THE ROLE OF NATIONAL AGRICULTURAL ADVISORY SERVICES FOR INTRODUCING DIGITAL FARMING TO SMALL FARMERS: A REVIEW

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Abstract
The pursuit of sustainability in agriculture, being a key focus in the Common Agricultural Policy (CAP) of the European commission, has resulted in numerous initiatives being launched to speed up the modern farmer's transition to sustainable farming practices. However, the use of digitalization in agriculture, despite being able to address many sustainability challenges, is still not resonating with small farmers, leading to their low adoption of digital farming practices. Bulgaria and Romania – two of the EU countries where small farmers dominate the agricultural landscape – are among the EU countries with least digitalization in farming, and this is particularly valid for small farms. The goal of this paper is to explore the potential of the National Agricultural Advisory Services (NAAS) in Bulgaria and Romania in encouraging the small farmers' adoption digitalization via the support with consulting and application preparation for European Union (EU)-funded projects. Drawing on literature review and previous surveys related to the efficiency of the NAAS of Bulgaria and Romania and the consulting needs of the farmers in the two countries, the paper makes conclusions on the potential of those services to successfully promote the use of digital technologies by small farmers. The analysis reveals that if the NAAS is able to efficiently reach the farmers and respond to their consulting needs, they can influence the farmer's decision to make an investment in digital agriculture solutions via EU-funded programs. Considering the role of example for the wider adoption of digitalization among small farmers, the study concludes that NAAS consultations can play a major role for the increased adoption of digital technologies among the small farmers in poorer EU countries like Bulgaria and Romania.
Keywords: digitalization in farming, national agricultural advisory services, small farmers, Bulgaria, Romania.

Introduction

With digital technologies entering and transforming every sphere of life, the wider adoption of digitalization in agriculture has long been awaited, in the view of the pressing issues with growing world population, climate change challenges and resulting food security issues.

The term 'digitalization in agriculture' refers to the process of integrating advanced digital technologies like Artificial Intelligence, big data, robotics, unmanned aviation systems, sensors, and communication networks, all connected through the Internet of Things into the farm production system (Lioutas et al., 2021). Digital technologies have the potential to increase efficiency, improve the predictability and sustainability of farms and ensure less dependency on the scarce supply on the agricultural labour market (Gebresenbet et al., 2023). Technologies also make the agricultural sector more attractive, particularly to the younger generation (Borda et al., 2023) which has to take over the responsibility for ensuring the food supply of nowadays, albeit in challenging times. Finally, technologies like precision farming can reduce the negative environmental impact of agriculture, ensuring that resources such as water, fertilizers, and pesticides are applied precisely and mitigating the negative impacts on soil health, water quality, and biodiversity (Getahun et al., 2024).

Due to the numerous benefits of digitalization in farming, it is a key priority for the EU agricultural sector, with digitalization being embedded in the achievement of 10 key objectives of CAP 2023-27 (European Commission, 2025).

Digital technologies, however, can be expensive to adopt and integrate into the farming processes. This is particularly valid for the farmers defined as 'small' in poorer EU countries like Bulgaria and Romania.

The agricultural sector is comprised of different types of farmers, with one of the criteria being the size of the farmer. There is no universally accepted definition of a small farm and farm size can be assessed using farm's structural size, economic size, labour force and farms' market participation. EUROSTAT and the Food and Agriculture Organization (FAO) define small farms as those with an agricultural area of less than 5 hectares (ha), but this threshold can vary geographically (Guiomar et al., 2018).

Almost two-thirds of the EU's farms were less than 5 ha in size in 2020. Bulgaria and Romania are two countries in the EU with a significant percentage of small farmers, Romania being the leader in small farmers among all EU countries (Eurostat, 2023).

The economic effect of small farms is considerably less significant compared to larger farms; they are not as competitive as the big farmers in terms of access to labour and market. The importance of those farms lies in their ability to offer diverse varieties of agricultural produce, including traditional ones, to maintain the livelihood and existence of the rural communities (European parliament, 2022).

The EU objectives in the latest CAP are underwired by digital tools, and the aim for increased digitalization for small farms, is evident in the increased importance of digitalization and environmental criteria for receiving EU funds by small farms. However, the lower economic potential of the small farmers in the EU makes them less able to afford to invest in the advancements of technologies to become more sustainable and efficient (Rijswijk et al., 2021). In Bulgaria, the small farmers do not have enough assets, their business is considered high risk and hence, they

have low access to banking loans (Koteva & Fidanska, 2018). The same is valid for Romania - credit institutions place most farmers in the high-risk category (Mihai & Toderiţă, 2013) resulting in few loans given.

Thus, small farmers in Bulgaria and Romania count on EU-funded and government-funded programs to grow their business and finance new technologies. Hence, EU-funded programs can become the mechanism driving the adoption of digitalization in small farms.

Studies of the Bulgarian and Romanian NAAS, however, show that the small farmers in those two countries need consulting support to be able to take advantage of the EU-funded programs.

The purpose of the present review is to study the role that EU funded programs can play in the small farmers' decisions for investment in digital innovations. It aims to review the specifics of the European funding for small farmers in Bulgaria that can motivate small farmers to invest in digitalization via EU-funded programs. Next, it seeks to review the results reported by the NAAS of Bulgaria, as well as surveys on the farmers' opinion on the consulting institutions in two countries, in order to identify how the public agricultural consulting service can efficiently reach the farmers, increase the success of its services and influence the small farmers' decision to introduce digital technologies in their farms.

Materials and Methods

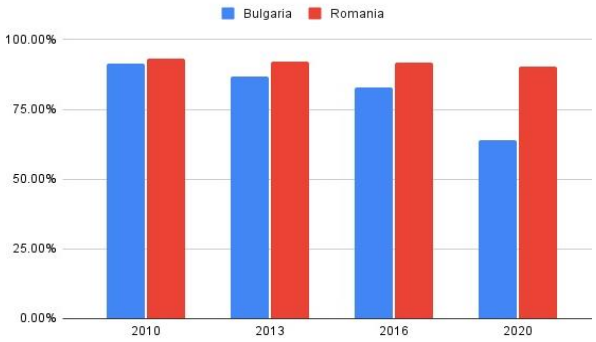
In the article, review of statistical data from various national and statistical portals has been done in order to identify indicators of the agricultural sector in Bulgaria and Romania confirming the importance of small farmers for the agricultural sector. Classical research methods such as analysis of results from previous surveys were used to identify the expectations of the farmers towards the consulting services and the characteristics of the NAAS of Bulgaria and Romania that can increase the success of the agricultural consulting service. Review has been done on the information available publicly on the website of the NAAS of Bulgaria 2019-2024 in the form of annual reports and announcements in order to collect information of the results they achieved in that period. Descriptive statistical analysis methods were used to present data from Eurostat and information on the specifics and results of Bulgarian and Romanian NAAS.

Results and Discussion

Small farmers dominate the agricultural landscape in Bulgaria and Romania. Between 2010 and 2020, farms of 5 ha or less in these two countries hold a significant share of the total number of farm holdings 'Figure 1'. In the aforementioned period, the share of small farmers in Romania persisted above 90%. In Bulgaria small farmers somewhat diminished but still accounted for about two-thirds of all farmers (Eurostat, 2023, latest date available is as of 2020).

Figure 1

Small farms in Bulgaria and Romania as % from the total number of farms, 2010-2020



Small farmers in all EU countries have EU funding programs accessible to them that aim to encourage the sustainability and modernisation of the farms. In poorer EU countries like Bulgaria and Romania, these funding programs could be the only option for the farmer to afford investment in assets, including digital technologies. However, small farmers require extra government support to take advantage of EU-funded programs. Applying for a subsidy from the EU-funded programs requires meeting eligibility criteria, preparing a business plan for achieving specific targets, and tailoring the business plan in order to maximize the points earned based on the project criteria (National Agricultural Advisory Service, 2025). This means that the application for funding programs for small farmers requires specific knowledge, including meeting the administrative criteria. Additionally, a business plan is not something small farmers are preparing as part of their daily activities, considering that in Romania, for example, 99.1% of small farmers do not even have a legal personality (Stoica, 2023).

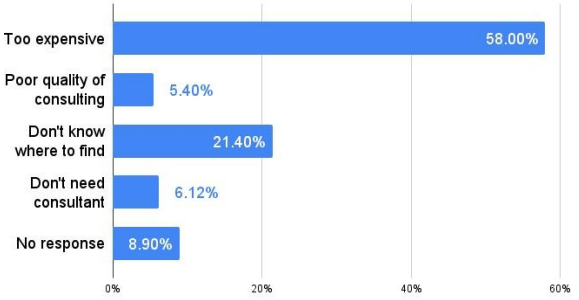
Further to the above, small farmers have little or no budget to spend with consultants preparing projects for the EU funding calls. This was confirmed by a survey of Bulgarian NAAS performed in the first years after it was selected as a single provider of advisory services by Ministry of Agriculture and Food in the context of the Rural Development Programme 2007-2013, measure 143 'Provision of agriculture advice and consultancy in agriculture in Bulgaria and Romania'. The survey (National Agricultural Advice Service, 2014) which included a total of 1,733 farmers, 76.6% being small farmers cultivating up to 5 ha of land, showed that 58% of the interviewed farmers do not use consulting services because they are expensive. 21.4% of the surveyed farmers do not know where to find consulting services 'Figure 2'. This confirmed the necessity for free public agricultural consultancy by Bulgarian NAAS.

McBride & Daberkow (2003) conclude that it is personal contacts, including informal contacts with relatives and peers and formal contacts with institutionalised sources, such as organisations and

consultants that have greater effectiveness compared to impersonal sources in affecting users' perceptions regarding the usefulness and ease of use of an innovation. This implies that formal contacts with organisations and consultants, like agricultural consultants from NAAS, can potentially influence the farmer's decision to use innovations on their farm. It also shows that if part of the small farmers is supported to adopt and start using digital technologies efficiently, then they could refer the solutions used to their close peers' network and increase the widespread adoption among the general small farmer community.

Figure 2

Reasons why farmers in Bulgaria are not using consultancy services



With regard to the specific consulting topics needed by the small farmers, Bulgarian NAAS survey confirmed that consulting needs are mostly related to accessing EU funding. 90% of the survey respondents said finding information about the farmer funding programs as well as applying for them would create difficulties for them. The same consulting needs, albeit from a later survey performed in 2022 and including 310 Romanian farmers and 50 actors directly involved in the agricultural knowledge and innovation system in Romania, showed that the state advisory system is in demand especially in the area of accessing subsidies and European funds (Meiroșu et al., 2023).

Free consulting related to EU funded programs and delivered by the Bulgarian and the Romanian National Agricultural Advisory Services is thus needed, and it is mostly related to support with EU-funded programs. Given the specific deadlines for the application periods, it poses demands for sufficient consulting personnel serving small farmers.

The Bulgarian NAAS has 27 regional offices and 28 mobile municipal offices in the country, with the latter created at the end of 2022. Bulgarian NAAS provides free specialized consulting services and prepares business plans for all measures of the Thematic subprogram for the development of small farms (EU CAP network, 2023; National Agricultural Advisory Service, 2025)

The Romanian public advisory system consists of 479 advisors working under the 41 County Agricultural Directorates (DAJs), working in the offices of the county seats of the DAJs (approx. 200 advisors) and at the local level through the local centres (approx. 7-9 municipalities in each county belonging to the local centre have agricultural advisors; a total of 279 advisors are distributed across all local centres). (Meiroșu et al., 2023).

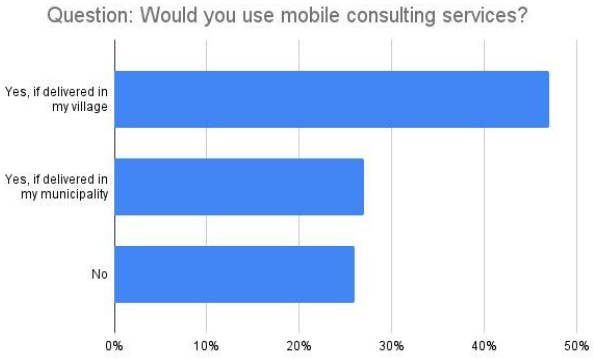
Comparing the National Agricultural Services of Bulgaria and Romania, we can see that they offer free advisory service via numerous offices and personnel. The efficiency of the public advisory system, measured in terms of its ability to reach farmers and make them use the advisory services, depends on the ability of the advisors to deliver consulting services close to the farmer.

In Romania, 92% of the farmers prefer to access advisory services in person. Both farmers and experts see a need to strengthen a regional network of physical offices where farmers can access a wide range of information, advice and services on a 'one-stop shop' basis (Meiroșu et al., 2023).

The survey of Bulgarian NAAS showed that 74% of farmers would use mobile consulting services, with 47% preferring mobile services in their city or village and 27% willing to use consulting from a mobile office that comes to their municipal centre 'Figure 3'.

Figure 3

Willingness of Bulgarian farmers to use mobile consultancy services



The two surveys show that farmers need consulting in person, on-site or near their farms. A regional network of physical offices where farmers can access agricultural advice and information is required, but mobile services visiting the farmers on site are highly needed.

In November 2021, the Bulgarian NAAS received a budget for setting up mobile units and as seen in 'Figure 4', in 2023 when the units were already functional, the total consultations delivered by NAAS surpassed the consultations delivered in any year from 2019 to 2022, with the mobile office consultations scoring the largest increase. Compared to 2022, the total consultations in 2023 increased significantly with 33.7% (National Agricultural Advisory Service, 2025) which showed the positive response by the farmers.

In-person consultations and on-site visits are however time-consuming due to the travel required, often in poor-infrastructure rural areas and thus are tightly related to the availability of advisory personnel. Table

1 below compares the availability of agricultural advisors in Romania and Bulgaria as of 2023. It shows that the number of farmers that one advisor in Romanian NAAS should serve is about 5.3 times more than the farmers an advisor in Bulgarian NAAS should serve (Meiroșu et al., 2023; National Agricultural Advisory Service, 2025).

But even the number of farmers to be served by 1 Bulgarian NAAS advisor is high. Experience elsewhere in Europe has shown that coverage of between 1 and 1.5 full time equivalents (FTE) of professional expertise is required to adequately serve 100 farmers – i.e., one consultant can efficiently advise between 65 and 100 farmers (Stefanescu et al., 2013).

Figure 4

Consultations delivered by Bulgarian NAAS

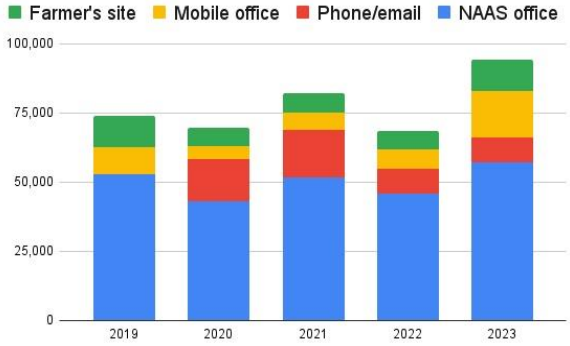


Table 1

NAAS of Bulgaria and Romania - advisors in 2023

Country	*Number of farmers*	*Agricultural advisors*	*Farmers per 1 advisor*
Bulgaria	132,742	117	1,135
Romania	2.887,000	479	6,027

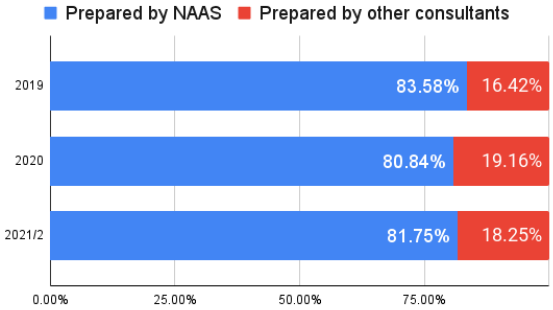
The deficiency of public advisors in Romania available to consult the farmers is reflected in the fact that the website of the Romanian Agency for Financing Rural Investments - an institution subordinated to the Ministry of Agriculture and Rural Development (MARD) that is responsible for the technical and financial implementation of the National Rural Development Program 2014 - 2020 (NRDP 2020) - lists the contacts of a large list of private consultants, along with region they cover and funding programs they consult on (AFIR, 2025).

The preparation of an application for an EU-funded Bulgarian small farmer program requires evaluation of the appropriateness of the farm and defining a number of administrative characteristics for it, like the standard production output of the farmer, creation of a business plan and making sure the plan includes the components appropriate to the farm that would give extra points to its application. Thus, we can consider the number of EU-funded applications submitted by the NAAS as an indicator on longer and more in-deep collaboration with the farmer rather than an indicator of one-time consulting service done. Between 2019 and 2022, Bulgarian NAAS prepared a total of 3,452 project applications only on sub-measure 6.3 'Start-up' aid for the development of small farms. Those applications were more than 80% of all applications submitted 'Figure 5'. This shows that Bulgarian NAAS is succeeding in establishing in-depth cooperation with many small farmers.

The recent funding programs for small farmers, per Bulgaria's CAP strategic plan (CAPSP) for agriculture and rural development 2023-2027, include criteria of investment in assets contributing to digitalization, offsetting climate change and environmental impact in all funding programs for small farmers (State Fund Agriculture, 2025).

Figure 5

Project applications for sub-measure 6.3 for very small farmers in Bulgaria, 2019-2022



As seen in Table 2, such an investment contributes between 18.52% and 28.85% of the maximum points in the application, emphasizing the significance of this criteria. The usage of digital technologies in farming can be used to combat climate change and protect the environment, as already stated above, and hence digital solutions can be used to match these criteria.

Table 2

Bulgarian EU-funded programs for small farmers 2024: Points for digitalization, climate change or environmental protection assets

Funding program	*Points*	*% from max points*
Young farmers	10	18.52%
Very small farmers	15	28.85%
New farmers	8	20.00%

Additionally, a fixed minimum part of such an investment is required to be done from the first funding received, as seen in Table 3, thus encouraging the farmer to use the purchased asset to achieve the results entitling him/her to get the second 50% of the funding (State Fund Agriculture, 2025).

Table 3
Bulgarian EU-funded programs for small farmers 2024: Investment in digitalization, climate change or environmental protection assets

Funding program	***Minimum to be invested***
Young farmers	€7,000. 35+ % from first payment
Very small farmers	€1,750
New farmers	€2,250

Given the importance of the digital criteria in the three funding programs for small farmers in Bulgaria, the consultants would need to be aware of the available digital solutions on the market that can fit the specifics and budgets of the small farmers applying for funding. This makes the training of the NAAS consultants critical in order to positively influence the adoption of digital tools.

It could be additionally researched how each NAAS can ensure that all consultants have relevant knowledge of digital tools and can recommend the best tool for every farmer. The steps that the Bulgarian NAAS has taken, as seen in their annual budgets, is sending printed materials, conducting webinars and on-site seminars for its consultants. However, the role of the consultant's background and his motivation to perform highly and meet the needs of the farmer can be factors affecting the efficiency of NAAS in promoting the appropriate digitalization tools and those can be the subject of further analysis.

A further complexity lies in the fact that NAAS, being a state-funded institution, cannot officially promote and recommend commercial digital solutions. This hinders the collaboration, like on-site demonstrations and trainings with commercial providers of digital solutions and thus, consultants can only recommend general approaches/solutions for digitalization of the small farm, leaving the final provider selection in the hands of the farmer. A step in this direction has been made by the Romanian Rural Investments Financing Agency AFIR which maintains a third-party Price Reference Database (PRD) on its website.

'Through the Price Reference Database, the Rural Investments Financing Agency (AFIR) facilitates access for applicants to the European fund information while also simplifying the procurement procedure. Thus, the products that can be found in this Database are directly available for purchase for private beneficiaries without going through any other procurement procedure' (AFIR, 2025).

The PRD of AFIR gives a choice of verified solutions, categorized per the respective EU funding programs and enables the taking of a more informed decision by the funding applicant or by the consultants on the funding programs. The Bulgarian NAAS does not have such a database of digital solutions.

Even though Bulgarian and Romanian public agricultural advisory services cannot directly recommend digital solutions suppliers, it is clear that they can influence the farmers to include digital solutions in their business plan in order to maximize on funding application points. Even if the decision on selecting a digital solution is left in the hands of the farmer, the consultant plays a major role in communicating the importance of digital solutions for winning the EU funding, in raising interest and provoking action by the farmer towards researching available digital solutions, considering the potential benefit from each and making his choice. Such a first step, even though provoked by the need to access EU funding, can equip the farmer with his first digital farming tools, letting him see the benefits from digitalization in farming and potentially resulting in sharing his experience and the larger adoption of digital solutions among the small farmers community.

Conclusions

The following can be concluded from the research results:

1. Small farmers in poorer EU countries like Bulgaria and Romania cannot afford consultancy services and would rather use public, free agricultural consulting.
2. Consulting by NAAS is not efficient and used if there are insufficient human resources to deliver consulting in person, close to the farmer's location.
3. Mobile offices and consultations delivered in or close to the farmer's village at specific times of the day are more likely to be used by the farmers and hence the success of reaching the farmer would be higher.
4. Free agricultural consulting for EU-funded projects can open the door to the first steps in digitalization in farming.
5. The criteria for digitalization or reduction of environmental impact on small farmer EU-funded projects is likely to push consultants into increasing their own and the farmer's awareness on digital tools for agriculture so that appropriate tools fitting the budget requirements can be proposed for the business plan in pursuit of maximized points.

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