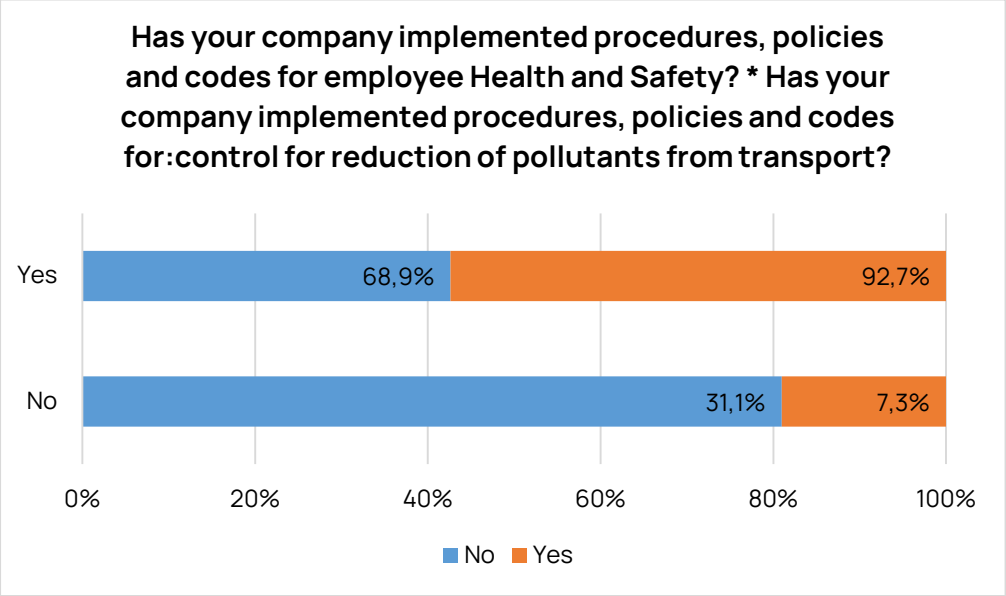


*Figure 24.1.4: Health & safety* control for reduction of pollutants from transport*

Analysis of the data suggests that there are statistically significant relationships with multiple other indicators regarding the implementation of procedures, policies and codes regarding discrimination and harassment in the workplace. On the one hand, this is the gender of the respondents, on the other hand, connections are observed in terms of the sector in which enterprises and farms operate (in particular, the presence of connections is registered in the packaging sector and the trade sector). As a third aspect of the nature of the identified relationships, one can distinguish the way in



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which the benefits of using operational business tools are perceived, and as a fourth, the way in which problems are treated in companies (in particular, these are marketing, education and training, human resources and environmental issues). Another dimension of the relationship between the answers to the question under consideration and the answers to the other ones is objectified in determining the burden of costs in enterprises and farms (in particular, these are the costs of wages; for transport and logistics; costs caused by inflation; costs for energy.

The relationship with gender is weak (Approx. Sign. = 0.018; Cramer's V = 0.220; Phi = -0.220), and the differences in responses observed are objectified in that 27% of men declare that in the companies they work procedures, policies and regulations are in place to prevent discrimination and harassment in the workplace, while only 9.6% of women declare the same. In this sense, two problems can be highlighted - on the one hand, the low level of introduction of such tools for prevention, and on the other hand, women, who are traditionally more vulnerable to such treatment, are not sufficiently protected.

Regarding the relationship with the packaging sector, it can be said that it is weak (Approx. Sign. = 0.003; Cramer's V = 0.276; Phi = -0.276) and is expressed in the fact that it is extremely peculiar to enterprises and farms, who work in the field to declare that they implement procedures, policies and/or codes of prevention against discrimination and harassment in the workplace. None of these respondents who work in the field of packaging declare that their workplace has implemented policies, procedures and codes for the prevention of discrimination and harassment, 25.3% are those who are external to the field and implement tools against harassment and discrimination in the workplace.

The situation is similar with the trade sector, where a weak relationship is again observed (Approx. Sign. = 0.017; Cramer's V = 0.224; Phi = -0.224).


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Only 7.3% of respondents from businesses operating in the field of trade declared that their workplaces have procedures, policies and/or codes to prevent harassment and discrimination in the workplace, while out of 25, 7% of the external respondents shared that such regulations are applied at their place of work.

The relationship between respondents' opinion on the implementation of procedures, policies and codes and on the burden of labor costs, however, is rather more significant as its strength is moderate (Approx. Sign. = 0.000; Cramer's V = 0.390; Phi = 0.390). As can be seen in figure 24.2.1, the most serious difference consists in the fact that the respondents from the enterprises for which the labor cost is considered the most severe, to the greatest extent, declare that there are procedures in place for prevention of discrimination and harassment. This allows for the construction of a hypothesis that in enterprises in which the staff is larger (and therefore also the costs for them) are more likely to introduce such procedures, policies and codes, and high labor costs do not appear as a barrier to the implementation of procedures, policies and codes that are the subject of this analysis.

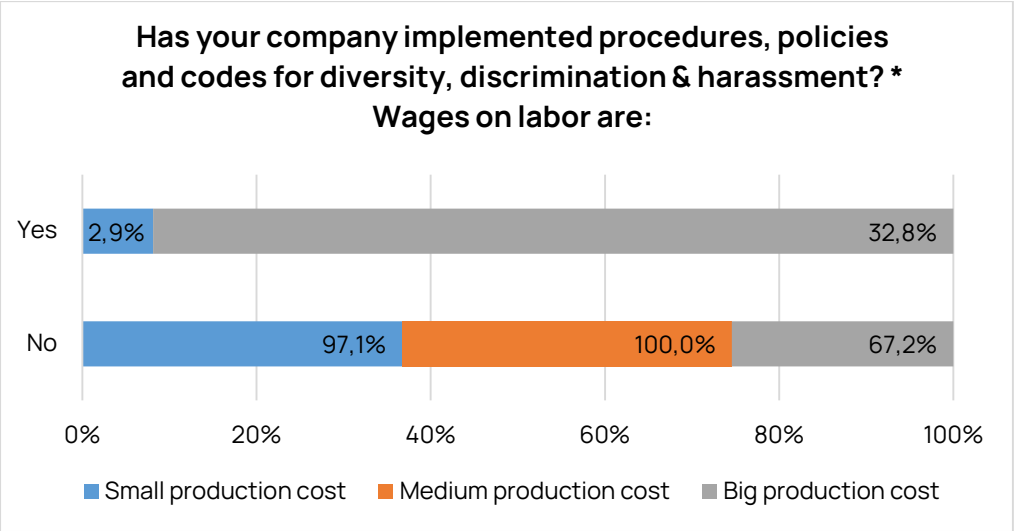


*Figure 24.2.1: Diversity, discrimination & harassment * wages*



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Although weaker than before, the relationship between opinions about the severity of marketing as a problem and the implementation of prevention tools against discrimination in the workplace is again of moderate strength (Approx. Sign. = 0.000; Cramer's V = 0.337; Phi = 0.337). The most visible embodiment of the relationship is revealed in the fact that enterprises and farms that do not consider marketing a significant issue in the context of their operation practically do not apply policies, procedures and codes for the prevention of discrimination in the workplace, unlike those in which marketing is considered an important issue.

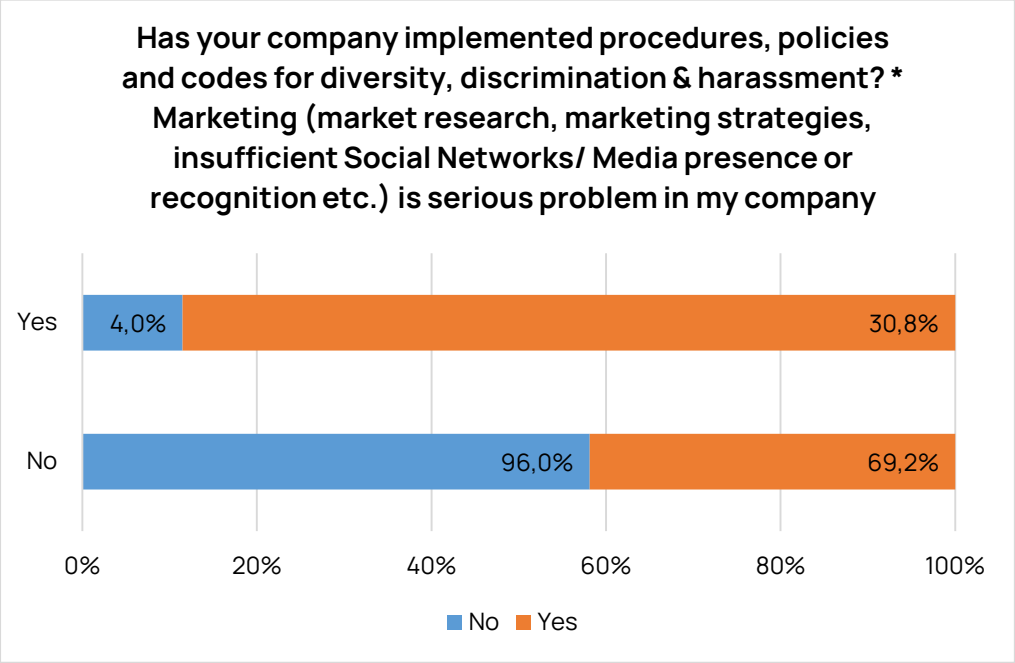


*Figure 24.2.2: Diversity, discrimination & harassment * marketing*

The relationship that is objectified between the answers to the problematized question in this part of the text and the attitude towards the burden of education and staff training is weak (Approx. Sign. = 0.006; Cramer's V = 0.259; Phi = 0.259) and is expressed in the fact, that respondents who have a higher level of education state that their workplace has procedures, policies and codes for the prevention of discrimination and harassment.



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The relationship between the implementation of tools for the prevention of discrimination and harassment in the workplace and the opinion about the severity of problems related to human resources is much more significant than the previous one that was the subject of analysis. (Approx. Sign. = 0.000; Cramer's V = 0.352; Phi = -0.352). The larger differences in respondents' responses can be seen in the figure below in the text, where it is clearly shown that companies where HR issues are less important are significantly more likely to implement procedures, workplace discrimination and harassment prevention policies and/or codes.

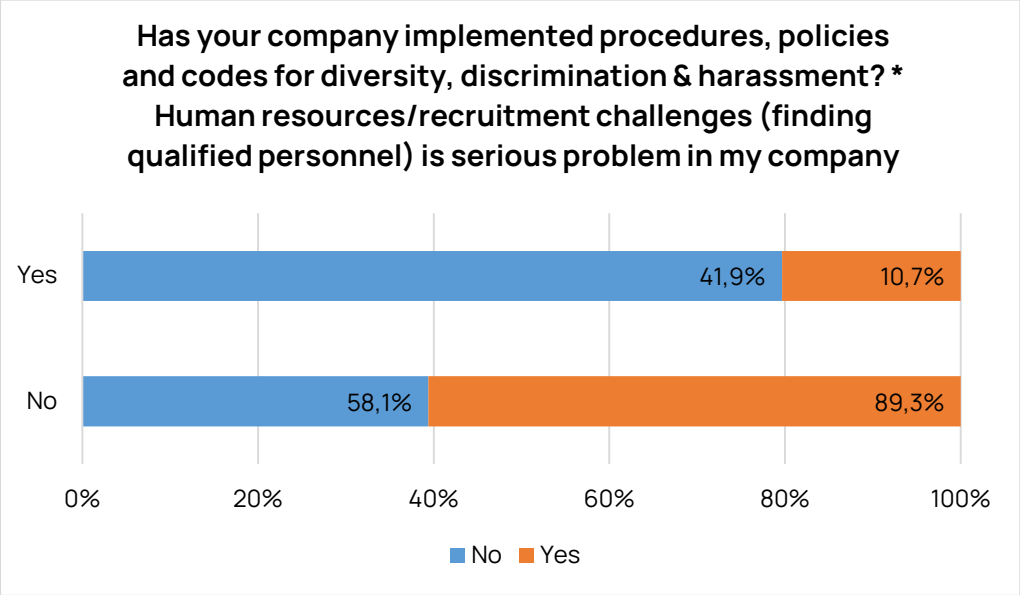


*Figure 24.2.1: Diversity, discrimination & harassment * human resources*

The relationship between the implementation of procedures, policies and tools for the prevention of harassment and violence in the workplace and the way in which environmental problems are treated in enterprises and farms is extremely weak (Approx. Sign. = 0.044; Cramer's V = 0.188; Phi = -0.188), and the relationship shows that enterprises that experience such problems to a lesser extent are more likely to apply mechanisms to neutralize discrimination and harassment, as only 6.7% of enterprises in the first group apply such measures against 23 .5% of enterprises from the second.



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It should be noted that respondents who are reserved about the benefits of using operational business tools in 100% of cases declare that their enterprises and farms have not implemented procedures, policies and tools for the prevention of harassment and violence in the workplace.

The next identified statistically significant relationship between variables was observed between the introduction of workplace procedures, policies and codes that aim to ensure the prevention of discrimination and the importance of transport and logistics costs (Approx. Sign. = 0.004; Cramer's V = 0.312; Phi = 0.312). The data in Figure 24.2.4 show that the statistically significant difference in responses found lies in the fact that all 32 respondents (i.e. 100%) who stated that in their companies transport and logistics costs are lows do not have implemented policies, rules and codes for the prevention of discrimination and harassment in the workplace. Predominantly these are implemented by enterprises that treat transport and logistics costs as medium.

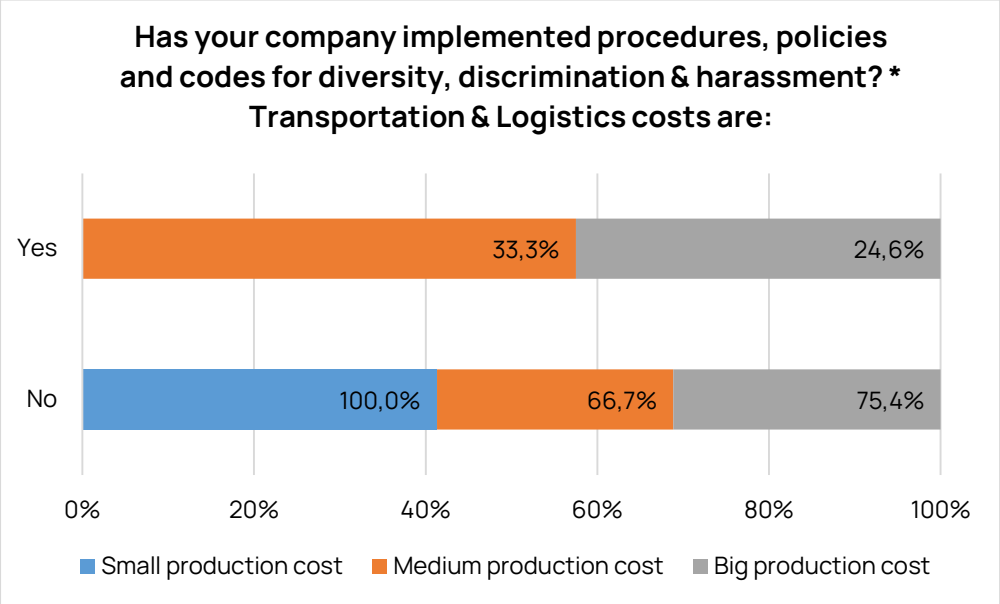


*Figure 24.2.4: Diversity, discrimination & harassment * transportation & logistics costs*



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A weak relationship is also found regarding the costs that are caused by inflation (Approx. Sign. = 0.010; Cramer's V = 0.282; Phi = 0.282). It is most strongly observed in relation to those who answered that inflation for them is a small production cost. It is precisely for this group that it is most typical to apply regulations for the prevention of discrimination and harassment in the workplace (30.8% of them declare that such policies, procedures and codes have been introduced in their workplace), while only 6.7% of respondents who consider the costs caused by inflation to be large and significant for their enterprises and farms declare that they apply tools to prevent discrimination and harassment at work.

Following the conclusion that has been drawn about the relationship between the implementation of procedures, policies and codes for the prevention of discrimination and harassment and the burden of inflation costs, it is quite reasonable to assume that there is also a relationship with energy costs, insofar as they are based on the increased inflation of recent months. The analysis of the data clearly shows that there is indeed such a relationship and it is significant to the extent that it is defined as moderate (and close to the limit of being defined as strong) (Approx. Sign. = 0.000; Cramer's V = 0.451; Phi = 0.451). The relationship is expressed in the fact that enterprises and farms in which energy costs are a small production cost apply to an extremely higher degree procedures, policies and codes for the prevention of discrimination and harassment in the workplace. Moreover, they are the only group approaching parity in terms of application-non-application of such tools.


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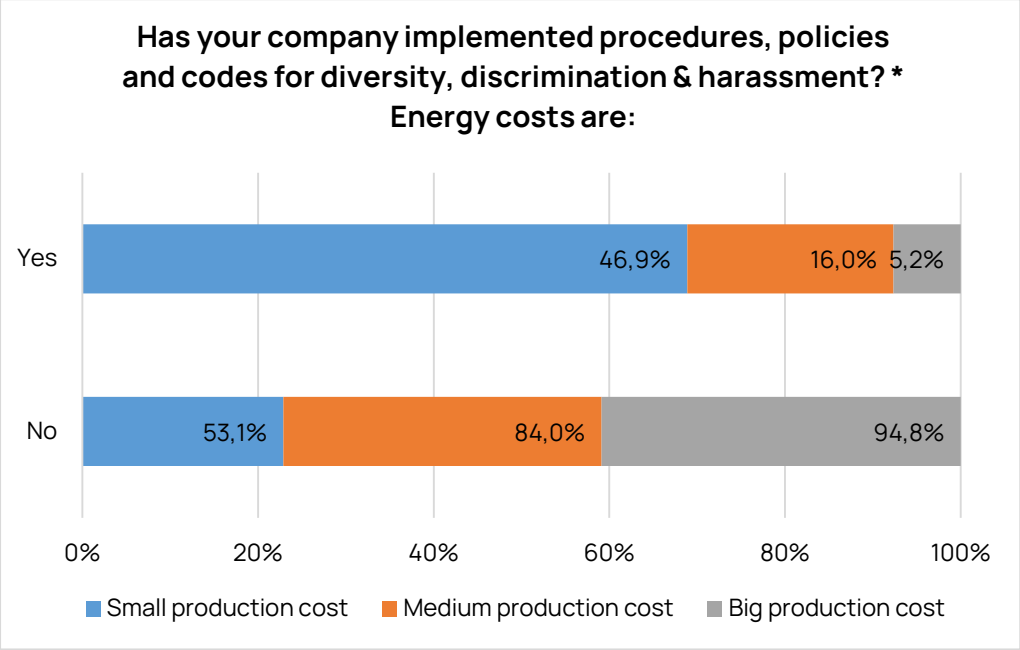


*Figure 24.2.5: Diversity, discrimination & harassment * energy costs*

Another important group of procedures, policies and codes are those related to the control of supply chains. The first statistically significant relationship that is revealed is between the applied procedures, policies and codes of enterprises and farms carrying out activity in the field of trade (Approx. Sign. = 0.029; Cramer's V = 0.204; Phi = 0.244), and it can be noted, that the connection is weak. It is expressed in the fact that for the business entities that carry out the activity in the sphere of trade, it is more appropriate to declare the application of procedures, policies and codes in the field of the supply chain. Over 48% is the share of respondents from the field of trade who have applied such tools, while for those who work outside this field, the relative share is almost 2 times lower - 28.4%.

The second identified link comes to show that the implementation of procedures, policies and codes in the field of control for supply chains is also characteristic of enterprises working in the field of packaging, as more than 53% of them declare this, and less than 30% external to they tend to state that they have implemented such regulations as well (Approx. Sign. = 0.023; Cramer's V = 0.212; Phi = 0.212).



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The existence of a statistically significant and weak relationship is also observed regarding the opinion about the benefits of using the operational business tools trade (Approx. Sign. = 0.029; Cramer's V = 0.248; Phi = 0.248). The difference in answers that determines the presence of a relationship consists in the fact that for respondents who believe that the use of operational business tools in their organization can bring benefits, they are more likely to declare that procedures, policies are implemented in their workplace and/or supply chain codes. It can also be seen that the more reserved the attitude towards the benefits of operational business tools becomes, the more this tendency decreases.

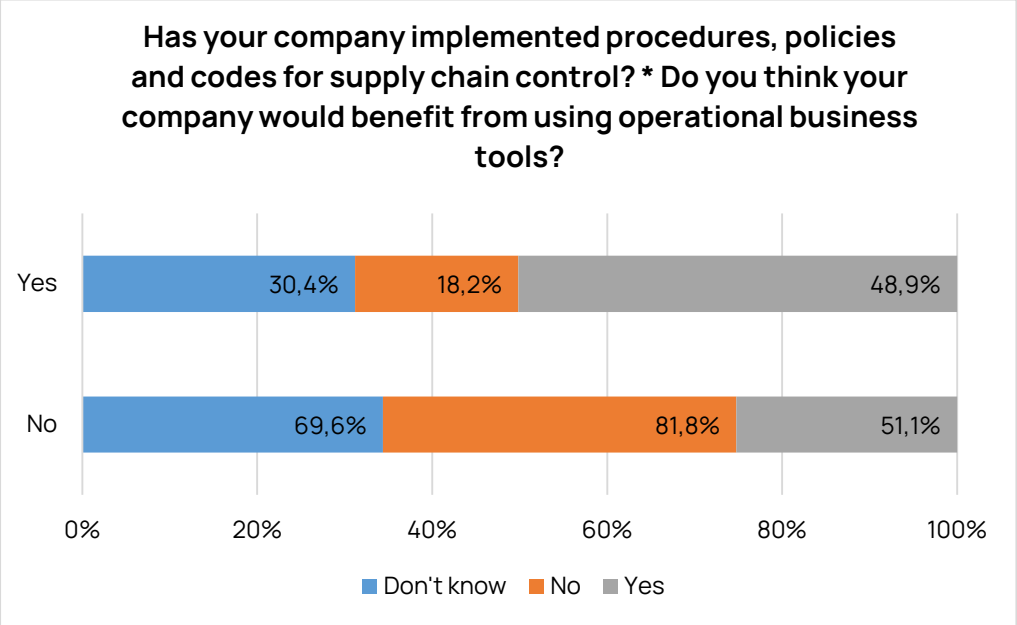


*Figure 24.3.1: Supply chain control * operational business tools*

Another link, albeit a weak one, that emerges from the analysis of the procedures, policies and codes in place in the field of supply chains is observed in relation to the receipt of consulting assistance. (Approx. Sign. = 0.023; Cramer's V = 0.213; Phi = 0.213), insofar as the propensity of enterprises that receive consulting assistance to apply tools in the field of supply chains is clearly expressed (47.1% of those receiving consulting assistance apply, versus 26.6% of non-recipients).



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A moderately statistically significant relationship was found in the responses to the questions regarding the implementation of supply chain control policies, procedures and codes and the implementation of a strategic plan (Approx. Sign. = 0.001; Cramer's V = 0.304; Phi = 0.304). As can be seen from the figure below in the text, the implementation of procedures, policies and codes in the field of supply chains is far more typical for enterprises and farms that have developed a strategic plan, which can be attributed to the fact that in their organizational culture is higher.

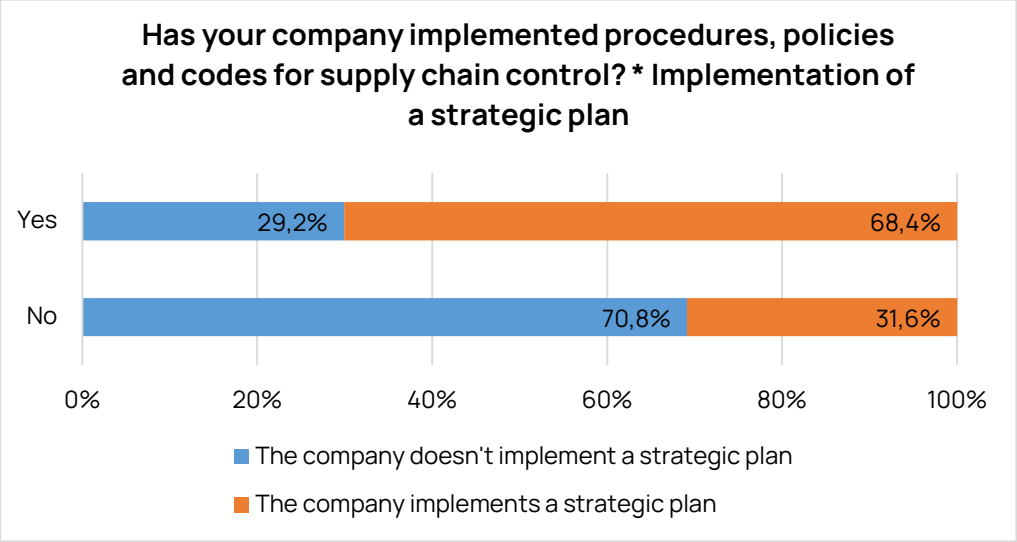


*Figure 24.3.2: Supply chain control * strategic plan*

A weak statistically significant relationship can be observed between the problematized question in this part of the text and the opinion of the respondents regarding the importance of access to a foreign market of the enterprises in which they are located. (Approx. Sign. = 0.008; Cramer's V = 0.249; Phi = 0.249). The relationship is expressed in that respondents who treat the issue as significant are more likely to implement procedures, policies and codes in relation to supply chains. Almost half (49%) of this group of respondents declared that such tools are applied in their enterprise/farm, while only 25% of the other group were able to declare the same.



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Another weak relationship that can be found is objectified in that companies that have developed policies, procedures and codes in the field of ensuring good and safe working conditions are much more likely (almost 4 times) to implement such tools and in relation to the control of supply chains. (Approx. Sign. = 0.004; Cramer's V = 0.272; Phi = 0.272). 42.7% of them express the opinion that the enterprises in which they work have such procedures, policies and codes, while for enterprises that do not develop workplace safety tools, this share is only 11.5%.

The analysis allows us to observe another statistically significant weak relationship, which consists in the fact that over half (54.1%) of the enterprises and farms that have developed procedures, policies and/or control codes for the reduction of pollutants from transport tend to develop such documents in the field of supply chains as well (Approx. Sign. = 0.005; Cramer's V = 0.265; Phi = 0.265). External business entities are more than twice as likely to apply such tools in the context of supply chains as well (26.9%).

Even weaker is the link between the application of procedures, policies and codes in the area of control of supply chains and the application of the same in the area of taking action to reduce emissions from transport. (Approx. Sign. = 0.045; Cramer's V = 0.187; Phi = 0.187). The connection lies in the fact that it is more typical for enterprises that apply the second type of regulations to also apply them in the field of supply chains (51.9% vs. 30.7%).

Another weak relationship (Approx. Sign. = 0.007; Cramer's V = 0.250; Phi = 0.250) is revealed between the implementation of procedures, policies and codes in the field of supply chains and in the field of food safety management. The essence of the relationship lies in the fact that businesses and farms that implement food safety regulations are twice as likely to implement similar regulations in the area of supply chain control as those that do not. (51.2% vs. 26.4%).


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The analysis of the implementation of procedures, policies and codes in the field of control for the reduction of pollutants from transport activity gives the reason to conclude that there is a statistically significant weak relationship with whether the companies participating in the research are active in the field of processing (Approx. Sign. = 0.016; Cramer's V = 0.224; Phi = 0.224). The data shows that it is more typical for organizations that work in the field of processing to implement such regulations, as more than 52% of them declare that they have implemented procedures, policies and codes in the field of control to reduce pollutants from transport activities, while the readiness of the enterprises outside this sphere to apply such tools is more than twice less.

Almost the same can be concluded with regard to the identified relationship with whether the enterprises work in the field of logistics (Approx. Sign. = 0.000; Cramer's V = 0.372; Phi = 0.372), insofar as the characteristic of this relationship is that the enterprises that operating in this area are far more likely to implement control procedures, policies and codes to reduce pollutants from transport activities. The strength of the relationship is moderate, which shows that the differences in responses according to whether an enterprise is engaged in logistics activity are more significant.

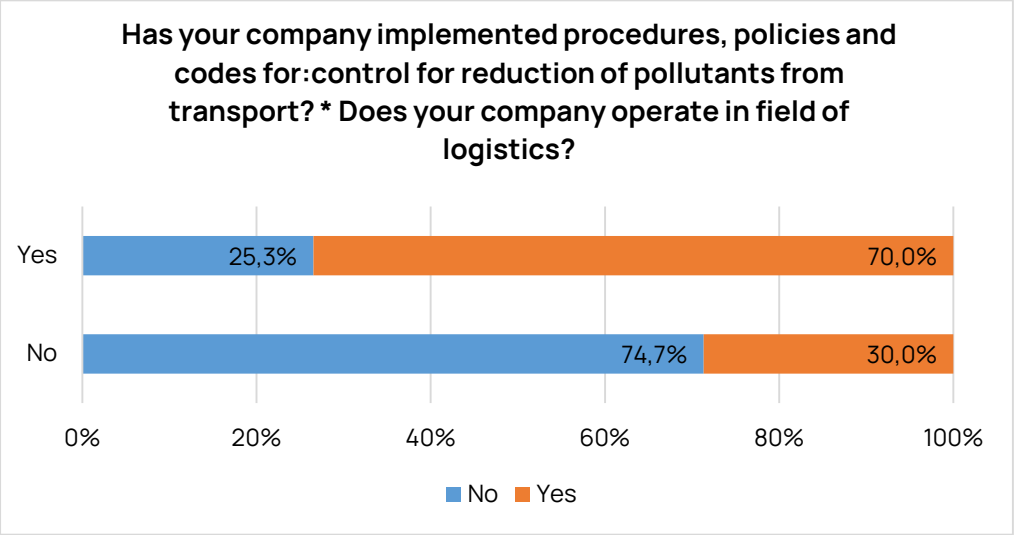


*Figure 24.4.1: control for reduction of pollutants from transport * logistics*



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Very important and eloquent for the distribution of the answers is the following relationship between the answers to the question about the application of procedures, policies and codes in the field of control for the reduction of pollutants from transport activity (Approx. Sign. = 0.005; Cramer's V = 0.333; Phi = 0.333). The data suggest that the relationship observed is moderate and consists in the fact that those unfamiliar with the essence of green practices are least likely to apply procedures, policies and codes in the field of pollution control from transport activity, and most characteristic of the implementation of such regulations is that they are most strongly advocated by enterprises and farms that have introduced green practices and technologies. This gives reason to reasonably assume that an organizational culture based on promoting the use of green technologies with a concern for environmental protection underlies the responses.

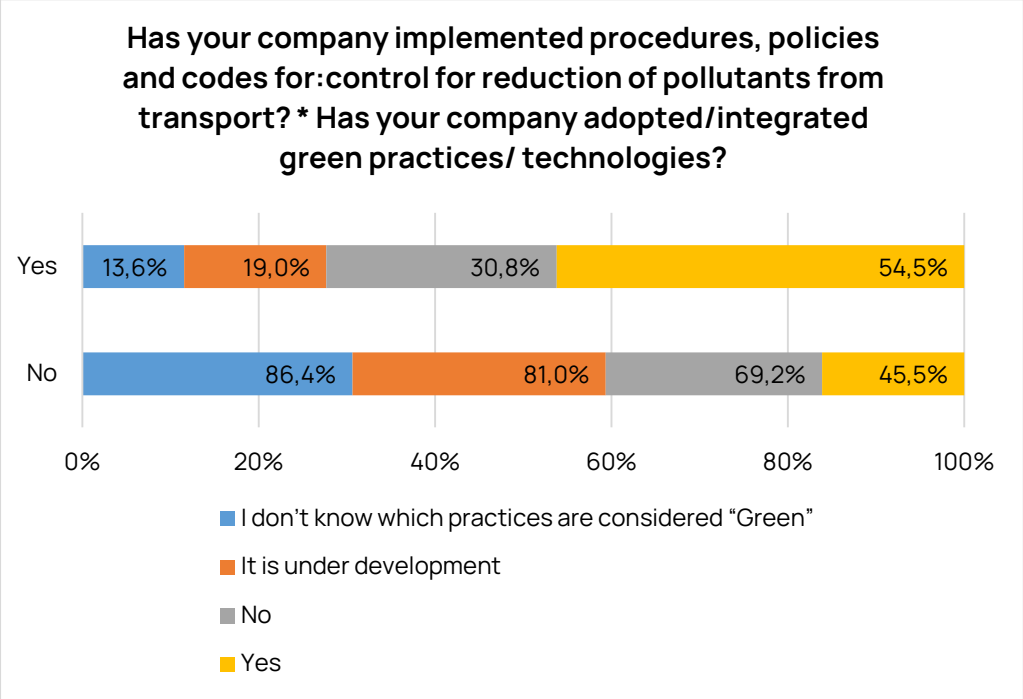


*Figure 24.4.2: control for reduction of pollutants from transport * integrated green practices*

Within the present analysis another significant relationship can be found, between the burden of labor costs and the implementation of procedures,



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policies and codes in the field of control for the reduction of pollutants from transportation activity (Approx. Sign. = 0.005; Cramer's V = 0.393; Phi = 0.393). The relationship is moderate and indicates the higher level of variation in responses relative to how the burden of different costs is treated. Figure 24.4.3 shows that enterprises and farms that point personnel costs as highest burden are most likely not to implement control procedures, policies and codes to reduce pollutants from transport activities. The application of such regulations becomes a major characteristic of those who regard labor costs as insignificant part of the operational costs.

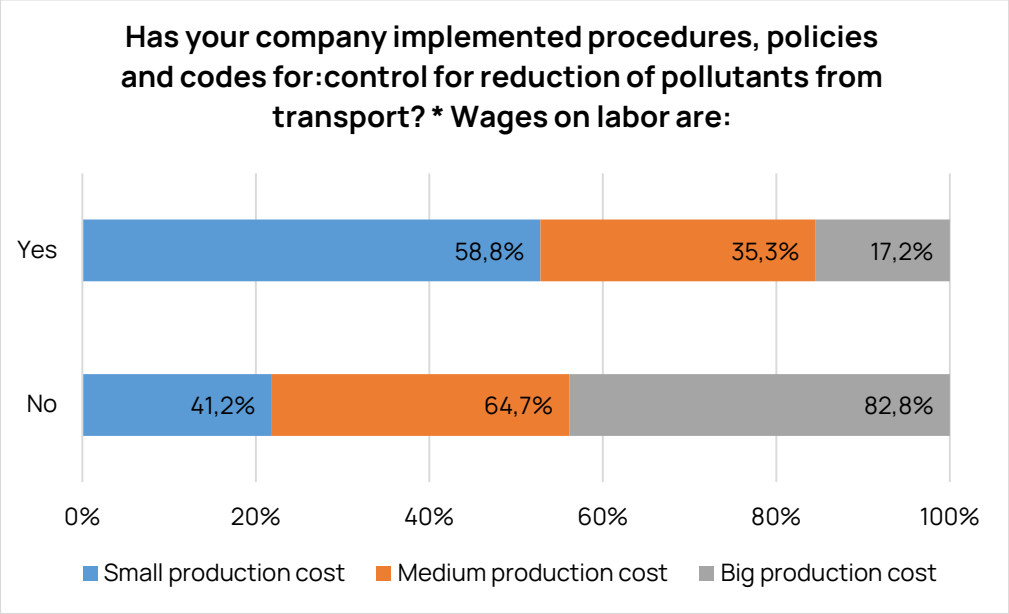


*Figure 24.4.3: control for reduction of pollutants from transport * wages*

A weak relationship is also found with the enterprises that consider marketing to be their main problem (Approx. Sign. = 0.005; Cramer's V = 0.260; Phi = -0.260), insofar as where the problem is present it is registered more than twice as small willingness to implement procedures, policies and codes in the field of pollution control from transport activity (21.5% vs. 46%).



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Another weak relationship was identified with companies that implement procedures, policies and codes in the field of supply chains (Approx. Sign. = 0.005; Cramer's V = 0.265; Phi = 0.265), which means that those companies, who have applied such tools are more than twice as likely to also apply such tools in the field of control for the reduction of pollutants from transport activity (48.8% vs. 23%), compared to those who have not applied such tools in the field of control supply chains.

Perhaps the most important of the relationships identified so far in the issue of the implementation of procedures, policies and codes in the area of control for the reduction of pollutants from transport activity is that observed in relation to taking action to reduce emissions from transport. The strength of the relationship is strong (Approx. Sign. = 0.000 Cramer's V = 0.716; Phi = 0.716) and is expressed in the fact that companies that have implemented procedures, policies and codes in the area of taking action to reduce harmful emissions from transport companies are highly inclined to implement procedures, policies and codes in the field of pollution control from transport activities.

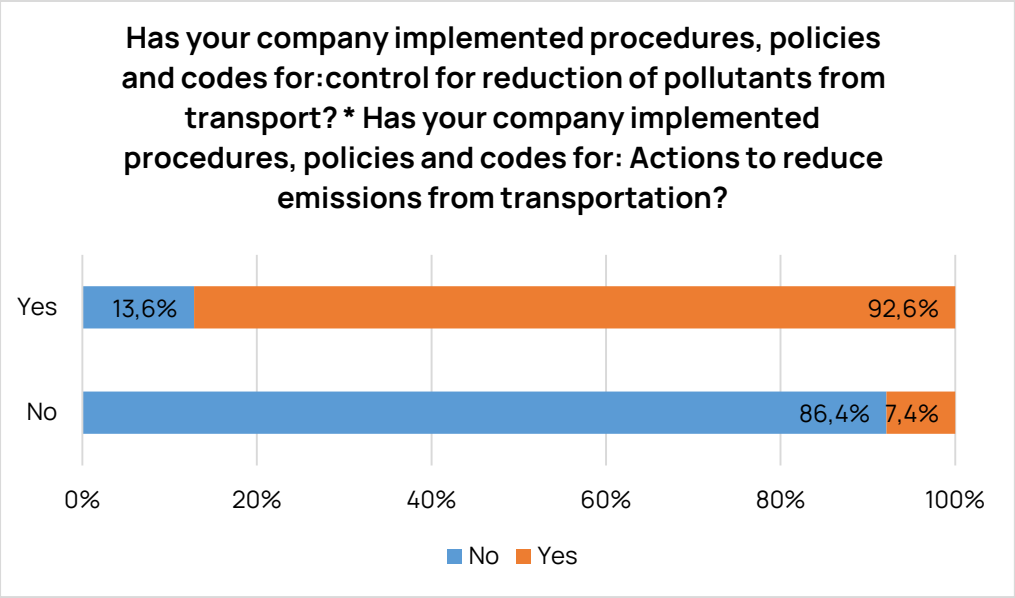


*Figure 24.4.4: control for reduction of pollutants from transport * reduce emissions from transportation*



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An analysis of the implementation of policies, procedures and codes to reduce harmful emissions from transport begins with the finding that there are several weak links. The first is with the answers to the question of whether the enterprises and farms from the cross-border region participating in the research are engaged in production activities in the Agro-Food Sector, and this relationship shows that those who do not participate in this sphere of economic life are significantly more likely to implement policies, procedures and codes to reduce transport emissions than those outside manufacturing (Approx. Sign. = 0.004 Cramer's V = 0.265; Phi =- 0.265). Almost 40% (39.5%) of those not operating in manufacturing have procedures, policies and codes in place to reduce emissions from transport, while only 15.6% of those outside this sector also do.

On the other hand, it seems typical for companies from the processing sector to apply such procedures, policies and codes, as 40% of them declared exactly this, against 18.9%, which also applied such regulations, but were external to the processing sector. (Approx. Sign. = 0.028 Cramer's V = 0.205; Phi = 0.205).

Another very weak relationship observed between the answers to the question about the implementation of procedures, policies and codes for taking action to reduce emissions from transport and the attitude towards the importance of environmental problems for the companies participating in the study (Approx. Sign. = 0.043 Cramer's V = 0.189; Phi = -0.189). The relationship is that companies that do not experience such problems are more likely to implement procedures, policies and codes to reduce transport emissions.

The next relationship that stands out comes to highlight that for businesses that treat transport and logistics costs as average, they are most likely to implement procedures, policies and codes to reduce transport emissions


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(44.4%). while those who state that it is a small share of their production costs apply such regulations only 12.5% of the time. (Approx. Sign. = 0.038 Cramer's V = 0.239; Phi = 0.239).

In continuation of the trend of reporting weak relationships, the presence of another one (Approx. Sign. = 0.045 Cramer's V = 0.187; Phi = 0.187) was found, which makes it clear that 34.1% of the enterprises that apply procedures, policies and codes in the field of supply chains have also managed to implement those to control emissions from transport, against 17.6% who have not implemented such regulations in the field of supply chains, but have managed to implement such in order to reducing emissions from transport.

The relationship, of extreme importance for the analysis of the present question, is observed between the application of procedures, policies and codes to reduce emissions from transport and the application of the same in the field of implementing control to reduce pollutants from transport activity (Approx. Sign. = 0.000 Cramer's V = 0.716; Phi = 0.716). The relationship is strong, which goes to show that the responses are differentiated to an extremely high degree. As can be seen in Figure 24.5.1, the application of procedures, policies and codes to reduce emissions from transport is characteristic of the enterprises and farms that have introduced such in the field of implementation of control to reduce pollutants from transport activity.

In the analysis of the establishment of statistically significant relationships with regard to the implementation of procedures, policies and codes for a documented food safety management system, an extremely high level of association with the various variables was observed, therefore, more


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serious attention will be paid only to the most those relevant to the study, without, of course, neglecting the other connections.

In this sense, it is necessary to say that for women, for people with higher education; enterprises working in the field of processing; in the field of trade; enterprises open to synergy with stakeholders; enterprises currently developing green practices and technologies; enterprises for which the use of operational business tools would bring benefits, enterprises for which problems related to education and training are not significant; businesses for which raw material costs represent a high proportion of total production costs and businesses implementing supply chain procedures, policies and codes; it is characteristic to a greater extent that they declare the implementation of procedures, policies and codes for a documented food safety management system, compared to their opposites in the respective groups (men, non-processing enterprises, etc.). In all these cases, the values of Pearson's coefficient, Phi and Cramer's V give reason to conclude that weak statistically significant relationships are observed, the specificity of which has already been expressed.

The first stronger relationship (moderate in its strength) that is registered with respect to the application of procedures, policies and codes for a documented management system comes to show that it is highly characteristic of enterprises that work in the field of processing to implement precisely such procedures, policies and codes (Approx. Sign. = 0.000 Cramer's V = 0.399; Phi = 0.399). The figure below in the text clearly shows this property.

The second moderate relationship observed consists in the fact that companies for which finding funds for consulting assistance is the main barrier are the least likely to implement procedures, policies and codes for a


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documented food safety management system, while those who state that existing support mechanisms cannot provide a comprehensive solution are the most likely to implement such procedures and policies and codes. (Approx. Sign. = 0.002 Cramer's V = 0.329; Phi = 0.329).

The only statistically significant relationship that can be registered as credible regarding the implementation of procedures, policies and codes regarding certification related to environmental protection, social or business ethics, etc. (e.g. ISO 14001, ISO 45001/OHSAS 18001) is observed in the fact that respondents who are not clear about whether the enterprises and companies of which they are a part would benefit from operational business tools to the most significant extent do not apply the procedures, policies and codes under analysis (Approx. Sign. = 0.003 Cramer's V = 0.319; Phi = 0.319). On the other hand, respondents who are positive about the use of operational business tools are most likely to apply procedures, policies and codes regarding certification related to environmental protection, social or business ethics, etc. (e.g. ISO 14001, ISO 45001/OHSAS 18001).



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# 7. Conclusions & Suggestions

The first conclusion that can be made regarding the conducted research is that there is a disproportion in the responses of the respondents in terms of basic demographic, social, economic, etc. characteristics. Thus, the number of men who participated in the survey was higher, and the majority were middle-aged respondents who participated in the survey, while the youngest and oldest were the least represented. The presence of respondents with higher education prevails. From the point of view of the regional distribution of the answers, it should be noted that there is an extremely high level of participation of enterprises and farms from the Blagoevgrad region, while economic subjects from the other regions in the cross-border region are very poorly represented. On the other hand, to the highest degree, the answers were generated by owners of enterprises and farms, which suggests a high awareness of the respondents regarding the state of the enterprises and contributes to the awareness of the research. Enterprises and farms that have been in economic activity between 5 and 10 years are most strongly represented, while start-ups are least represented. Regarding the sphere in which they operate, it should be noted that most of the enterprises and farms participating in the research perform economic activity in the field of production, and the least in the field of service provision. The number of enterprises and farms with a staff between 0 and 10 people is the highest, while the smallest is that of companies with a staff between 50 and 100 people - only 3 such. In relation to the size, it should be noted that the enterprises and farms with an annual turnover of up to 500,000 euros are represented in the highest degree, while those in which it exceeds 2,000,000 euros are the smallest - 3 companies.

Regarding how the various market agents operating within the agri-food sector in the cross-border region, the analysis finds that there are many problems and deficits, the overcoming of which can improve the competitiveness of


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enterprises and farms from the agri-food sector in the cross-border region. For example, the preparation and implementation of a strategic development plan (development strategy) is not a widespread practice among the enterprises and farms of the cross-border region that participate in the study.

On the other hand, the preparation and implementation of marketing plans is an even less prevalent practice among the enterprises that are included in the study, which represents a barrier to the implementation of an adequate and consistent marketing policy and achieving market recognition.

In addition to this, it can be noted that there is a tendency to develop and implement green technologies and practices, but nevertheless it is registered that there is a serious deficiency of competence to recognize the essence of green practices and technologies. On the other hand, the share of those who have not introduced green technologies indicates a serious degree of non-introduction of such practices and technologies, as it equals 1/3.

In contrast to the degree of introduction of green practices and technologies, the concept of the circular economy is known and applied to a very low degree among the respondents.

Despite these problems, the fact that a high degree of readiness to realize synergy with stakeholders in the Agro-Food Sector in the cross-border region is registered is encouraging. Seen in perspective, this readiness can reflect on the increase of the social capital of enterprises and farms from the Agro-Food Sector in the Cross-Border Region, which increase should be objectified and in direct benefits such as increased market scope, securing partnerships, discovering sources for providing various forms of support, etc. A low level of introduction of practices characteristic of the circular economy in the activities of the enterprises and farms included in the study is registered, and there is a lack of trend and culture for the development of such practices and technologies at the moment. It can be said that there is some optimism


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regarding the benefits of using operational business tools, but there is also a lack of competence on the subject.

Regarding the importance of the problems, it can be noted that financial management is considered the most severe problem, while access to information and communication technologies can be considered the least significant problem. The specific thing about the problems is that the other three, which can be treated as significant - marketing, business management and human resources, is that they largely talk about internal-organizational problems, i.e. such in the structure of the organizations themselves, which is worrying.

Labor costs are among the most significant for the surveyed enterprises and farms, while administrative costs are the lightest. In addition to this, it should be noted that the costs of transport and logistics and of raw materials also represent a significant share (very close to that of labor wages).

In addition to this, it should be noted that the majority of enterprises/farms/companies that participated in the study did not use advisory support, and among the main barriers to this, the agri-food business entities from the cross-border region that participated in the study not to seek help for their problems are the unaffordable prices of consulting services. Another main barrier to the economic entities included in the research are the limitations of the existing support mechanisms, which are not able to provide a complete solution to the existing problems.

The research also shows that participation in professional organizations aimed at supporting business is a poorly represented practice. Of the studied economic subjects, most participate in chambers of commerce and industry. Membership in branch organizations, however, generates support for the enterprises and farms in the cross-border region included in the study, to a large extent, to the extent that more than 70% of the members of such


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structures received it in various forms. The main forms of support that are encountered are objectified in representation before regional and national regarding specific policies, as well as increasing the qualification of the staff.

The last conclusion that can be made is that, except in the area of ensuring safe working conditions, the development and implementation of procedures, practices and codes and practices are very poorly represented.

In addition to all that has been said, it should be noted that the observed phenomena and trends are particularly specific to different groups of respondents and enterprises, as shown in the analysis of statistically significant relationships.

Taking into consideration all of the above, we conclude in that in general terms the Agri-food sector in the areas of interest has started to be modernized. However, it is observed that they have to solve some crucial issues regarding their daily operation and their business structure. First of all, it would be truly beneficial if they manage to become a member of a large entity which could offer them a bigger negotiating power in the market as well as consulting in their problematic areas at a lower cost. Moreover, taking into account the changes in the EU Agri-food industry, it is necessary to focus more on the integration of "green" and circular economy practices in their business models. Finally, it is a challenge for Greek Agri-food companies to motivate more young people to be involved with primary production and agriculture since the average age of those who are related to the Agri-food sector is quite high, giving a warning of a serious lack of suitably skilled personnel in the foreseeable future.


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# Annex I: Logistics Performance of 200 countries

| Country Name | Logistics performance index: Overall score (1=low to 5=high) | Ability to track and trace consignments, score (1=low to 5=high) | Competence and quality of logistics services, score (1=low to 5=high) | Ease of arranging competitively priced international shipments, score (1=low to 5=high) | Quality of trade- and transport-related infrastructure, score (1=low to 5=high) |
|---|---|---|---|---|---|
| Germany | 4.20 | 4.24 | 4.31 | 3.86 | 4.37 |
| Sweden | 4.05 | 3.88 | 3.98 | 3.92 | 4.24 |
| Belgium | 4.04 | 4.05 | 4.13 | 3.99 | 3.98 |
| Austria | 4.03 | 4.09 | 4.08 | 3.88 | 4.18 |
| Japan | 4.03 | 4.05 | 4.09 | 3.59 | 4.25 |
| Netherlands | 4.02 | 4.02 | 4.09 | 3.68 | 4.21 |
| Singapore | 4.00 | 4.08 | 4.10 | 3.58 | 4.06 |
| Denmark | 3.99 | 4.18 | 4.01 | 3.53 | 3.96 |
| United Kingdom | 3.99 | 4.11 | 4.05 | 3.67 | 4.03 |
| Finland | 3.97 | 4.32 | 3.89 | 3.56 | 4.00 |
| United Arab Emirates | 3.96 | 3.96 | 3.92 | 3.85 | 4.02 |
| Hong Kong SAR, China | 3.92 | 3.92 | 3.93 | 3.77 | 3.97 |
| Switzerland | 3.90 | 4.10 | 3.97 | 3.51 | 4.02 |
| United States | 3.89 | 4.09 | 3.87 | 3.51 | 4.05 |
| New Zealand | 3.88 | 3.92 | 4.02 | 3.43 | 3.99 |
| France | 3.84 | 4.00 | 3.84 | 3.55 | 4.00 |
| Spain | 3.83 | 3.83 | 3.80 | 3.83 | 3.84 |
| Australia | 3.75 | 3.82 | 3.71 | 3.25 | 3.97 |
| Italy | 3.74 | 3.85 | 3.66 | 3.51 | 3.85 |
| Canada | 3.73 | 3.81 | 3.90 | 3.38 | 3.75 |
| Norway | 3.70 | 3.94 | 3.69 | 3.43 | 3.69 |



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| Country Name | Logistics performance index: Overall score (1=low to 5=high) | Ability to track and trace consignments, score (1=low to 5=high) | Competence and quality of logistics services, score (1=low to 5=high) | Ease of arranging competitively priced international shipments, score (1=low to 5=high) | Quality of trade- and transport-related infrastructure, score (1=low to 5=high) |
|---|---|---|---|---|---|
| Czech Republic | 3.68 | 3.70 | 3.72 | 3.75 | 3.46 |
| Portugal | 3.64 | 3.72 | 3.71 | 3.83 | 3.25 |
| Luxembourg | 3.63 | 3.61 | 3.76 | 3.37 | 3.63 |
| Korea, Rep. | 3.61 | 3.75 | 3.59 | 3.33 | 3.73 |
| China | 3.61 | 3.65 | 3.59 | 3.54 | 3.75 |
| Taiwan, China | 3.60 | 3.67 | 3.57 | 3.48 | 3.72 |
| Poland | 3.54 | 3.51 | 3.58 | 3.68 | 3.21 |
| Ireland | 3.51 | 3.62 | 3.60 | 3.42 | 3.29 |
| Qatar | 3.47 | 3.56 | 3.42 | 3.75 | 3.38 |
| Hungary | 3.42 | 3.67 | 3.21 | 3.22 | 3.27 |
| Thailand | 3.41 | 3.47 | 3.41 | 3.46 | 3.14 |
| South Africa | 3.38 | 3.41 | 3.19 | 3.51 | 3.19 |
| Chile | 3.32 | 3.20 | 3.13 | 3.27 | 3.21 |
| Slovenia | 3.31 | 3.27 | 3.05 | 3.19 | 3.26 |
| Estonia | 3.31 | 3.21 | 3.15 | 3.26 | 3.10 |
| Israel | 3.31 | 3.50 | 3.39 | 2.78 | 3.33 |
| Panama | 3.28 | 3.40 | 3.33 | 3.31 | 3.13 |
| Vietnam | 3.27 | 3.45 | 3.40 | 3.16 | 3.01 |
| Iceland | 3.23 | 3.35 | 3.61 | 2.79 | 3.19 |
| Malaysia | 3.22 | 3.15 | 3.30 | 3.35 | 3.15 |
| Greece | 3.20 | 3.18 | 3.06 | 3.30 | 3.17 |
| Oman | 3.20 | 2.97 | 3.05 | 3.30 | 3.16 |
| India | 3.18 | 3.32 | 3.13 | 3.21 | 2.91 |
| Cyprus | 3.15 | 3.15 | 3.00 | 3.15 | 2.89 |
| Indonesia | 3.15 | 3.30 | 3.10 | 3.23 | 2.90 |
| Turkey | 3.15 | 3.23 | 3.05 | 3.06 | 3.21 |
| Romania | 3.12 | 3.26 | 3.07 | 3.18 | 2.91 |
| Croatia | 3.10 | 3.01 | 3.10 | 2.93 | 3.01 |


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| Country Name | Logistics performance index: Overall score (1=low to 5=high) | Ability to track and trace consignments, score (1=low to 5=high) | Competence and quality of logistics services, score (1=low to 5=high) | Ease of arranging competitively priced international shipments, score (1=low to 5=high) | Quality of trade- and transport-related infrastructure, score (1=low to 5=high) |
|---|---|---|---|---|---|
| Cote d'Ivoire | 3.08 | 3.14 | 3.23 | 3.21 | 2.89 |
| Mexico | 3.05 | 3.00 | 3.02 | 3.10 | 2.85 |
| Bulgaria | 3.03 | 3.02 | 2.88 | 3.23 | 2.76 |
| Slovak Republic | 3.03 | 2.99 | 3.14 | 3.10 | 3.00 |
| Lithuania | 3.02 | 3.12 | 2.96 | 2.79 | 2.73 |
| Saudi Arabia | 3.01 | 3.17 | 2.86 | 2.99 | 3.11 |
| Brazil | 2.99 | 3.11 | 3.09 | 2.88 | 2.93 |
| Rwanda | 2.97 | 2.75 | 2.85 | 3.39 | 2.76 |
| Colombia | 2.94 | 3.08 | 2.87 | 3.19 | 2.67 |
| Bahrain | 2.93 | 3.01 | 2.86 | 3.02 | 2.72 |
| Philippines | 2.90 | 3.06 | 2.78 | 3.29 | 2.73 |
| Argentina | 2.89 | 3.05 | 2.78 | 2.92 | 2.77 |
| Ecuador | 2.88 | 3.07 | 2.75 | 2.75 | 2.72 |
| Kuwait | 2.86 | 2.66 | 2.80 | 2.63 | 3.02 |
| Iran, Islamic Rep. | 2.85 | 2.77 | 2.84 | 2.76 | 2.77 |
| Serbia | 2.84 | 2.79 | 2.70 | 2.97 | 2.60 |
| Ukraine | 2.83 | 3.11 | 2.84 | 2.83 | 2.22 |
| Egypt, Arab Rep. | 2.82 | 2.72 | 2.82 | 2.79 | 2.82 |
| Kenya | 2.81 | 3.07 | 2.81 | 2.62 | 2.55 |
| Malta | 2.81 | 2.80 | 2.80 | 2.70 | 2.90 |
| Latvia | 2.81 | 2.79 | 2.69 | 2.74 | 2.98 |
| Kazakhstan | 2.81 | 2.78 | 2.58 | 2.73 | 2.55 |
| Bosnia and | 2.81 | 2.89 | 2.80 | 2.84 | 2.42 |


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| Country Name | Logistics performance index: Overall score (1=low to 5=high) | Ability to track and trace consignments, score (1=low to 5=high) | Competence and quality of logistics services, score (1=low to 5=high) | Ease of arranging competitively priced international shipments, score (1=low to 5=high) | Quality of trade- and transport-related infrastructure, score (1=low to 5=high) |
|---|---|---|---|---|---|
| Herzegovina | | | | | |
| Costa Rica | 2.79 | 2.96 | 2.70 | 2.78 | 2.49 |
| Paraguay | 2.78 | 2.61 | 2.72 | 2.69 | 2.55 |
| Russian Federation | 2.76 | 2.65 | 2.75 | 2.64 | 2.78 |
| Benin | 2.75 | 2.75 | 2.50 | 2.73 | 2.50 |
| Montenegro | 2.75 | 2.58 | 2.72 | 2.68 | 2.57 |
| Mauritius | 2.73 | 3.00 | 2.86 | 2.12 | 2.80 |
| Lebanon | 2.72 | 2.80 | 2.47 | 2.80 | 2.64 |
| Brunei Darussalam | 2.71 | 2.75 | 2.71 | 2.51 | 2.46 |
| Macedonia, FYR | 2.70 | 2.64 | 2.74 | 2.84 | 2.47 |
| Lao PDR | 2.70 | 2.91 | 2.65 | 2.72 | 2.44 |
| Peru | 2.69 | 2.55 | 2.42 | 2.84 | 2.28 |
| Jordan | 2.69 | 2.77 | 2.55 | 2.44 | 2.72 |
| Uruguay | 2.69 | 2.78 | 2.71 | 2.73 | 2.43 |
| Maldives | 2.67 | 2.60 | 2.29 | 2.66 | 2.72 |
| Dominican Republic | 2.66 | 2.97 | 2.44 | 2.77 | 2.36 |
| Albania | 2.66 | 2.67 | 2.56 | 2.82 | 2.29 |
| São Tomé and Principe | 2.65 | 2.78 | 2.65 | 2.42 | 2.33 |
| Djibouti | 2.63 | 2.85 | 2.25 | 2.45 | 2.79 |
| Burkina Faso | 2.62 | 2.40 | 2.46 | 2.92 | 2.43 |
| Armenia | 2.61 | 2.51 | 2.50 | 2.65 | 2.48 |


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| Country Name | Logistics performance index: Overall score (1=low to 5=high) | Ability to track and trace consignments, score (1=low to 5=high) | Competence and quality of logistics services, score (1=low to 5=high) | Ease of arranging competitively priced international shipments, score (1=low to 5=high) | Quality of trade- and transport-related infrastructure, score (1=low to 5=high) |
|---|---|---|---|---|---|
| Honduras | 2.60 | 2.68 | 2.72 | 2.66 | 2.47 |
| Sri Lanka | 2.60 | 2.79 | 2.42 | 2.51 | 2.49 |
| Cameroon | 2.60 | 2.47 | 2.60 | 2.87 | 2.57 |
| Mali | 2.59 | 3.08 | 2.45 | 2.70 | 2.30 |
| Malawi | 2.59 | 2.67 | 2.68 | 2.55 | 2.18 |
| Cambodia | 2.58 | 2.52 | 2.41 | 2.79 | 2.14 |
| Uzbekistan | 2.58 | 2.71 | 2.59 | 2.42 | 2.57 |
| Bangladesh | 2.58 | 2.79 | 2.48 | 2.56 | 2.39 |
| El Salvador | 2.58 | 2.47 | 2.56 | 2.71 | 2.25 |
| Uganda | 2.58 | 2.41 | 2.50 | 2.76 | 2.19 |
| Belarus | 2.57 | 2.54 | 2.64 | 2.31 | 2.44 |
| Solomon Islands | 2.57 | 2.37 | 2.73 | 2.20 | 2.21 |
| Tunisia | 2.57 | 2.86 | 2.30 | 2.50 | 2.10 |
| Ghana | 2.57 | 2.57 | 2.51 | 2.53 | 2.44 |
| Comoros | 2.56 | 2.93 | 2.21 | 2.49 | 2.25 |
| Kyrgyz Republic | 2.55 | 2.64 | 2.36 | 2.22 | 2.38 |
| Morocco | 2.54 | 2.51 | 2.49 | 2.58 | 2.43 |
| Nigeria | 2.53 | 2.68 | 2.40 | 2.52 | 2.56 |
| Zambia | 2.53 | 1.98 | 2.48 | 3.05 | 2.30 |
| Bahamas, The | 2.53 | 2.52 | 2.27 | 2.50 | 2.41 |
| Jamaica | 2.52 | 2.48 | 2.54 | 2.53 | 2.32 |
| Nepal | 2.51 | 2.65 | 2.46 | 2.36 | 2.19 |
| Congo, Rep. | 2.49 | 2.38 | 2.28 | 2.87 | 2.07 |
| Moldova | 2.46 | 2.21 | 2.30 | 2.69 | 2.02 |
| Algeria | 2.45 | 2.60 | 2.39 | 2.39 | 2.42 |


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| Country Name | Logistics performance index: Overall score (1=low to 5=high) | Ability to track and trace consignments, score (1=low to 5=high) | Competence and quality of logistics services, score (1=low to 5=high) | Ease of arranging competitively priced international shipments, score (1=low to 5=high) | Quality of trade- and transport-related infrastructure, score (1=low to 5=high) |
|---|---|---|---|---|---|
| Togo | 2.45 | 2.45 | 2.25 | 2.52 | 2.23 |
| Georgia | 2.44 | 2.26 | 2.26 | 2.38 | 2.38 |
| Congo, Dem. Rep. | 2.43 | 2.51 | 2.49 | 2.37 | 2.12 |
| Sudan | 2.43 | 2.51 | 2.51 | 2.58 | 2.18 |
| Pakistan | 2.42 | 2.27 | 2.59 | 2.63 | 2.20 |
| Chad | 2.42 | 2.37 | 2.62 | 2.37 | 2.37 |
| Trinidad and Tobago | 2.42 | 2.27 | 2.27 | 2.59 | 2.38 |
| Guatemala | 2.41 | 2.42 | 2.25 | 2.33 | 2.20 |
| Turkmenistan | 2.41 | 2.56 | 2.31 | 2.29 | 2.23 |
| Gambia, The | 2.40 | 2.81 | 2.21 | 2.71 | 1.82 |
| Madagascar | 2.39 | 2.61 | 2.33 | 2.19 | 2.16 |
| Guinea-Bissau | 2.39 | 2.78 | 2.28 | 2.53 | 1.78 |
| Mongolia | 2.37 | 2.10 | 2.21 | 2.49 | 2.10 |
| Bolivia | 2.36 | 2.13 | 2.21 | 2.54 | 2.15 |
| Guyana | 2.36 | 2.44 | 2.24 | 2.17 | 2.09 |
| Fiji | 2.35 | 2.31 | 2.31 | 2.16 | 2.40 |
| Tajikistan | 2.34 | 2.33 | 2.33 | 2.31 | 2.17 |
| Mauritania | 2.33 | 2.47 | 2.19 | 2.19 | 2.26 |
| Equatorial Guinea | 2.32 | 2.13 | 2.25 | 2.88 | 1.88 |
| Myanmar | 2.30 | 2.20 | 2.28 | 2.20 | 1.99 |
| Syrian Arab Republic | 2.30 | 2.37 | 2.29 | 2.37 | 2.51 |
| Lesotho | 2.28 | 2.37 | 2.03 | 2.21 | 1.96 |



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| Country Name | Logistics performance index: Overall score (1=low to 5=high) | Ability to track and trace consignments, score (1=low to 5=high) | Competence and quality of logistics services, score (1=low to 5=high) | Ease of arranging competitively priced international shipments, score (1=low to 5=high) | Quality of trade- and transport-related infrastructure, score (1=low to 5=high) |
|---|---|---|---|---|---|
| Yemen, Rep. | 2.27 | 2.16 | 2.26 | 2.21 | 2.12 |
| Senegal | 2.25 | 2.11 | 2.11 | 2.36 | 2.22 |
| Venezuela, RB | 2.23 | 2.29 | 2.21 | 2.38 | 2.10 |
| Liberia | 2.23 | 2.05 | 2.14 | 2.08 | 1.91 |
| Somalia | 2.21 | 2.23 | 2.30 | 2.61 | 1.81 |
| Guinea | 2.20 | 2.70 | 2.07 | 2.32 | 1.56 |
| Cuba | 2.20 | 2.15 | 2.20 | 2.27 | 2.04 |
| Iraq | 2.18 | 2.19 | 1.91 | 2.32 | 2.03 |
| Papua New Guinea | 2.17 | 2.26 | 1.88 | 2.15 | 1.97 |
| Bhutan | 2.17 | 2.35 | 2.35 | 1.80 | 1.91 |
| Gabon | 2.16 | 2.07 | 2.07 | 2.10 | 2.09 |
| Central African Republic | 2.15 | 2.10 | 1.93 | 2.30 | 1.93 |
| Zimbabwe | 2.12 | 2.26 | 2.16 | 2.06 | 1.83 |
| Haiti | 2.11 | 2.05 | 2.19 | 2.01 | 1.94 |
| Libya | 2.11 | 1.64 | 2.05 | 1.99 | 2.25 |
| Eritrea | 2.09 | 2.17 | 2.17 | 2.09 | 1.86 |
| Sierra Leone | 2.08 | 2.27 | 2.00 | 2.18 | 1.82 |
| Niger | 2.07 | 2.22 | 2.10 | 2.00 | 2.00 |
| Burundi | 2.06 | 2.01 | 2.33 | 2.21 | 1.95 |
| Angola | 2.05 | 2.00 | 2.00 | 2.20 | 1.86 |
| Afghanistan | 1.95 | 1.70 | 1.92 | 2.10 | 1.81 |

*Table 5: Logistics Performance of 200 countries*


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# Annex II: Tables on Export and Imports for All Commodities

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|
| Belgium | 340,390,790.3 | 339,025,541.23 | 340,609,606.59 | 337,874,405.49 | 342,030,535.83 | 358,035,858.93 | 265,450,237.16 | 261,942,127.71 |
| Bulgaria | 24,528,282.33 | 24,893,899.59 | 25,328,506.79 | 25,727,128.39 | 25,452,269.54 | 29,095,901.98 | 30,751,125.94 | 32,284,960.08 |
| Czechia | 82,626,889.98 | 81,740,677.66 | 85,317,435.04 | 91,827,669.75 | 93,830,854.54 | 102,242,834.99 | 110,637,766.43 | 110,219,600.9 |
| Denmark | 68,056,568.35 | : | 69,230,113.04 | 73,523,253.4 | 73,709,356.32 | 77,086,258.38 | 79,940,279.1 | 82,405,707.43 |
| Germany [8] | 747,863,659.52 | 735,813,964.47 | 766,975,635.2 | 798,712,087.23 | 774,075,146.56 | 866,434,660.51 | 911,227,752.74 | 941,060,411.58 |
| Estonia | 13,677,055.05 | 13,392,518.12 | 13,329,421.14 | 12,671,070.81 | 13,475,349.1 | 14,721,608.39 | : | 15,216,049.9 |
| Ireland | : | 52,927,019.47 | 59,866,739.22 | 67,504,450.56 | 70,531,471.96 | 80,710,333.36 | 89,168,360.77 | 85,910,341.86 |
| Greece | 48,364,479.21 | 46,093,730.15 | 46,721,647.59 | 41,957,208.91 | 42,350,381.31 | 45,133,414.3 | 50,529,936.9 | 51,780,364.59 |
| Spain | 237,013,433.07 | 233,184,513.64 | 249,590,045.03 | 256,417,601.89 | 256,187,890.75 | 280,276,611.88 | 301,439,629.67 | 297,841,318.47 |
| France | 449,968,173.71 | 439,896,614.18 | 438,307,786.38 | 443,274,894.67 | 452,830,153.03 | 466,023,440.1 | 485,244,465.89 | 487,523,048.14 |
| Croatia | 16,139,111.46 | 16,407,075.76 | 16,988,960.17 | 18,326,898.27 | 19,067,658.04 | 21,193,826.84 | 22,977,193.53 | 23,151,984.66 |
| Italy | : | : | 304,516,040.01 | 315,951,768.2 | 313,507,559.15 | 341,463,555.18 | 362,425,187.65 | 367,084,975.95 |
| Cyprus | 5,655,570.96 | 4,746,167.67 | 6,007,175.62 | 6,323,712.27 | 7,064,208.67 | 8,018,240.13 | 8,709,388.37 | 7,897,547.15 |
| Latvia | 12,941,828.23 | 12,912,802.15 | 13,127,336.56 | 12,698,531.21 | 12,470,795.33 | 14,319,968.48 | 15,324,517.19 | 15,440,341.94 |
| Lithuania | 22,794,638.39 | 23,208,484.28 | 21,425,656.17 | 21,134,417.91 | 20,725,398.41 | 23,574,883.68 | 25,944,565.97 | 26,753,466.11 |
| Luxembourg | 20,858,700.81 | 19,713,210.79 | 19,704,686.36 | 20,849,127.96 | 19,351,124.09 | 19,868,406.53 | 17,266,260.18 | 17,952,454.86 |
| Hungary | 72,332,708.21 | 73,840,357.93 | 77,414,594.36 | 81,262,598.12 | 83,237,667.52 | 92,530,872.75 | 84,643,279.34 | 89,265,753.84 |
| Malta | 5,117,268.38 | 4,624,521.68 | 5,171,486.02 | 5,418,627.64 | : | : | 4,311,555.13 | : |
| Netherlands | : | 330,940,722.87 | 330,522,787.05 | 323,182,895.09 | 325,266,201.28 | 356,298,469.37 | 378,604,174.3 | 396,159,517.32 |
| Austria | 136,049,433.76 | 134,518,074.41 | 133,323,900.28 | 136,611,618.56 | 139,532,578.66 | 152,269,270.85 | 154,956,492.22 | 156,543,336.49 |
| Poland | 137,255,507.79 | 138,489,971.48 | 147,355,657.72 | 151,336,558.38 | 152,993,936.7 | 172,872,067.61 | : | 194,331,037.42 |
| Portugal | 55,555,799.53 | 56,338,174.39 | 58,269,253.16 | 59,383,728.1 | 60,422,755.64 | 68,246,738.62 | 69,088,432.32 | 73,063,692.24 |
| Romania | 49,864,863.12 | 49,956,679.74 | 58,284,913.87 | 62,584,577.68 | 66,868,223.12 | 74,865,212.09 | 75,536,103.45 | 78,858,746.57 |
| Slovenia | 20,378,833.03 | 20,074,594.05 | 20,489,681.76 | 21,244,612.03 | 22,180,522.66 | 25,565,475.31 | 28,270,555.48 | 31,015,740.48 |
| Slovakia | : | 56,338,784.92 | 55,549,700.73 | 60,481,294.34 | 61,888,964.25 | 66,815,349.55 | 70,524,239.14 | 70,305,000.86 |
| Finland | 55,797,012.17 | 56,026,888.89 | 55,611,967.97 | 53,074,069.44 | 54,183,436.23 | 61,195,350.8 | 65,652,562.06 | 64,848,931.97 |
| Sweden | 121,130,986.67 | 113,013,648.75 | 113,204,242.59 | 116,705,191.9 | 118,533,357.29 | 128,228,953 | 134,964,748.4 | 133,341,190.99 |
| Iceland | : | : | 4,037,043.52 | 4,769,495.41 | 4,927,907.07 | 5,876,662.38 | 6,151,745.77 | 5,613,970.34 |
| Norway | : | : | : | 68,271,916.89 | : | : | : | : |
| Switzerland | : | : | : | : | 244,117,739.75 | 238,887,777.54 | 230,863,848.16 | 244,330,775.82 |
| United Kingdom | 502,977,038.63 | 464,256,441.51 | 486,035,669.36 | 535,281,389.44 | 536,140,043.75 | 522,097,739.32 | 506,379,139.71 | : |
| Serbia | 13,466,942.4 | 13,260,497.85 | 13,433,917.44 | 14,356,529.61 | 15,144,519.57 | 17,516,112.85 | 20,038,361.68 | 22,181,108.83 |
| Turkey | : | : | : | 186,510,222 | 179,553,997.31 | 206,653,677.13 | 184,454,719.36 | 181,024,714.28 |
| Bosnia and Herzegovina | : | : | : | : | 8,138,980.88 | 9,180,597.13 | 9,709,853.01 | 9,797,764.49 |
| Kosovo [9] | : | : | : | : | : | 2,891,521.6 | 3,263,305.15 | 3,390,850.39 |

*Table 1: Trade by commodity and NACE Rev. 2 activity, IMPORTS, Total CPA products (EUROSTAT, Trade by commodity and NACE Rev. 2 activity, EXT_TEC05, 2022)*

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|
| **Belgium** | 340,425,133.46 | 346,068,187.18 | 347,950,822.88 | 350,495,271.11 | 352,311,969.21 | 370,742,130.37 | 255,824,042.56 | 260,047,694.63 |
| **Bulgaria** | 20,250,211.12 | 21,640,360.95 | 21,495,117.64 | 22,205,855.02 | 23,104,517.36 | 26,195,789.33 | 26,835,312.69 | 28,316,102.55 |
| **Czechia** | 86,784,434.52 | 86,606,270.19 | 91,612,362.99 | 97,226,336.47 | 99,924,841.69 | 108,838,584.58 | 114,290,899.83 | 116,148,386.85 |
| **Denmark** | 80,231,352.28 | : | 79,870,029.92 | 83,359,748.14 | 84,613,296.55 | 87,958,185.28 | 87,190,436.52 | 93,432,867.02 |

[8] (until 1990 former territory of the FRG)

[9] (under United Nations Security Council Resolution 1244/99)



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| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|
| Germany [10] | 976,658,507.42 | 955,755,952.56 | 989,893,812.82 | 1,050,381,026.77 | 1,003,455,179.66 | 1,113,022,967.2 | 1,148,097,691.35 | 1,168,620,762.55 |
| Estonia | 11,968,605.46 | 11,719,514.08 | 11,605,320.97 | 11,103,888.71 | 11,790,094.9 | 12,727,729.47 | : | 12,986,400.22 |
| Ireland | : | 86,512,998.09 | 89,666,051.78 | 110,383,518.87 | 115,974,749.11 | 118,922,550.15 | 135,163,862.92 | 146,094,949.54 |
| Greece | 27,172,529.03 | 26,841,268.31 | 26,643,595.22 | 25,279,784.45 | 24,989,437.28 | 28,280,232.23 | 31,902,928.94 | 31,329,366.75 |
| Spain | 207,527,465.75 | 214,257,982.13 | 222,770,659.23 | 232,243,255.53 | 239,810,172.22 | 255,952,421.59 | 266,926,781.7 | 267,189,195.29 |
| France | 382,461,055.63 | 374,010,690.92 | 372,876,251.5 | 388,557,531.18 | 391,420,532.78 | 401,254,526.91 | 414,131,369.28 | 422,196,472.19 |
| Croatia | 9,599,957.63 | 9,463,033.74 | 10,148,060.91 | 11,298,327.88 | 11,935,620.85 | 13,262,850.83 | 13,966,129.59 | 13,170,765.36 |
| Italy | : | : | 378,553,914.9 | 390,833,847.22 | 395,368,010.32 | 425,122,871.15 | 439,913,479.35 | 421,453,054.78 |
| Cyprus | 1,347,164.37 | 1,512,465.55 | 2,370,692.92 | 2,958,114.04 | 2,676,876.19 | 2,901,818.25 | 3,986,655.28 | 2,973,024.89 |
| Latvia | 9,956,773.14 | 10,060,552.62 | 10,241,729.35 | 10,302,439.96 | 10,312,399.91 | 11,472,997.08 | 11,994,523.55 | 12,156,657.87 |
| Lithuania | 18,961,186.79 | 19,617,276.89 | 18,435,566.2 | 18,105,962.86 | 17,879,035.02 | 20,439,246.11 | 21,890,029.3 | 22,661,540.51 |
| Luxembourg | 14,566,442.82 | 13,808,380.49 | 14,300,458.03 | 15,354,651.25 | 14,137,449.08 | 13,860,761.64 | 10,714,008.87 | 10,995,901.16 |
| Hungary | 78,698,241.14 | 79,492,799.51 | 81,820,476.12 | 87,260,963.06 | 90,519,775.32 | 98,286,063.27 | 77,858,577.67 | 80,594,583.04 |
| Malta | 3,304,534.79 | 2,738,935.53 | 2,206,881.98 | 2,346,116.22 | : | : | 2,418,132.74 | : |
| Netherlands | : | 340,163,791.19 | 340,700,538.6 | 338,438,254.22 | 343,041,205.27 | 370,353,771.51 | 389,522,408.02 | 410,833,983.05 |
| Austria | 125,869,859.61 | 127,333,709.27 | 129,682,013.15 | 133,525,132.3 | 134,136,781.78 | 145,026,588.39 | 147,103,166.87 | 150,498,352.2 |
| Poland | 124,180,207.17 | 132,297,382.96 | 137,830,417.53 | 145,602,578.46 | 147,041,825.85 | 160,937,792.67 | : | 178,615,736.84 |
| Portugal | 44,524,701.15 | 46,404,766.89 | 47,004,395.33 | 48,563,302.38 | 48,972,941.61 | 53,771,229.93 | 52,973,020.71 | 54,555,265.3 |
| Romania | 40,491,496 | 44,368,219.78 | 51,595,143.89 | 53,496,659.28 | 56,204,190.35 | 61,399,251.52 | 58,407,552.17 | 59,154,642.49 |
| Slovenia | 19,186,400.14 | 19,499,076.39 | 20,714,410.26 | 21,383,130.46 | 22,126,597.39 | 25,183,278.49 | 27,554,931.65 | 30,172,980.85 |
| Slovakia | : | 58,474,265.1 | 58,109,677.49 | 60,768,004.74 | 61,164,826.61 | 64,427,875.6 | 67,316,548.79 | 64,185,069.04 |
| Finland | 52,575,378 | 52,795,164.14 | 52,635,479.75 | 51,723,942.94 | 50,579,000.89 | 59,158,917.74 | 62,907,713.88 | 64,252,748.41 |
| Sweden | 130,364,659.32 | 121,511,030.45 | 119,779,302.14 | 121,637,302.35 | 121,238,511.1 | 131,344,023.77 | 136,224,365.5 | 138,916,075.8 |
| Iceland | : | : | 3,811,673.44 | 4,275,412.21 | 4,019,671.79 | 4,308,584.47 | 4,706,211.62 | 4,622,047.27 |
| Norway | : | : | : | 65,926,118.88 | : | : | : | : |
| Switzerland | : | : | : | : | 273,718,584.83 | 265,263,881.35 | 259,879,395.64 | 278,667,132.8 |
| United Kingdom | 332,543,173.16 | 374,639,090.73 | 348,349,174.67 | 387,172,329.76 | 346,483,282.12 | 361,846,412.83 | 323,558,488.97 | : |
| Serbia | 8,260,637.81 | 10,412,272.44 | 10,545,226.95 | 11,438,313.8 | 12,729,746.41 | 14,368,400.71 | 15,640,949.45 | 16,848,457.34 |
| Turkey | : | : | : | 129,553,884 | 128,994,586.26 | 139,263,211.45 | 142,690,417.24 | 153,326,970.63 |
| Bosnia and Herzegovina | : | : | : | : | 4,811,546.13 | 5,649,928.04 | 6,080,885.87 | 5,872,481.12 |
| Kosovo [11] | : | : | : | : | : | 376,018.9 | 365,838.66 | 381,965.49 |

*Table 2: Trade by commodity and NACE Rev. 2 activity, IMPORTS, Total CPA products (EUROSTAT, Trade by commodity and NACE Rev. 2 activity, EXT_TEC05, 2022)*

# Annex III: Tables on Imports and Exports of Agricultural products and Foods

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|
| Belgium | 10,703,764.26 | 10,541,016.9 | 10,683,494.94 | 9,427,316.03 | 10,191,297.77 | 10,687,569.79 | 7,136,866.22 | 7,103,134.84 |
| Bulgaria | 523,728.1 | 543,332.03 | 558,504.44 | 558,699.77 | 587,407.36 | 744,940.89 | 745,650.04 | 891,912.99 |
| Czechia | 1,511,426.19 | 1,535,246.36 | 1,465,847.32 | 1,464,843.75 | 1,558,447.2 | 1,637,773 | 1,682,157.46 | 1,749,610.6 |
| Denmark | 2,481,794.9 | : | 2,938,343.2 | 3,237,615.62 | 3,331,991.67 | 3,491,976.96 | 3,686,863.98 | 3,691,070.66 |

[10] (until 1990 former territory of the FRG)
[11] (under United Nations Security Council Resolution 1244/99)


This Project is co-funded by the European Development Fund (ERDF) and by national funds of the countries participating in the Interreg V-A "Greece – Bulgaria 2014-2020" Cooperation Programme

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|
| Germany [12] | 22,815,682.94 | 29,835,088.6 | 23,074,958.73 | 25,323,006.64 | 23,492,040.87 | 24,631,954.19 | 24,101,962.55 | 26,733,348.72 |
| Estonia | 226,846.36 | 293,033.95 | 288,749.34 | 292,640.28 | 260,301.38 | 300,222.78 | : | 332,433.45 |
| Ireland | : | 1,328,720.76 | 1,311,576.66 | 1,473,003.48 | 1,369,743.91 | 1,485,061.68 | 1,663,577.11 | 1,690,207.65 |
| Greece | 1,466,895.14 | 1,497,529.02 | 1,439,643.74 | 1,479,957.9 | 1,411,373.51 | 1,464,003.03 | 1,472,645.03 | 1,565,631.23 |
| Spain | 9,942,669.49 | 9,527,923.95 | 9,938,511.54 | 10,996,944.86 | 11,074,169.42 | 11,507,508.15 | 11,943,339.68 | 11,439,811.11 |
| France | 10,080,770.92 | 10,833,753.64 | 10,564,891.91 | 11,615,545.52 | 11,807,908.76 | 12,788,513.18 | 12,493,348.46 | 12,807,189.36 |
| Croatia | 438,234.4 | 463,644.91 | 493,023.18 | 542,149.99 | 527,632.61 | 612,961.05 | 645,410.53 | 657,758.05 |
| Italy | : | : | 11,173,143.35 | 11,882,240.55 | 11,933,890.44 | 12,435,084.99 | 11,883,563.88 | 13,048,126.98 |
| Cyprus | 190,899.97 | 186,066.22 | 192,896.4 | 189,597.63 | 174,259.73 | 190,670.15 | 205,625.45 | 209,568.36 |
| Latvia | 523,678.03 | 490,900.5 | 547,248.42 | 557,752.93 | 571,239.6 | 254,181.12 | 285,340.63 | 634,159.52 |
| Lithuania | 672,207.83 | 744,231.02 | 789,031.42 | 893,623.63 | 719,146.07 | 755,207.92 | 759,786.01 | 879,869.97 |
| Luxembourg | 633,845.34 | 593,886.29 | 583,260.47 | 634,709.11 | 585,654.98 | 595,207.82 | 602,176.17 | 605,965.85 |
| Hungary | 1,005,553.17 | 1,036,022.58 | 1,057,086.92 | 1,137,138 | 1,122,959.81 | 1,199,761.6 | 1,010,233.26 | 1,267,221.59 |
| Malta | 125,786.58 | 129,990.32 | 109,423.87 | 122,803.51 | 176,158.08 | 181,213.43 | 170,040.06 | 153,003.17 |
| Netherlands | : | 14,550,991.36 | 14,654,289.85 | 6,175,960.79 | 5,411,170.22 | 16,570,413.54 | 16,970,127.1 | 17,828,273.71 |
| Austria | 3,207,412.35 | 3,417,326.55 | 3,276,486.69 | 3,554,676.14 | 3,595,161.9 | 3,628,770.68 | 3,593,616.62 | 3,623,212.04 |
| Poland | 4,129,301.67 | 4,473,690.75 | 4,670,030.79 | 4,743,084.48 | 4,671,436.24 | 5,362,822.04 | : | 5,773,211.34 |
| Portugal | 3,027,023.21 | 3,179,848.15 | 2,995,767.18 | 3,168,459.02 | 3,309,697.93 | 3,518,829.38 | 3,096,888.17 | 3,187,579.75 |
| Romania | 1,237,223.36 | 1,381,799.97 | 1,689,965.14 | 2,218,002.56 | 2,151,628.32 | 2,220,018.35 | 2,133,327.52 | 2,187,455.84 |
| Slovenia | : | 503,935.78 | 471,872.73 | 499,903.7 | : | 575,294.53 | : | : |
| Slovakia | : | 1,002,004.39 | 883,091.75 | 904,366.86 | 886,473.75 | 1,002,224.26 | 1,040,672.92 | 1,124,697.87 |
| Finland | 1,644,547.08 | 0 | 1,842,389.46 | 1,683,331.22 | 1,691,613.13 | 1,767,975.54 | 1,984,550.9 | 1,810,670.91 |
| Sweden | 2,480,930.84 | 2,471,526.06 | 2,591,939.38 | 2,745,206.47 | 2,585,408.07 | 2,678,557.71 | 2,946,996.78 | 2,854,276.01 |
| Iceland | : | : | 88,109.07 | 99,272.86 | 105,848.19 | 110,468.83 | 110,666.61 | 111,255.12 |
| Norway | : | : | : | 1,851,105.57 | 1,844,790.54 | 1,870,449.98 | : | : |
| Switzerland | : | : | : | : | 3,305,255.93 | 3,396,391.61 | 3,244,992.9 | 3,300,040.19 |
| United Kingdom | 8,123,928.31 | 11,785,770.21 | 11,291,407.44 | 12,645,948.32 | 11,585,015.13 | 11,909,949.73 | 10,188,379.76 | : |
| Serbia | 477,520.56 | 461,335.67 | 503,658.64 | 567,340.79 | 548,403.6 | 621,699.72 | 554,543.11 | 578,788.51 |
| Turkey | : | : | : | 6,482,807 | 6,218,300.77 | 7,889,732.69 | 7,393,312.42 | 8,397,596.42 |
| Bosnia and Herzegovina | : | : | : | : | 380,603.67 | 411,806.04 | 372,633.04 | 373,885.48 |
| Kosovo [13] | : | : | : | : | : | 130,385.92 | 139,766.29 | 151,382.06 |

[12] (until 1990 former territory of the FRG)
[13] (under United Nations Security Council Resolution 1244/99)


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*Table 3: Trade by commodity and NACE Rev. 2 activity, IMPORTS, Products of agriculture, forestry and fishing (EUROSTAT, Trade by commodity and NACE Rev. 2 activity, EXT_TEC05, 2022)*

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|
| **Belgium** | 6,724,061.8 | 6,731,148.87 | 6,715,448.68 | 6,330,508.33 | 6,619,322.31 | 7,124,920.91 | 3,894,557.05 | 3,952,750.98 |
| **Bulgaria** | 1,659,560.8 | 2,260,051.2 | 1,834,984.38 | 1,673,058.89 | 1,955,105.01 | 1,804,775.23 | 1,835,760.56 | 2,086,305.7 |
| **Czechia** | 1,603,914.97 | 1,663,501.52 | 1,683,859.16 | 1,834,492.92 | 1,804,336.16 | 1,858,716.14 | 1,774,023.39 | 1,938,111.11 |
| **Denmark** | 4,331,488.54 | : | 4,243,466.43 | 4,726,011.9 | 4,482,877.86 | 4,930,990.06 | 4,435,801.17 | 4,600,336.53 |
| **Germany** [14] | 8,085,147.73 | 15,178,215.13 | 8,615,124.69 | 8,877,158.49 | 8,230,248.92 | 7,978,218.22 | 7,587,456.28 | 7,846,524.05 |
| **Estonia** | 321,897.29 | 347,700.81 | 320,839.84 | 364,423.73 | 341,748.38 | 364,218.34 | : | 442,159.84 |
| **Ireland** | : | 850,084.39 | 813,134.59 | 913,506.81 | 716,458.45 | 850,954.94 | 782,763.85 | 842,887.22 |
| **Greece** | 2,195,768.02 | 2,112,690.99 | 2,086,496.45 | 2,026,287.01 | 2,281,716.97 | 2,194,689.71 | 2,199,396.57 | 2,386,066.4 |
| **Spain** | 12,420,059.45 | 13,668,306.05 | 13,752,098.78 | 15,541,882.31 | 15,913,742.36 | 16,266,309.63 | 16,603,391.15 | 16,991,427.87 |
| **France** | 12,514,693.19 | 13,441,259.99 | 12,210,715.01 | 12,601,196.97 | : | 12,766,966.28 | 13,683,774.93 | 13,907,589.13 |
| **Croatia** | 413,756.72 | 415,148.87 | 434,425.86 | 526,786.69 | 481,162.46 | 663,079.31 | 683,864.29 | 690,930.29 |
| **Italy** | : | : | 4,565,368.06 | 5,117,613.69 | 5,250,465.99 | 5,457,467.95 | 5,257,077.29 | 6,002,608.21 |
| **Cyprus** | 90,656.07 | 122,364.04 | 101,207.66 | 92,622.97 | 105,274.3 | 104,009.2 | 103,639.09 | 108,322.05 |
| **Latvia** | 960,830.04 | 781,396.15 | 746,122.93 | 881,925.15 | 876,863.88 | 689,329.71 | 541,784.61 | 925,623.47 |
| **Lithuania** | 1,093,286.9 | 1,256,888.03 | 1,212,336.82 | 1,302,610.16 | 1,176,696.51 | 1,155,062.99 | 1,030,348.85 | 1,249,325.42 |
| **Luxembourg** | 179,262.43 | 259,728.87 | 197,573.8 | 213,417.09 | 203,865.93 | 229,078.27 | 207,968.42 | : |
| **Hungary** | 2,874,931.83 | 2,478,276.42 | 2,377,699.19 | 2,570,198.08 | 2,439,662.72 | 2,924,054 | 2,100,701.92 | 2,537,677.36 |
| **Malta** | 47,046.73 | 14,997.8 | 17,394.25 | 60,875.93 | 132,224.21 | 98,246.63 | 49,672.8 | 116,975.36 |
| **Netherlands** | : | 21,449,785.83 | 20,964,065.38 | 2,802,191.56 | 2,574,464.01 | 23,607,898.45 | 24,219,395.28 | 26,028,945.14 |
| **Austria** | 1,278,605.13 | 1,260,464.39 | 1,212,335.88 | 1,209,171.19 | 1,278,500.44 | 1,325,701.93 | 1,199,203.64 | 1,270,237.07 |
| **Poland** | 2,782,895.47 | 3,393,517.26 | 3,444,763.43 | 3,684,768.24 | 3,325,587.33 | 3,301,679.06 | : | 3,398,631.3 |
| **Portugal** | 962,309.4 | 981,202.14 | 1,111,947.21 | 1,150,445.35 | 1,234,369.56 | 1,447,174.85 | 1,388,401.26 | 1,482,301.67 |
| **Romania** | 1,849,569.17 | 2,856,302.81 | 3,228,495.82 | 3,209,624.52 | 3,417,079.13 | 3,625,765.29 | 3,025,666.66 | 3,279,173.71 |
| **Slovenia** | : | 276,645.82 | 314,049.77 | 353,004.57 | 416,508.75 | 486,855.68 | 478,706.68 | 423,567.26 |
| **Slovakia** | : | 1,173,393.85 | 933,651.15 | 914,705.73 | 876,923.05 | 894,484.9 | 864,452.77 | 863,279.62 |
| **Finland** | 936,442.09 | 0 | 756,324.22 | 919,257.55 | 603,271.46 | 805,918.05 | 706,203.73 | 695,024.61 |
| **Sweden** | 1,938,896.84 | 2,284,264.77 | 2,672,388.49 | 3,106,475.96 | 3,680,306.53 | 3,421,640.83 | 3,703,508.99 | 3,670,676.16 |
| **Iceland** | : | : | 84,082.59 | 106,982.13 | 146,929.27 | 166,257.96 | 205,961.8 | 271,551.51 |
| **Norway** | : | : | : | 4,980,736.46 | 6,162,416.42 | 6,277,180.66 | : | : |
| **Switzerland** | : | : | : | : | 157,999.18 | 155,262.75 | 154,973.13 | 157,439.95 |
| **United Kingdom** | 1,673,761.09 | 2,624,513.98 | 2,797,396.74 | 3,300,381.85 | 3,232,308.36 | 2,963,538.39 | 2,801,770.99 | : |
| **Serbia** | 742,679.01 | 633,063.2 | 726,349 | 837,828.12 | 936,887.89 | 850,609.61 | 835,480.96 | 1,015,874.97 |
| **Turkey** | : | : | : | 5,267,813 | 5,130,010.28 | 5,053,779.19 | 5,050,047.92 | 5,316,079.67 |
| **Bosnia and Herzegovina** | : | : | : | : | 140,571.79 | 144,524.88 | 126,944.02 | 116,483.2 |
| **Kosovo** [15] | : | : | : | : | : | 10,973.58 | 12,784 | 14,279.26 |

[14] (until 1990 former territory of the FRG)
[15] (under United Nations Security Council Resolution 1244/99)



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*Table 4: Trade by commodity and NACE Rev. 2 activity, EXPORTS, Products of agriculture, forestry and fishing (EUROSTAT, Trade by commodity and NACE Rev. 2 activity, EXT_TEC05, 2022)*

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|
| **Belgium** | 16,174,457.86 | 17,059,102.4 | 17,531,148.74 | 17,486,709.37 | 17,901,017.84 | 19,173,458.34 | 15,543,220.8 | 15,521,773.46 |
| **Bulgaria** | 1,417,631.75 | 1,517,818.1 | 1,571,577.95 | 1,670,433.84 | 1,736,828.7 | 1,877,414.44 | 1,912,958.13 | 2,079,722.8 |
| **Czechia** | 3,777,642.78 | 4,005,135.33 | 4,228,921.94 | 4,689,463.79 | 4,815,345 | 4,873,315.98 | 4,906,546.05 | 5,293,915.89 |
| **Denmark** | 7,131,743.2 | : | 7,430,705.08 | 7,677,394.11 | 8,143,018.95 | 8,234,957.68 | 8,270,580.63 | 8,631,061.47 |
| **Germany** [16] | 34,986,235.55 | 34,015,955.12 | 36,537,115.71 | 37,439,058.65 | 40,320,170.67 | 42,854,327.8 | 42,213,718.06 | 43,547,365.75 |
| **Estonia** | 725,231.7 | 796,298.81 | 754,775.91 | 738,544.2 | 786,220.65 | 881,903.72 | : | 936,905.07 |
| **Ireland** | : | 4,873,901.14 | 5,025,234.24 | 5,316,471.49 | 5,389,512.02 | 5,878,476.25 | 6,249,591.71 | 6,212,124.8 |
| **Greece** | 4,391,209.09 | 4,484,552.75 | 4,483,790.77 | 4,309,186.77 | 4,576,542.17 | 4,824,788.25 | 4,648,103.06 | 4,837,827.08 |
| **Spain** | 15,405,589.27 | 15,541,850.68 | 15,883,937.78 | 17,056,965.49 | 17,772,963.67 | 19,827,590.68 | 19,768,179.22 | 20,845,364.92 |
| **France** | 27,356,335.39 | 28,287,356.13 | 28,581,107.52 | 27,949,610.79 | 30,748,996.2 | 32,272,610.77 | 32,382,017.32 | 32,881,764.12 |
| **Croatia** | 1,394,937.01 | 1,455,154.67 | 1,602,563.62 | 1,769,284.62 | 1,809,205.58 | 2,029,987.34 | 2,090,937.23 | 2,221,049.74 |
| **Italy** | : | : | 24,780,443.41 | 24,457,045.02 | 24,289,455.09 | 25,298,683.16 | 24,122,494.18 | 25,529,499.35 |
| **Cyprus** | 603,139.64 | 577,605.42 | 613,981.24 | 630,908.74 | 675,811.41 | 719,708.78 | 739,693.13 | 769,644.43 |
| **Latvia** | 1,067,343.78 | 1,116,544.44 | 1,052,999.66 | 969,685.69 | 1,036,053.9 | 702,648.75 | 701,137.34 | 1,277,613.52 |
| **Lithuania** | 1,504,582.72 | 1,605,998 | 1,586,122.72 | 1,523,799.48 | 1,618,655.21 | 1,781,465.73 | 1,909,592.45 | 2,071,030.77 |
| **Luxembourg** | 1,159,858.07 | 1,204,318.41 | 1,257,626.23 | 1,236,921 | 1,260,989.34 | 1,320,413.82 | 1,077,170.83 | 1,140,624.89 |
| **Hungary** | 2,848,186.73 | 2,864,261.2 | 3,015,985.87 | 3,079,069.71 | 3,305,516.19 | 3,552,440.46 | 3,362,010.03 | 3,906,929.78 |
| **Malta** | 382,486.12 | 397,207.1 | 405,168.8 | 416,073.32 | 427,790.77 | 464,649.86 | 458,716.81 | 437,809.09 |
| **Netherlands** | : | 24,268,352.13 | 23,468,491.51 | 15,548,285.2 | 15,683,155.5 | 27,987,905.04 | 28,364,937.1 | 29,088,434.09 |
| **Austria** | 6,562,099.52 | 6,805,390.16 | 7,018,172.3 | 7,050,904.16 | 7,230,642.67 | 7,670,958.54 | 7,700,058.41 | 7,906,240.58 |
| **Poland** | 7,905,014.09 | 8,152,793.52 | 8,429,891.55 | 8,529,319.96 | 9,058,905.59 | 9,987,270.21 | : | 10,650,237.1 |
| **Portugal** | 5,216,133.78 | 5,371,042.52 | 5,251,363.7 | 5,382,928.29 | 5,810,213.51 | 6,372,866.51 | 6,466,274.57 | 6,670,356.43 |
| **Romania** | 2,783,933.83 | 2,840,153.54 | 3,045,995.48 | 3,394,220.98 | 3,810,468.85 | 4,213,266.87 | 4,289,105.06 | 4,794,384.04 |
| **Slovenia** | 1,119,312.12 | 1,234,617.27 | 1,267,235.43 | 1,343,389.02 | 1,402,980.68 | 1,489,331.63 | 1,586,458.58 | 1,630,326.48 |
| **Slovakia** | : | 2,596,386.96 | 2,412,084.26 | 2,407,939.66 | 2,641,672.35 | 2,604,070.09 | 2,925,193.46 | 3,084,158.31 |
| **Finland** | 2,978,425.5 | 2,072,580.38 | 2,874,113.5 | 2,941,603.19 | 2,975,195.2 | 3,010,016.16 | 3,046,936.38 | 3,208,430.43 |
| **Sweden** | 6,614,889.21 | 6,977,506.43 | 7,116,626.36 | 7,151,392.75 | 7,371,595.73 | 7,701,839.91 | 7,675,934.84 | 7,850,405.16 |
| **Iceland** | : | : | 320,172.36 | 432,531.13 | 399,644.48 | 424,053.88 | 454,409.5 | 499,341.87 |
| **Norway** | : | : | : | 4,342,660 | 4,359,359.78 | 4,391,981.99 | : | : |
| **Switzerland** | : | : | : | : | 5,756,674.51 | 5,860,187.2 | 5,812,570.23 | 5,976,820.64 |
| **United Kingdom** | 26,331,311.55 | 29,250,752.23 | 30,437,770.07 | 33,169,491.39 | 31,987,766.12 | 32,848,969.15 | 29,406,962.52 | : |
| **Serbia** | 682,990.49 | 758,118.34 | 810,404.49 | 800,982.37 | 825,236.49 | 924,624.39 | 1,049,514.33 | 1,148,821.71 |
| **Turkey** | : | : | : | 4,670,866 | 4,537,402.54 | 4,536,736.22 | 3,903,381.82 | 4,098,139.7 |
| **Bosnia and Herzegovina** | : | : | : | : | 947,368.38 | 996,993.82 | 997,886.17 | 1,053,773.78 |
| **Kosovo** [17] | : | : | : | : | : | 422,310.71 | 430,351.69 | 458,905.84 |

[16] (until 1990 former territory of the FRG)

[17] (under United Nations Security Council Resolution 1244/99)



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*Table 5: Trade by commodity and NACE Rev. 2 activity, IMPORTS, FOOD PRODUCTS (EUROSTAT, Trade by commodity and NACE Rev. 2 activity, EXT_TEC05, 2022)*

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|
| **Belgium** | 22,880,098.24 | 23,692,781.15 | 23,956,310.99 | 24,634,838.04 | 25,813,044.24 | 27,217,926.36 | 21,427,473.89 | 21,792,039.98 |
| **Bulgaria** | 1,267,076.7 | 1,396,438.26 | 1,556,776.37 | 1,672,054.86 | 1,711,668.06 | 1,849,289.12 | 1,926,331.94 | 2,019,331.21 |
| **Czechia** | 2,782,337.27 | 2,996,516.49 | 3,223,198.42 | 3,628,785.86 | 3,508,218.38 | 3,303,392.65 | 3,256,908.49 | 3,466,460.71 |
| **Denmark** | 12,310,115.61 | : | 12,330,742.23 | 12,516,495.42 | 13,220,459.72 | 13,633,969.04 | 13,312,794.38 | 13,798,433.44 |
| **Germany** [18] | 39,901,118.96 | 39,388,672.11 | 41,213,427.04 | 40,914,036.42 | 42,056,552.27 | 44,329,992.39 | 43,870,832.22 | 47,338,713.28 |
| **Estonia** | 718,478.61 | 778,346.43 | 761,225.73 | 675,712.81 | 655,711.66 | 750,785.47 | : | 845,207.23 |
| **Ireland** | : | 8,279,805.22 | 8,953,062.78 | 9,210,881.43 | 9,560,116.42 | 10,728,872.79 | 10,513,974.7 | 10,868,476.48 |
| **Greece** | 2,593,426.15 | 2,825,191.92 | 2,590,735.38 | 3,185,607.17 | 3,295,390.69 | 3,362,195.85 | 3,638,420.08 | 3,471,233.76 |
| **Spain** | 18,334,023.27 | 18,656,370.94 | 19,974,422.19 | 21,081,030.12 | 23,175,083.84 | 25,471,740.23 | 25,180,664.56 | 28,154,912.75 |
| **France** | 26,029,760.54 | 26,433,702.63 | 25,781,671.01 | 24,581,264.89 | 26,367,761.43 | 27,414,243.02 | 27,200,752.98 | 27,314,336.68 |
| **Croatia** | 710,187.24 | 667,443.96 | 741,960.28 | 852,093.02 | 988,127.95 | 1,002,520.38 | 1,058,037.48 | 1,066,127.35 |
| **Italy** | : | : | 20,951,821.66 | 22,403,001.9 | 23,096,914.5 | 24,112,242.51 | 24,661,594.79 | 25,392,802.12 |
| **Cyprus** | 130,378.37 | 139,446.73 | 151,960.7 | 174,979.03 | 212,611.98 | 246,672.72 | 283,924.65 | 307,898.82 |
| **Latvia** | 733,406.24 | 932,044.36 | 837,656.34 | 759,001.17 | 801,693.46 | 508,679.25 | 525,009.66 | 1,046,145.53 |
| **Lithuania** | 1,769,129.79 | 1,904,175.07 | 1,974,046.37 | 1,935,490.96 | 2,019,122.03 | 2,168,286.61 | 2,192,947.84 | 2,419,346.07 |
| **Luxembourg** | 672,089.3 | 706,484.15 | 813,382.12 | 826,273.82 | 768,113.71 | 839,887.78 | 550,048.8 | 530,667.54 |
| **Hungary** | 4,297,121.14 | 4,547,700.58 | 4,555,270.64 | 4,492,765.11 | 4,600,855.16 | 4,880,324.54 | 4,482,036.73 | 4,862,651.39 |
| **Malta** | 138,210.53 | 187,232.82 | 180,529.28 | 174,317.38 | 153,410.49 | 178,662.54 | 297,419.65 | 204,982.41 |
| **Netherlands** | : | 38,022,987.43 | 38,710,873.41 | 23,961,388.97 | 24,538,264.01 | 44,764,287.12 | 45,219,301.2 | 47,069,493.46 |
| **Austria** | 6,140,466.55 | 6,583,583.62 | 6,811,853.87 | 6,824,527.28 | 7,007,097.67 | 7,431,657.26 | 7,569,424.75 | 7,912,961.38 |
| **Poland** | 11,873,885.59 | 13,275,843.3 | 13,510,217.58 | 14,252,511.31 | 14,794,294.83 | 16,574,447 | : | 18,336,710.2 |
| **Portugal** | 2,649,931.04 | 2,956,360.05 | 2,986,967.47 | 3,094,885.29 | 3,346,598.18 | 3,664,507.61 | 3,704,221.19 | 3,725,082.47 |
| **Romania** | 1,084,072.9 | 1,214,668.99 | 1,334,039.33 | 1,399,526.98 | 1,432,520.48 | 1,579,424.67 | 1,548,833.96 | 1,624,470.73 |
| **Slovenia** | : | 608,576.33 | 670,448.54 | 716,682.94 | 743,341.41 | 808,091.25 | 907,427.62 | 961,058.83 |
| **Slovakia** | : | 1,754,489.4 | 1,465,434.66 | 1,461,242.2 | 1,458,805.53 | 1,356,249.18 | 1,421,536.48 | 1,502,109.45 |
| **Finland** | 1,207,958.28 | 453,071.49 | 1,155,729.33 | 1,040,063.74 | 1,029,917.25 | 1,097,833.82 | 1,058,525.18 | 1,220,596.23 |
| **Sweden** | 3,469,154.97 | 3,588,937.42 | 3,636,786.87 | 3,701,546.34 | 3,869,479.51 | 4,143,383.81 | 4,150,009.81 | 4,357,322.71 |
| **Iceland** | : | : | 1,600,904.84 | 1,828,542.97 | 1,767,507.61 | 1,568,753.52 | 1,767,143.78 | 1,779,623.16 |
| **Norway** | : | : | : | 4,250,784.19 | 4,616,166.99 | 4,801,316.93 | : | : |
| **Switzerland** | : | : | : | : | 5,647,673.06 | 5,892,672.85 | 5,919,082.13 | 6,174,069.67 |
| **United Kingdom** | 10,108,420.79 | 11,501,231.51 | 12,345,122.34 | 13,119,121.65 | 12,922,386.31 | 13,835,555.64 | 11,779,777.3 | : |
| **Serbia** | 1,163,181.6 | 1,241,922.09 | 1,302,266.98 | 1,353,472.63 | 1,459,484.17 | 1,520,134.44 | 1,513,172.32 | 1,635,453.52 |
| **Turkey** | : | : | : | 9,240,832 | 9,054,733.1 | 9,342,900.35 | 9,359,371.77 | 10,065,177.98 |
| **Bosnia and Herzegovina** | : | : | : | : | 401,136.53 | 437,857.58 | 360,066.21 | 334,666.75 |
| **Kosovo** [19] | : | : | : | : | : | 37,230.56 | 34,585.1 | 28,421.78 |

*Table 6: Trade by commodity and NACE Rev. 2 activity, EXPORTS, FOOD PRODUCTS (EUROSTAT, Trade by commodity and NACE Rev. 2 activity, EXT_TEC05, 2022)*

[18] (until 1990 former territory of the FRG)
[19] (under United Nations Security Council Resolution 1244/99)



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