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SMART FARMING IN REPUBLIC OF MOLDOVA

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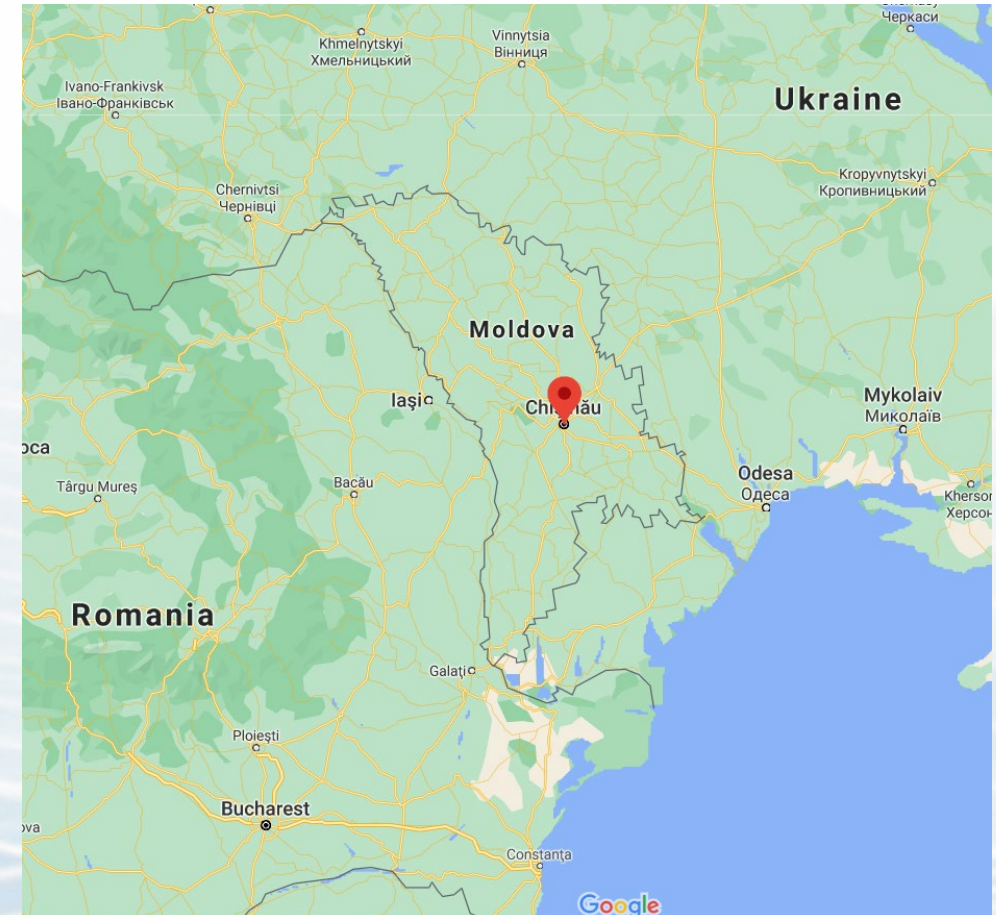


Republic of Moldova background / situation

*The **Republic of Moldova** is a tiny landlocked nation with a total area of 32,870 square kilometers, located in **Eastern Europe**, bordered to the west by **Romania** and to the north, east, and south by **Ukraine**.*

The nation is divided into 32 districts (raioane), 5 municipalities (muniten, which are special-status cities), and two autonomous regions - Găgăuzia and Transnistria - the latter of which is embroiled in political strife and claims unrecognized independence.

Chisinau, the country's capital, has a population of about 786,000 people.



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*Black dirt, also known as **chernozem**, covers about 75% of Moldova. More clay-textured soils can be found in the northern hills. Red-earth soil dominates in the south.*

*Approximately 60% of the country's waters flow into the **Nistru river** (1,352 km, including 657 km within the country's borders), approximately 34% into the **Prut river** (a tributary of the Danube that flows for 695 km along the Romanian border), and the remainder into a series of small rivers that directly flow into the **Black Sea**.*

Around 15% of the land is covered by natural vegetation, mostly trees, steppes, lakes, and rivers.



Northern Zone
Landscape: A hilly zone with forests, step and meadow vegetation that occupies the northern plateau along the Dniester River, the Transnistrian Highlands and the Balti rolling plain.
Temperature: Annual mean temperatures range from 6.3°C-9.7°C.
Precipitation: Annual mean precipitation for the majority of the zone ranges from 550-600mm, with between 285-300mm falling during the crop vegetative period.
Agriculture Conditions: This zone is best for cultivating sugar-beet, corn, pea, soy, wheat and barley. The zone is also highly productive for forage and pasture production for livestock.

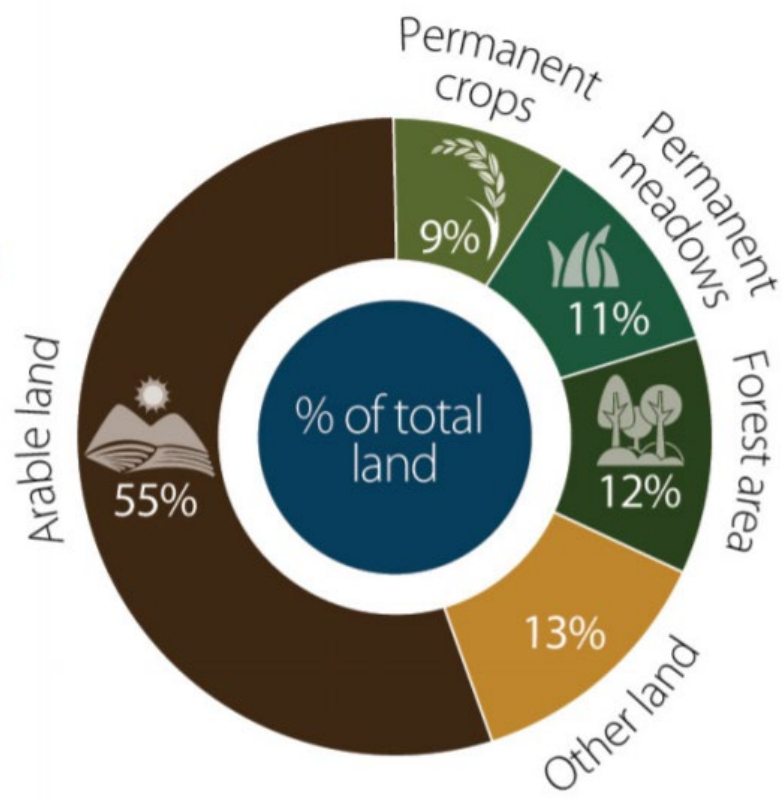
Central Zone
Landscape: This zone covers the Condru highland and is composed of hilly terrain and deep valleys.
Temperature: Annual mean temperature ranges from 7.5°C to 10°C.
Precipitation: Annual mean precipitation for the majority of the zone ranges from 500-550mm, with between 265-315mm falling during the crop vegetative period.
Agriculture Conditions: This zone is best for different types of perennial crops, including orchards and vineyards, although given the terrain, a wide variety of crops are successfully grown.

Southern Zone
Landscape: This zone incorporates the Bugeac Plain in the south and the Tighech Highland in the south-western region. The area is undulating with the hilly terrain interspersed with plains and large valleys.
Temperature: Annual mean temperature ranges from 8.3°C to 11.5°C.
Precipitation: Annual mean precipitation for the majority of the zone ranges from 450-550mm, with between 235-275mm falling during the crop vegetative period.
Agriculture Conditions: This zone is more marginal for production, due to higher temperatures and lower rainfall. Tobacco and grapes are grown widely in this area, as well as cereal crops like maize and wheat.

Sources:
1) Agro-Ecological Zones adapted from Daradur M., Cazac V., Mihailescu C., Boian I. Climate monitoring and droughts. Ministerul Ecologiei si Resurselor Naturale. Serviciul Hidrometeorologic de stat. Chisinau, 2007; Hazardous risks management in the Republic of Moldova. National Agency for rural development. Chisinau, 2007
2) DIVA GIS

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Agricultural
area
1,940,135 ha
= **59%** of total
land area

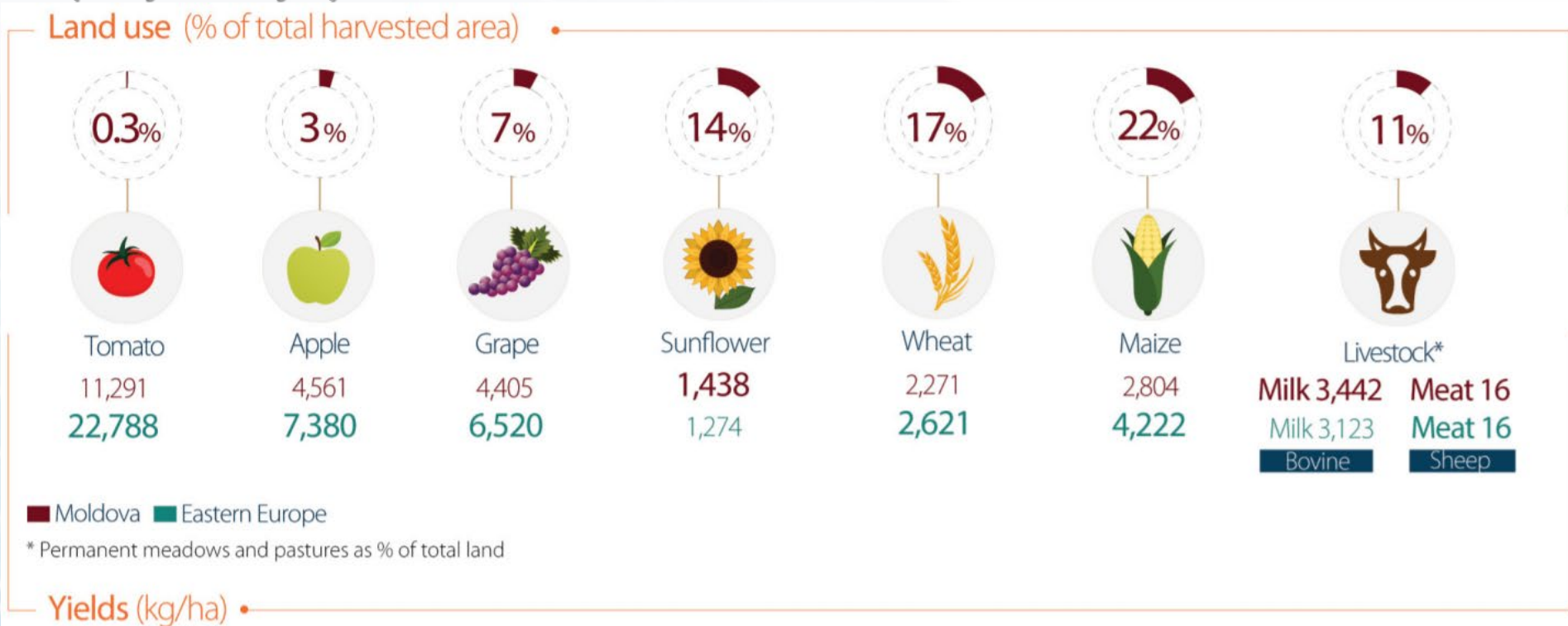


The Republic of Moldova is viewed as an agricultural region, with agriculture serving as the backbone of the Moldovan economy. The contribution of GDP and the impact on the job rate may also support this assertion. The agricultural sector employs a large number of people, particularly when it comes to subsistence agriculture.

Agriculture is a vital part of Moldova's economy and the primary source of income in rural areas. It accounts for nearly 14% of the country's GDP (down from 20% in 2004), with the food processing industry accounting for an additional 7%. Winter and spring grains, such as wheat, barley, and maize, as well as potatoes and other vegetables, as well as horticultural crops and berries, are important crops. Approximately 75% of the population lives in rural areas and makes a living from agriculture and related activities.

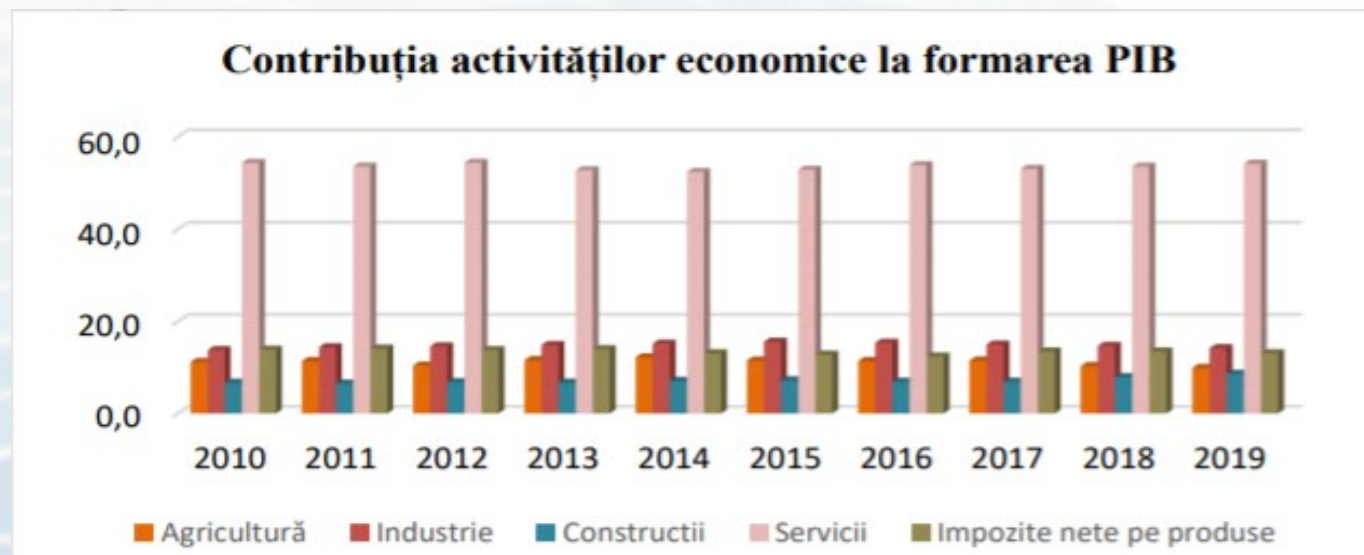
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Moldova is capitalizing on its agricultural export potential, especially in cereals, sunflowers, fruits, vegetables, and sugar. Exports of animal origin goods to EU Member States are currently not possible due to underdeveloped food safety institutions.



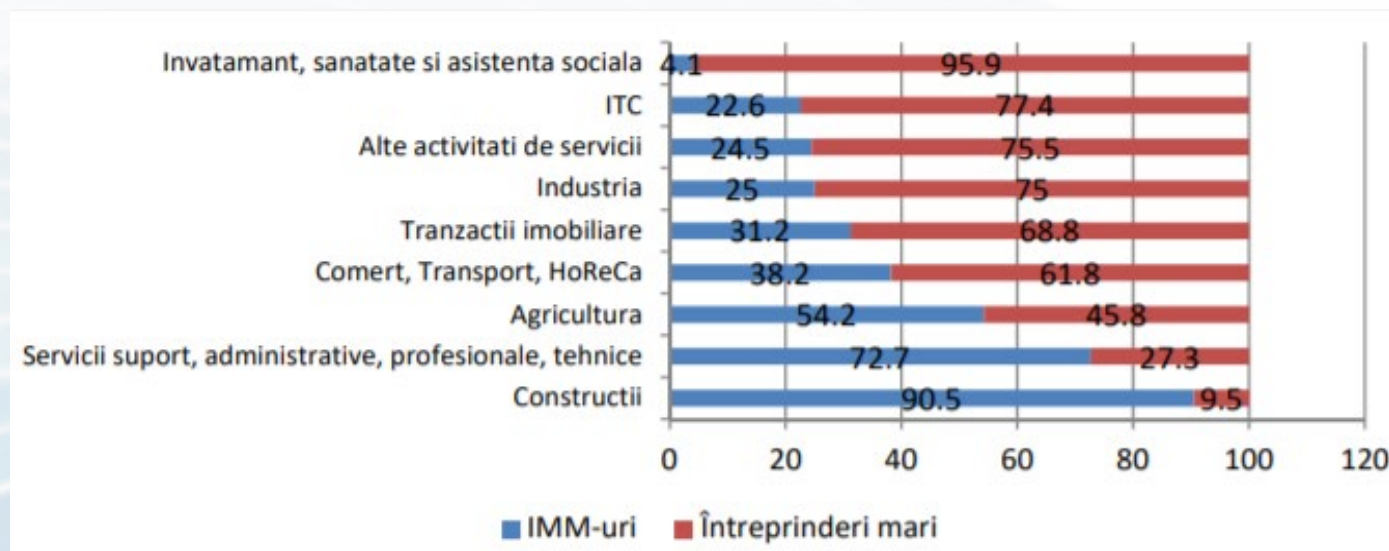
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Even though agriculture's contribution to the development of gross domestic product (GDP) is decreasing at the moment, agriculture remains a significant sector in the Republic of Moldova's economy. During the period 2010-2019, the contribution to GDP of this sector remained stable, fluctuating only slightly from 11.2 percent in 2010 to 9.9 percent in 2019.



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When it comes to the distribution of gross value added between small and medium-sized enterprises (SMEs) and large enterprises, we can see that SMEs dominate in the construction sector, with an average of 54.2 percent in support, administrative, educational, technological, and agricultural services.



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Moldova considers itself to be one of those countries committed to boosting the IT industry's growth and prospects. This is emphasized in strategic documents such as the national strategy for the growth of the information society, "Digital Moldova 2020," and the Strategy for the development of the information technology industry and the digital innovation ecosystem for the years 2018–2023, which continue the government's efforts to grow the field. The Strategy includes a number of initiatives aimed at boosting the entrepreneurial and IT educational ecosystems, as well as their start-ups and funding mechanisms, as well as promoting IT goods in niche markets.



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BSB projects

BSB projects in Moldova aim to improve the living standards of people in the riparian regions of the Black Sea Basin through sustainable economic growth and joint environmental protection. Actions are mainly focused on the promotion of business and entrepreneurship, the promotion of a coordinated environmental policy and the reduction of marine litter in the Black Sea Basin through joint actions, thus each project where Republic of Moldova is part of helps improve the cooperation between the entrepreneurs, farmers, local businesses as well as make exchange of good practices study cases and learn from the experience of other countries.

Smart and IoT technologies existent in Republic of moldova

In Republic of Moldova there are a few programmes especially facilitating the process of development, management and implementation of development policies of the agricultural IoT sector, to be mention in this regards, such us « e-Agriculture Strategic Program », « Export Moldova- Market Assistance website », « Agravista »

The results of this research show that Moldova has potential for growth in regards to technical equipment used in the agriculture sector. The main suppliers of machinaries and tools on the internal market are presented below. Although the technologies in their inventory is vary and of good quality the IoT in agriculture are still lacking form their portofolios.

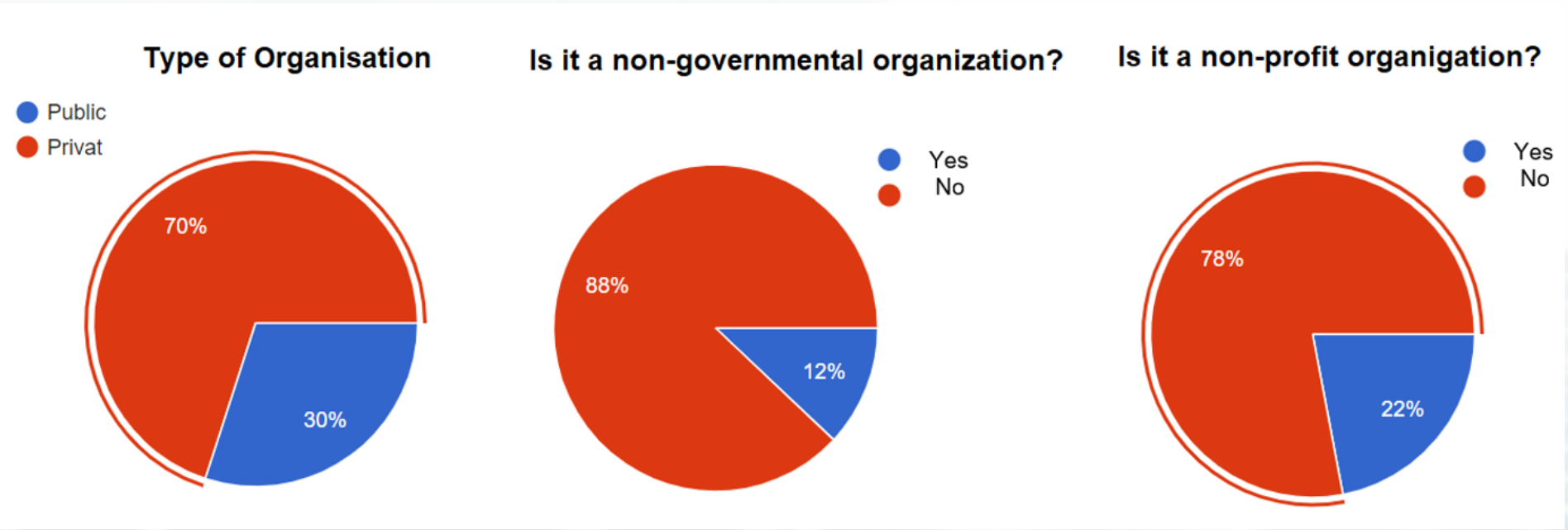
These entities provide such smart technologies as : automatic agricultural weather station, combine harvesters and tractors, deep plows, sowing equipment, trailers and semi-trailers, drills, feeders, loaders, compact cultivators, fertilizer harvesters minerals, vegetable seeders, spare parts, grain cleaning and drying equipment, milling cutters, tractors, soil preparation equipment, sprinklers, headers, driving systems, telescopic loaders, precision navigation and agriculture systems, vineyard shredder,

As the research showed on the market there are present few companies that provide with drones, integrated systems, farming OS control systems.

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Qudruple helix approach in agriculture field

The key stakeholders involved in the questionnaire (50)

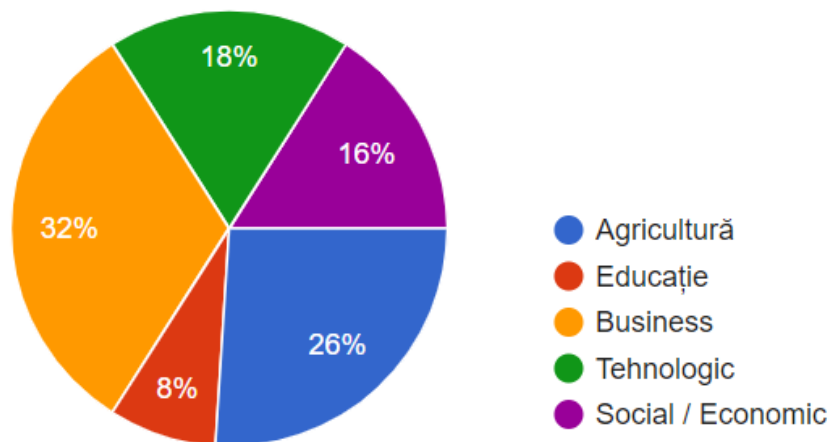


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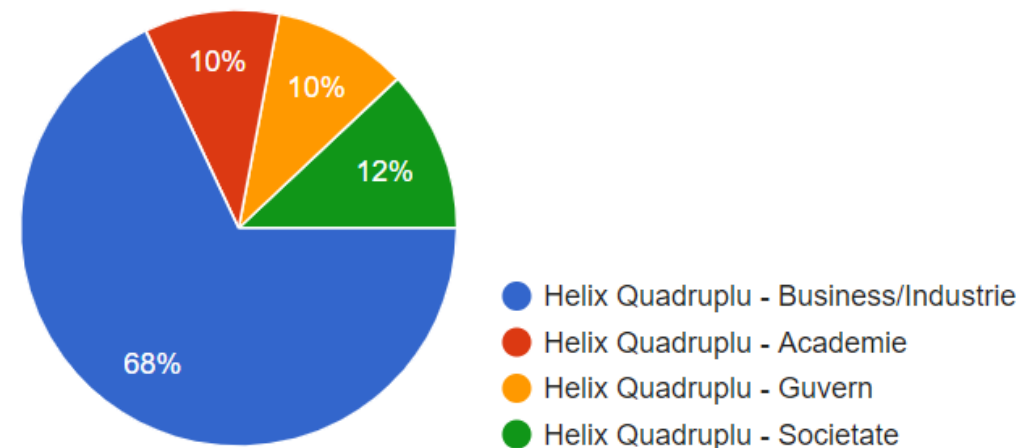
Quadruple helix approach in agriculture field

From the interviewed respondents 16 are business entities, 13 are in agriculture, 9 entities are offering tools and technologies for the agriculture, 8 respondents are from social/economic field, and 4 are from education and academia environment. As asked by the methodology 68% of the interviewers are from Business/Industry, 12% Society, 10% Government and 10% Academia.

Field of activity



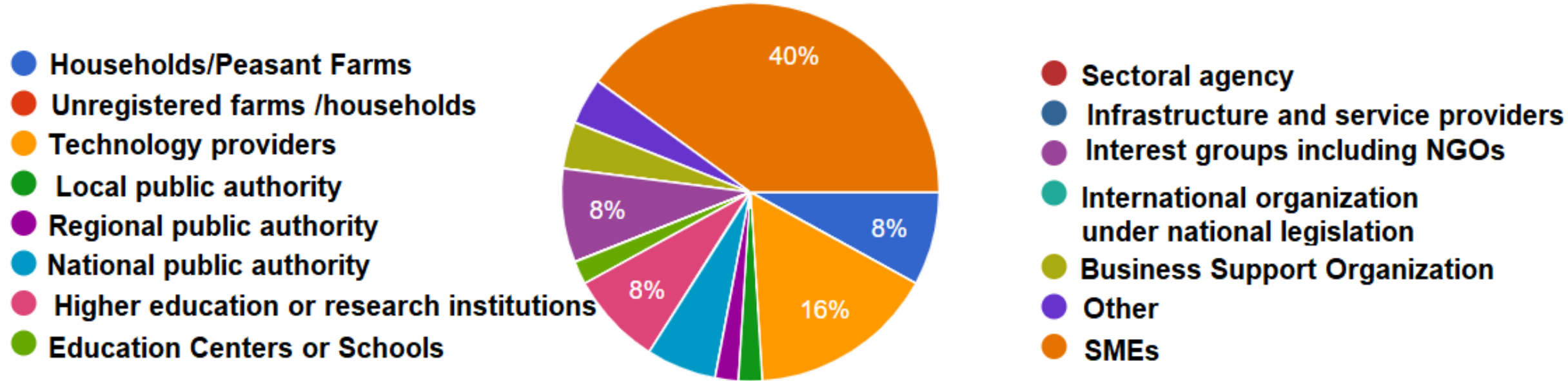
Helix Quadruple innovation system



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Qudruple helix approach in agriculture field

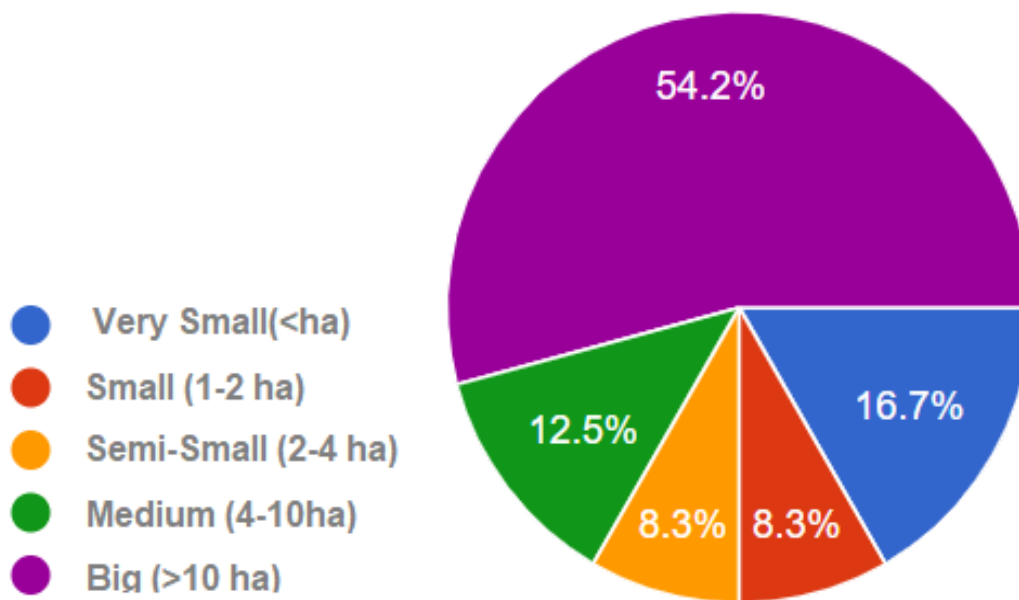
Type of Organization



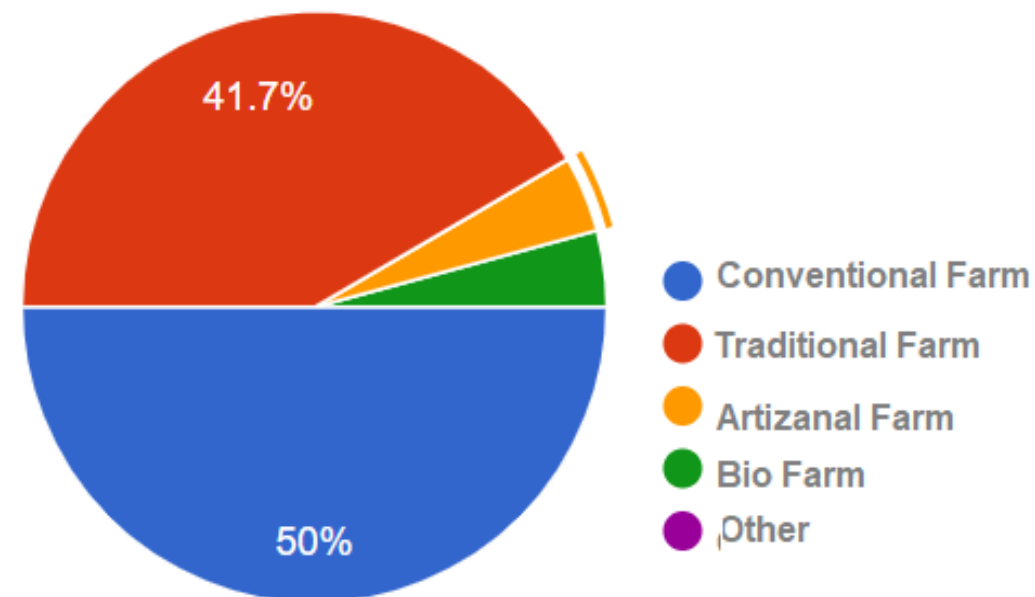
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Qudruple helix approach in agriculture field

Size of Owned Land



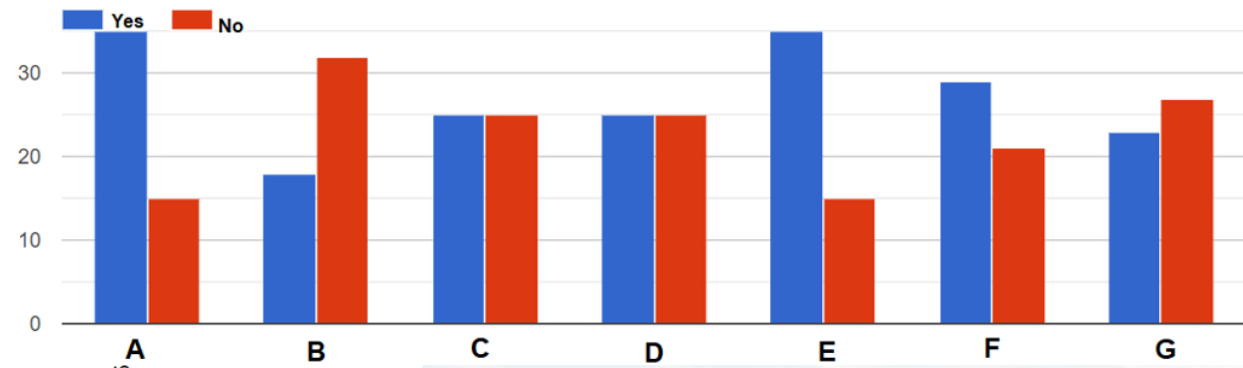
Type of Farm/SME



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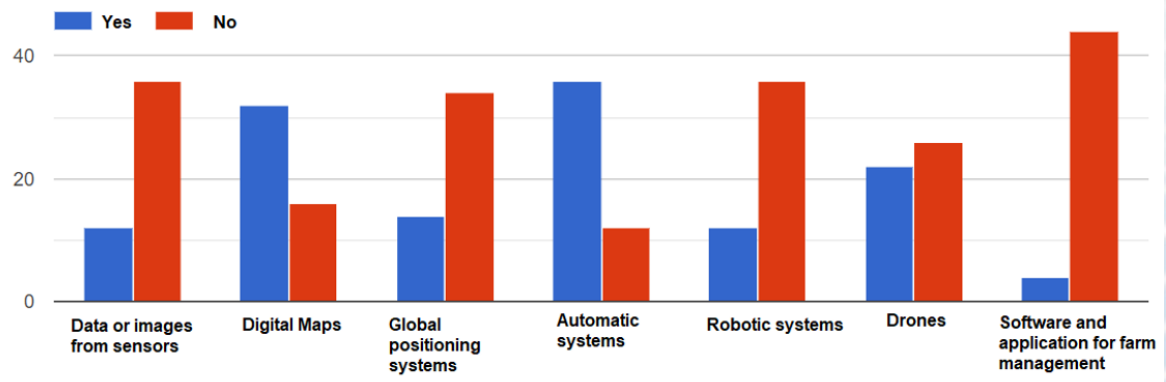
Agricultural needs of the rural communities in republic of moldova

1. What smart agricultural application do you know?



- A . Detection and control of water deficit
- B. Monitoring and management of cattle
- C. Crop management
- D. Weed detection and control
- E. Climate monitoring
- F. Pest and disease detection
- G. Rural property management

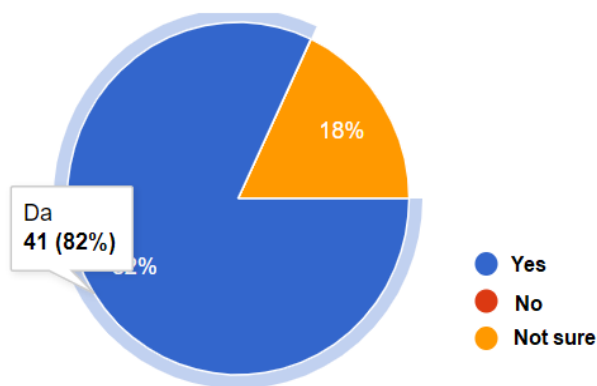
2. In your territory, what kind of intelligent agricultural technologies are used?



Agricultural needs of the rural communities in republic of moldova

The benefits of using smart agriculture from the point of view of our repondents are increased productivity (78%), high quality products(70%), incresead profit (60%) , planning of activities (56%), work efficiency (56%), reducind the impact on the environment (56%), and cost reduction (52%).

From your point of view, would farmers in your area want to adopt smart farming technologies?

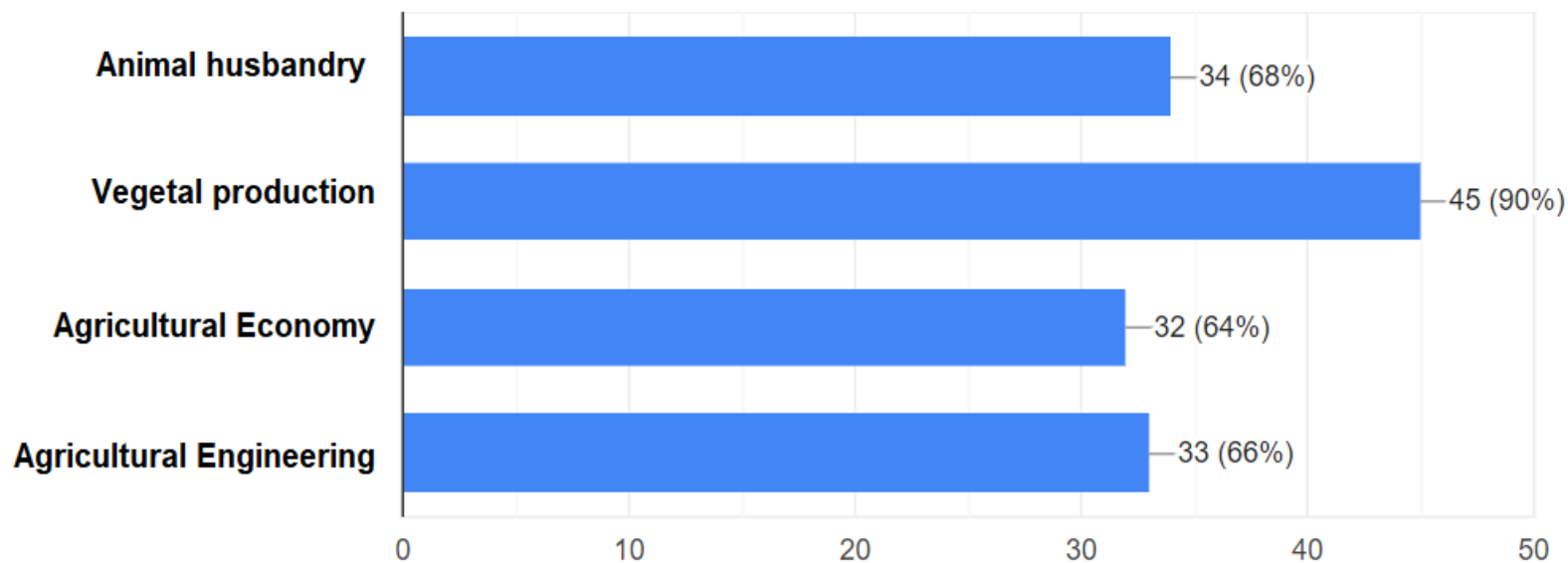


Only 18% of repondents were not sure of the need of smar farming technologies in their activities and in our country in general, but the majority (82%) consider this a must.

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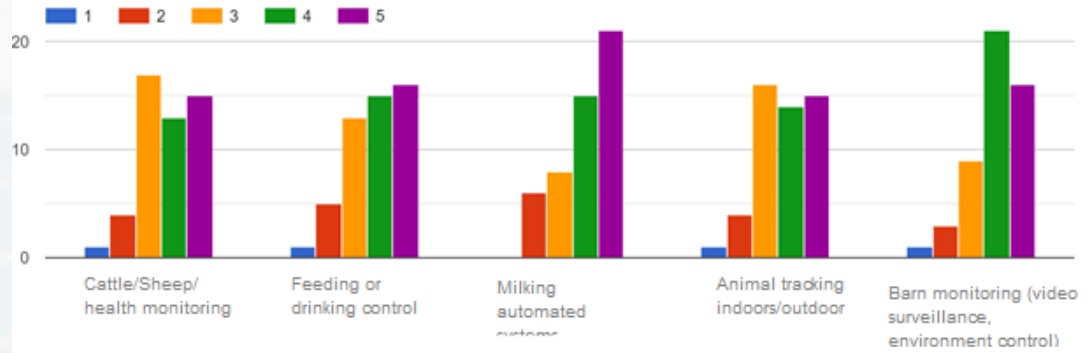
From your point of view, what are the agricultural fields that need smart agricultural technologies in your area?



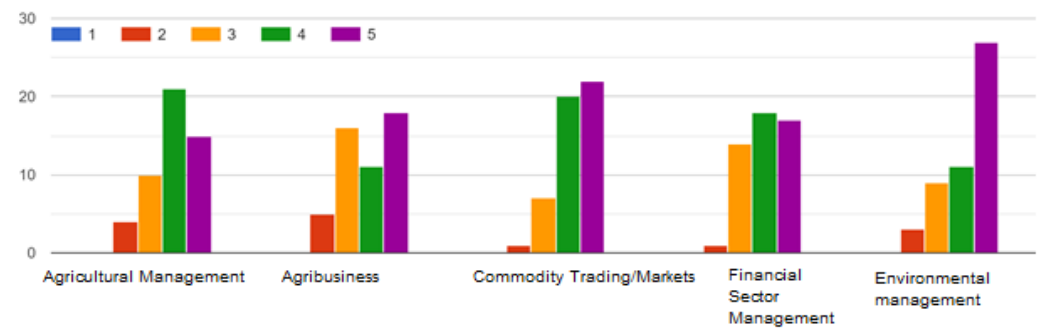
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Agricultural needs of the rural communities in republic of moldova

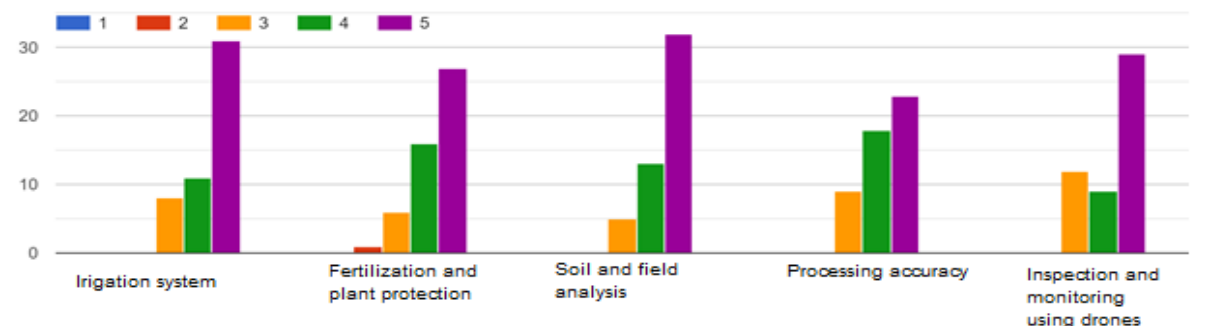
On a scale of 1 to 5, please specify the need to adopt intelligent agricultural technologies in the field of animal husbandry:



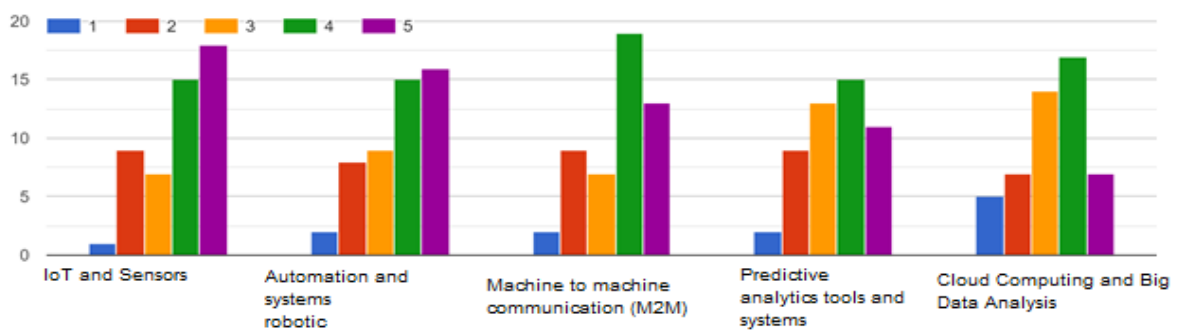
On a scale of 1 to 5, please specify the need to adopt smart agricultural technologies in the specific agricultural economic field:



On a scale of 1 to 5, please specify the need to adopt intelligent agricultural technologies in the field specific to plant production:

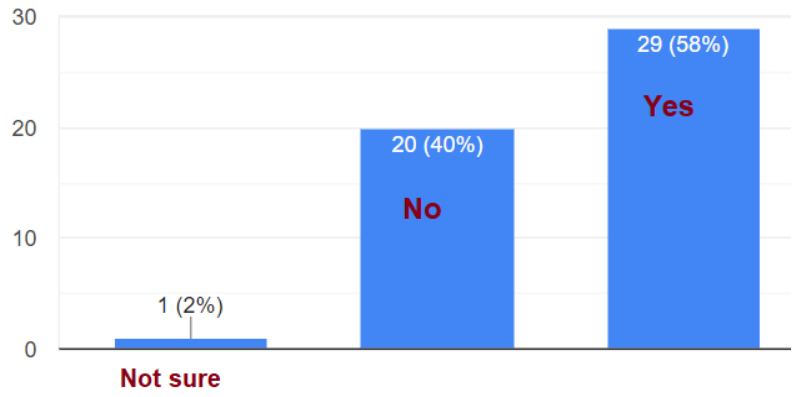


On a scale of 1 to 5, please specify the need for the adoption of intelligent technologies and systems in the field specific to agricultural engineering:

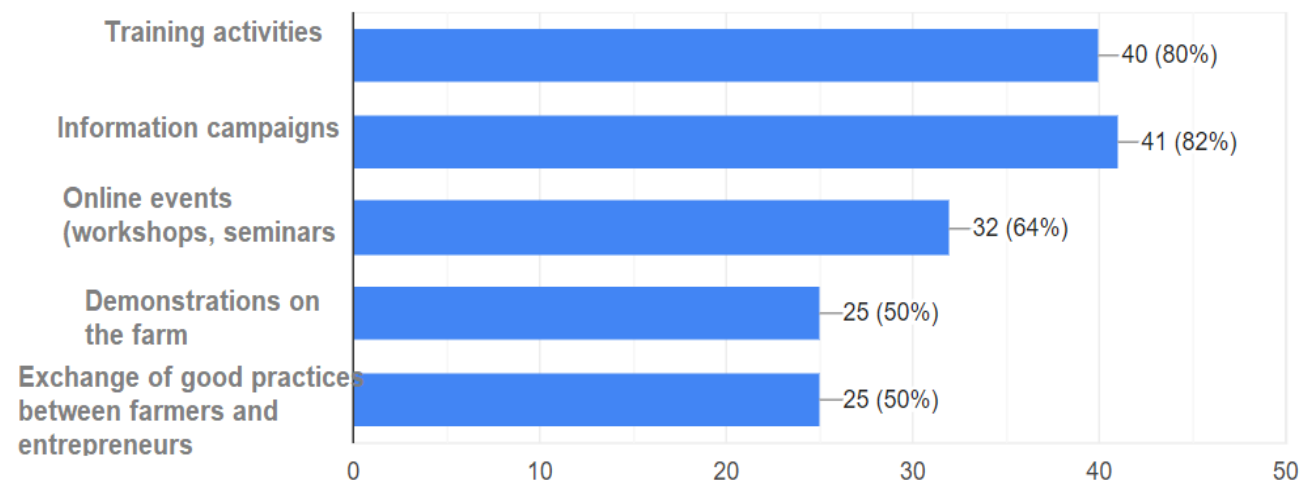


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In your opinion, can smart technologies and IoT lead to proper management of agriculture and address other major socio-economic challenges in your field, such as brain drain, youth unemployment and wasted intelligence?



In your opinion, what kind of initiatives are appropriate to promote smart farming in the farming community in your territory?



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Conclusions and recommendations

- ☐ Governments must be able to express their visions, set strategic goals, determine outcomes, identify trade-offs, develop action plans, and negotiate and compromise on individual contributions to the plans' implementation. Although individual smallholders may adopt SA practices, a coordinated response led by a strategic vision incorporating efficiency, connectivity, and conservation is needed to spread SA across the landscape.
- ☐ Agriculture has no future without digitalization. The development of the Smart Agriculture (Agricultural Smart Technologies) sector would require new knowledge and skills, which should be implemented in educational institutions.
- ☐ The Agrarian University should add to their curriculum such a course - technologies already implemented in agriculture.
- ☐ Despite the significant benefits of Smart Agricultural practices to productivity, resilience, and mitigation objectives, many small-scale farmers are still reluctant to such investments.
- ☐ Long-term benefits from investing in Smart Agriculture Technologies are generally unknown to farmers, which makes them sceptical about new agricultural paradigms, thus there is felt the need to disseminate and inform.
- ☐ The country analysis of Moldova's ICT-centric innovation environment reveals that existing policies are focused on international interests and should be refocused on national strengths. Many stakeholders believe that a holistic plan should prioritize particular ICT regions, other economic sectors, or specialized niches. Nanotechnology, e-agriculture, and the aerospace industry were among the suggested fields. ICTs, agriculture and food processing, biomedicine, and energy are the smart specialization areas defined in Moldova (where agriculture also plays a role).

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Acknowledgements

Thank you!



<http://bsb-smartfarming.com/>

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