7 *Resilience-Enhancing Strategies to Meet Future Challenges*

The Case of Arable Farming in Northeast Bulgaria

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7.1 Introduction

This chapter focuses on the results and analyses concerning the resilience of the specialized arable farming system in the Northeast region of Bulgaria. The analysed farming system consists mainly of large-scale grain producers (both corporate and family farms) and other actors, who affect and are affected by the grain farmers. The research is based on the SURE-Farm methodology as presented in Chapter 1. The analysis in this chapter is organized in three main parts: first the case study is presented describing the historical context, actors involved and system functions. Next, the challenges are presented, followed by the sections discussing resilience capacities and future strategies for enhancing farming system resilience. Conclusions are made in the last section. The Annex 7.1 presents the overview of the case study findings.

7.2 The Case Study

Crop production is important and has a long tradition in Bulgaria. The share of crop production in utilized agricultural land increases constantly and reached 60 per cent in 2020 (MAFF, 2020). This development results from specialization and concentration in the agricultural sector, induced by many factors, policy being the major one, according to the stakeholders. Simultaneously, specific production structures have developed, whose effectiveness increases with expansion of farm size and level of mechanization. Farms specialized in crop production achieved the highest economic capabilities with productivity close to the EU average (Koteva, 2019). Thus, their role has increased, thereby also strengthening the international competitiveness of the sector.

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Northeast Bulgaria, known as 'the granary of the country' is considered of high importance for crop production. The share of total crops produced in the case study region is between 45 per cent and 60 per cent of the national output and consists of mainly wheat, barley, maize and sunflower. The case study region produces 1/3 of the total gross value added in agriculture in the country (MAFF, 2020). The arable farming capacity in the region results from the natural conditions, i.e. fertile soils; varied landscape, including river valleys and lowlands; and a continental type of climate, and it is defined by the historical developments and transformations.

To understand the current status and processes in arable farming in Northeast Bulgaria, we have to consider the decisions taken in the country during the communist time and the transformations afterwards. The collectivization during the communist time interrupted the private ownership and the inheritance of land as well as the family nature of agricultural businesses, entrepreneurship and market-oriented business behaviour (Nicholas-Davis et al., 2020). In the 1990s, the reverse process occurred, including liquidation of collective farms from the communist regime, restoration of land ownership to the owners from the pre-socialist period or their heirs and privatization of all assets in the food chains. Thus, the land reform and continuously changing legal base for land ownership and stewardship led to land fragmentation. According to the most recent data approximately 88 per cent of utilized agricultural land is owned by 1.8 million holders (MAFF, 2020), which complicates the relationship between landowners and farmers and also puts significant administrative burden and financial costs on the latter (Nicholas-Davis et al., 2020). The resulting dualistic structure of agricultural production consists of economically viable and competitive, large-scale farms specialized in arable farming and economically non-viable farm structures, including small farms specialized in labour-intensive production (Koteva, 2019). There are also many other challenges and opportunities which have recently affected the farming system.

Crop production has always been considered to be the dominant farming system in Northeast Bulgaria. Even changes during and after the communist time have not changed the main specialization of the system, except for its actors and structures.

In this region, the changes after the collapse of communism (1989–1990) resulted in the emergence and development of a completely new structure of farming enterprises, and the transformation has continued since the introduction of the CAP in Bulgaria (2007).

Figure 7.1 Northeast Bulgaria landscape during the spring and autumn. Photos by Mariya Peneva.

Land consolidation and constantly increasing farm size have been accelerated by the introduction of direct payments (Koteva and Ivanov, 2020). The stakeholders characterized the processes as rapid and the increase in farm size as large. Farm sizes increased due to land purchase and renting. Large-scale farms own on average 40–50 per cent of the land they cultivate. The main farm type in the case study area gradually developed into its current form in the past twenty years, consisting of large-scale (above 1,000 ha of arable land) mechanized farms, specialized in the production of grains, maize and sunflower. The studied farming system includes also actors who are influenced by and who influence these farms, namely: other farm types such as livestock farms, farms with perennials, vegetable growers, beekeepers, smaller arable farms, land owners and farmers' households.

The identity of the farming system is characterized further by its ability to provide essential functions, including both private and public goods. This is one of the factors enhancing the resilience of the arable system in Northeast Bulgaria and answers the question for what purpose resilience is studied (Meuwissen et al., 2019). The results from farm survey, FoPIA-SureFarm (Reidsma et al., 2020) and quantitative assessment of the current state of the ecosystem services (Accatino et al., 2020) show that stakeholders prioritized the delivery of private over public goods. Also, the evaluation demonstrates that the grain farming system in Northeast Bulgaria performs better in the provision of private goods than in the provision of public goods. The food production and economic viability functions are considered as the most important functions which were perceived to perform at good and medium levels. The farmers value and take pride in the high levels of productivity achieved. This also illustrates the understanding that

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viable farms help strengthen the economy and contribute to the regional development, which is often present as justification for policy and other interventions. The provision of public goods scored well in regard to habitat quality. However, the performance in biodiversity function provision is perceived to be low and still needs improvement. The public functions in the social domain, namely quality of life (encompassing sources of incomes and employment conditions in the workplace) and attractiveness of the area (referring to the participants' perception of the region as a place of living), are considered as important for the case study and from the stakeholders' perspective they perform moderately.

In the course of the assessment, it was revealed that the stakeholders are more inclined to discuss and consider functions that are associated with their businesses more directly and which are relevant to the economic domain, such as productivity and net farm income. The study identified an inconsistency between the understanding of farming system development and assigning high importance to the environment as a precondition. Environment performance is underestimated despite stakeholders being aware of the negative consequences of increased specialization and established monoculture production structure for natural resources (e.g. soil fertility) maintenance and preservation. Another important issue which was revealed during the study was the fact that to some extent the large-scale grain producers contribute negatively to the implementation of the functions from the social domain. This is illustrated by the high level of inequality between the different types of farmers in regard to access to production factors. The grain producers are more powerful and their growth affected negatively the other producers by unfair competition for land and human resources. It led to substantial increase in farms' expenditures to lease/hire them. After the introduction of subsidies for agriculture in 2007, the sector has become more attractive for business, which has increased the competition additionally.

7.3 The Challenges

The arable farming system in Northeast Bulgaria faces many different challenges, which are recognized by the stakeholders across the different methods applied. There is consensus on the most important challenges from the economic, environmental, institutional and social domains. In regard to each domain, the main challenges for the farming system that emerged through the analysis of the stakeholders'

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opinions are: lack of stability in farmers' income, climate changes, legislation changes and negative demographic changes in rural areas (depopulation and ageing). It should be pointed out that usually the challenges are interpreted as changes which have brought negative consequences for the stakeholders and which have led to lower profitability/effectiveness of their activity. More generally, the challenges were perceived to have negative impacts on the production output of the grain farms, and stakeholders questioned the future of the arable farming system in the region as a whole. The research acknowledges that many of the challenges forced farming system actors to undertake specific actions, which in the long-term perspective increased its resilience, as discussed in the next section.

The economic challenges identified to influence resilience of the system are mainly associated with price fluctuations and the level of subsidies. Price volatility of inputs and outputs are important factors for the economic viability of farms. In this regard the marketing and financial management of the farms predefine the farmers' ability to sustain the system. That is why there is a need for improvements in order to allow farmers to better respond to the globalization of value chains and unequal distribution of power across the agri-food chain. Grains and oilseeds are world trade commodities and the capacity of the country's production is limited compared to the international players from the region. The most influential are Russia and Ukraine, which as regional price-makers also impact the studied arable system despite the fact that it is dominated by large-scale and competitive production structures. Thus the knowledge about market trends and data is a factor for economic success. The farmers should find trustworthy sources of information, assess their importance and learn and gain knowledge on how to manage and properly estimate that information. Better understanding of world markets and gaining knowledge to predict their future developments is part of dealing with the economic challenge. Yet, the market effects differ across the different stages of farm development and are influenced by the farmers' ability to accumulate financial resources. Furthermore, the current economic performance and profitability of the farm business correlate with the farmers' risk perceptions and acceptance of insurance (which are at a very low level at present), especially against climate risks. Part of the suggested response is to invest in better irrigation systems but it is an economic challenge to mobilize resources at the system level since it is often not affordable by single farmers, and even to the large-scale ones.

Last but not least, the stakeholders considered the changing needs and expectations of the society as a factor influencing economic viability of the farming system. Ultimately there is a need to invest in more sustainable production methods, which stimulate farmers to invest in new technologies, new machineries and new varieties and to bear the costs of their adaptation to the local conditions. Other economic shocks with short-term impacts which were mentioned by stakeholders include political trends, like the Russian embargo, and more general political risks originating from global conflicts between groups of countries.

According to the stakeholders, the most important issues after the economic ones are the environmental challenges. There is a specific focus on climate change which is the most topical, alongside natural resources preservation with an emphasis on soil and plant diseases. Extreme weather events are of the greatest concern, as for the arable farming system in Northeast Bulgaria droughts are the most cited as well as rain if occurring in the decisive moments of the production process. Farmers realize their dependence on natural and climate conditions and challenge themselves to apply good agricultural and environmental practices. They include crop rotation and technologies which preserve and increase soil fertility in order to ensure long-term preservation of the production capacity of the land. The agronomic conditions predetermine the productivity levels and require strict combination of resources, e.g. ensuring machineries in proportion to the land for timely execution of operations. On the other side the increased requirements as a result of the greening of the agricultural policy are perceived as shocks for those farmers who have not considered the mentioned agri-environmental practices before they became a compulsory condition for receiving subsidies. Monoculture-intensive farming is considered to be damaging for natural resources, which compels farmers to look for and introduce these practices, which is in turn related to the values and knowledge of the system actors. It should be mentioned that parts of the region are designated nitrate vulnerable zones, which imposes restrictions for all type of farms and specializations. The restrictions aim at preventing underground water and air contamination and require new approaches to farming practices and natural resources management.

Never-ending changes in the legislation and policy regulations (including requirements and restrictions) affect farmers' long-term decisions. The most important issue related to this challenge, which holds back farmers, is the constitution and control of land

relationships. These relationships are very complicated both by the existing structure of fragmented land ownership and by the unstable legislation. Both impede longstanding commitments between landholders and landlords. Negative effects relate to the land market, as the level of land prices (including rents/leases) increased enormously, and to production expenditures of farmers. One of the side effects mentioned by the stakeholders is that the established relations affect the territorial allocation of the farmed plots as well. Tenants look for solutions to merge scattered parcels and to consolidate farmed land each year and these negotiations between them are not always fair and efficient. The next negative effect for the farming system is the decreased numbers of initiated changes, including investments in productions where the biological lifecycle of crops/animals is longer than a year. For example, changing the production to, e.g., perennials requires investments and it demands persistent actions for several years to start cropping. The short-term contracts for land rent prevent these long-term decisions. The challenge originates from the overall lack of a holistic approach and the absence of a long-term national strategy that outlines a sustainable vision for the future development of the sector which adjusts the CAP implementation according to the national priorities and specifics. In conjunction with these issues is the issue of bureaucracy. On the one hand, it is part of the low level of coordination between government departments and governmental levels in terms of administrative burdens to the beneficiaries of both subsidy schemes and measures implemented under the Rural Development Program. On the other hand, it is partially predetermined by the skills and capacities of public officials. As a result, the governance process is not effective and the trust in institutions decreases.

The challenges associated with the negative demographic changes in the rural areas are depopulation of rural areas, which is inevitably interconnected with the ageing population, and the lack of generational renewal in the labour force. Both of which lead to lack of skilled labour force for field work and for managerial staff in the crop farming system. These challenges are regarded as equally important as climate change. The outcomes, such as lack of entrepreneurship, decreased amount of successors, resistance to changes and falling ambition for novelties and innovations, caused shortages in the performance and outcomes of agricultural activities. Stakeholders acknowledged that despite the high level of mechanization and intensification of the processes in the arable farming, farmers struggle to

secure workers for timely operations during the periods with high pressures and for the implementation of new technologies. The question is related to the quantity as well as the quality of the labour force. The process is controversial and it is admitted that the intensification and mechanization led to loss of jobs and forced depopulation of the region. Therefore, grain farmers should be an active part of rural revitalization. The specific aspect of the challenges from the social domain, which requires their efforts, is to increase the attractiveness (1) of the rural areas (for highly educated potential entrants offering them less personal risks and higher average wages, providing social benefits for workers living a long distance from the farm, and adequate public services) and (2) of the sector (development of joint programs with schools and universities to revive the vocational and agricultural education and training and acquisition of relevant skills). Part of this domain is the need to respond to society's expectations and consumers' preferences as well.

Other long-term social challenges are more specifically related to farming activities. These include the interaction and cooperation with neighbouring farmers during the production process and social self-organization within the crop farming system. The former is mostly related to the lack of physical borders when working with biological organisms, which exposes the grain farmers to the risk of actions undertaken by the neighbouring farmers, e.g. use of controversial seeds and inputs, spread of diseases, pests, etc. The latter is related to the resistance of the actors in the system to cooperate and collaborate on improving the system's capacity to respond to the challenges and to realize the effects of scale. It is rather an exception than a common action but it happens, usually during the policy decision-making process. Farmer collaboration gives them better positions to defend their interests and to champion their cause as an agricultural producers' community.

The field work studied in detail past and current challenges. But future challenges were also discussed. According to the stakeholders' perceptions, the main challenges in the next years will continue to be: extreme weather events, labour force availability, the speed of innovation implementation, market competition, policy arrangements and bureaucracy. Each of these challenges could not be studied independently. Their effects interrelate and accelerate the need for changes in the system to preserve its future functioning.

7.4 The Coping Efforts for Current Resilience of Crop Production in Northeast Bulgaria

The crop production in Northeast Bulgaria still copes with the mentioned challenges and proves its ability to be resilient in the years after the transformation of the political and economic systems in the country at the end of the last century. Actually, the past processes forced the overall agricultural system, including crop production in the case study region, to transform into its current state. But the current system's capacity towards transformability is not proved by the study. The existing and developing alternatives based on innovations in technology and varieties are sporadic and still unacceptable for the mainstream. The crop production has its traditions in the region and incremental changes or radical transformation could not happen without radical change in beliefs and values of wide range of actors. From this point of view, the unexpected severe shock or continuous stresses in a long-term period would induce the transformation in the studied farming system. At present, the general resilience of the system is assessed to be medium to low. Indeed, the arable farming system in the region showed a relatively high capacity to keep the status quo and proved to be at a relatively low level of transformation. This results also from the current policy configurations, which foster robustness and neglect transformability.

Robustness is represented by persistence in keeping up the same activities and lack of intentions for change in the long term because farming at the current size and specialization is mainstreamed as a profitable business. It is also supported by farmers' commitment and attachment to the sector, its traditions in land cultivation, the high share of labour of the farmer and their family, the annual area-based direct payments (corresponding to the short-term focus of policy instruments and providing buffer resources) and lack of need for change in the recent years. The study revealed that the major driving factor for the discontinuation of this status quo is the continuous presence of shocks and pressures caused by climate change, lack of available labour and policy reforms.

However, many changes have been implemented at the farm level in regard to optimization of the production costs and preservation of the food production levels, enhancing the economic viability and increasing the quality of life and attractiveness of the area, which indicates the capacity of the overall system to adapt. This adaptability is

conceptualized by Meuwissen et al. (2019) as the capacity of the farming system to change and adjust its internal elements and processes in response to shocks and stresses but without changing its structures and feedback mechanisms. Therefore, it is proved that adaptability of the studied system is evolving. First, small adjustments of the on-farm production have been introduced from conventional to innovative, experimenting with new technologies and varieties (even diversification). They aim at better economic performance, but are also a response to the climatic challenges. The need for adaptation in order to meet future challenges and to continue the business is clear, and the improvement in access to the main production factor through owning the land gives the actors security to continue adaptation of farming. The process of business growth through increasing the farm size within the system goes along with buying new land (it is also the way to overcome instability of regulations of land relationships) and identifying new market opportunities, both of which require more adaptations than robustness. Scarce labour accelerates the adaptability of the grain farming system influencing its mid- and long-term resilience, and farmers initiate investments in and engagement with human capital. The research admits the importance of education and training (even abroad) combined with open-mindedness to new ideas and technologies as factors of adaptability (and even transformability) and exploring new opportunities for business development. Adaptability also receives stronger support through policy goals rather than through actual policy instruments. Every change in CAP stimulates farmers to adjust their practices to the new regulations. This is especially valid for grain production dependent on subsidies, in which case the adaptability is not intentionally pursued but externally induced. Recently, the adaptability in the arable system has been enhanced through policies aiming at innovations and agri-environmental measures available to crop farmers.

The transformability is the capacity of the system to change significantly its internal structure, to develop new elements, processes and feedback mechanisms (changes in the functions) in response to either severe shocks, or enduring stress that make business as usual impossible (Meuwissen et al., 2019). Transformability in studied arable farming system is least supported, according to the results, because there is no long-term view for change which can take the farming system to a different equilibrium state. Growth has been observed in the agricultural production process in the last decades. This growth is determined by the soil fertility and limited capacity to increase land productivity by

additional investments (e.g. fertilisers). The current crop farming system in Northeast Bulgaria has reached the limit where innovations in varieties, technologies, etc. improve economic performance of the farm through optimization of costs. The soil fertility improvement and yield growth are bounded and a transformation of the system may offer better prospects with regard to diversification and cooperation within the value chain. This statement is proved by the quantitative study of ecosystem services. The model showed that the indicator of food crop production in the studied system is lower compared to the average for the EU (Accatino et al., 2020) but has the capacity to utilize different diversification opportunities. Transformability is also facilitated at the household level within the system through the participation of the next generation in the current farm business. Young people are less connected to the tradition and more influenced by the technological innovations and trends. Otherwise, the demographic processes are tend to collapse, which would disrupt the smooth succession process as well as intensify the concerns for labour availability in quality and quantity. The transformation is observed in two directions at the moment. First, the farmers start to diversify their production to nonconventional crops driven by the new perspective sought after by their children. Examples include lavender cultivation and set up of processing facilities for oil extraction. Second, transformations occur when the current intensive crop farming system is changed to more environment-friendly management practices, including transformation to organic production. This process involves using new techniques (strep-till and no-till) which support the building up of organic matter in the soil. This is expected to ultimately result in a more sustainable farming system with improved soil fertility and water holding capacity. The latter is the system's response to climate change (drought) and economic challenge to restore and maintain the irrigation systems in the case study region.

7.5 Strategies for the Future Resilience of the Crop Farming System in Northeast Bulgaria

The research of the different resilience capacities of arable farming acknowledges that it is not realistic to expect that a single strategy could improve the resilience of a complex system as the one in Northeast Bulgaria. The future system would combine elements from different alternatives which stakeholders consider as possible adaptations/transformations. Hence, the combination of several strategies would improve the system's resilience with regard to the identified critical thresholds of

resilience indicators (productivity, farm income, nutrient balance), attributes (coupled with local and natural capital, exposed to disturbances, socially self-organized) and challenges (price fluctuations and changes in climate, legislation and labour force).

During the discussions, a general consensus was achieved on the essential strategies in the preservation of the system's resilience in response to any challenges and changes (future but also current), namely implementation of new production technologies, technical modernization and soil quality preservation. These strategies all entail behaviour towards adaptation or transformation, which eventually would improve the productivity and facilitate higher net farm income, reduce the dependency on external factors and utilize the main learning strategies adopted by the actors. The innovation strategies and implementation of labour-substituting technologies in particular also facilitate the reduction of the negative consequences from the lack of skilled labour. Another underestimated possible strategy is production diversification (any kind including territorial diversity of plots), which preserves farms from the risk of income instability. In the case study region, the farming system is poorly diversified to on- and off-farm activities, as stated by the stakeholders. In this regard, experimentation is an important strategy for all the respondents, focusing on adaptation of new technologies and crop varieties to the local conditions and trying out different crops on different plots across the farm.

For Bulgarian farmers, a key challenge was to learn how to act as entrepreneurs in a market economy after decades of a centrally planned economy. In this regard strategies to reduce market risks are still needed and some suggestions to be applied include using market instruments (insurance contracts, futures), participation in trade platforms and organization and dissemination of market bulletins.

Future strategies are also proposed in the institutional domain implying more stable policies with long-term vision and better cooperation with actors inside and outside the farming system. An emphasis is put on the interlinkages with research institutions and universities, the expectation for improvement in knowledge networks, and opportunities to exchange ideas and information. As the innovations are perceived as vital for the future resilience of the farming system, the mentioned strategies are expected to make farmers more open-minded to different viewpoints and improve their attitude towards participating in trainings, seminars and exhibitions. But we have to be aware that the mentioned processes may be controversial since many farmers feel more familiar

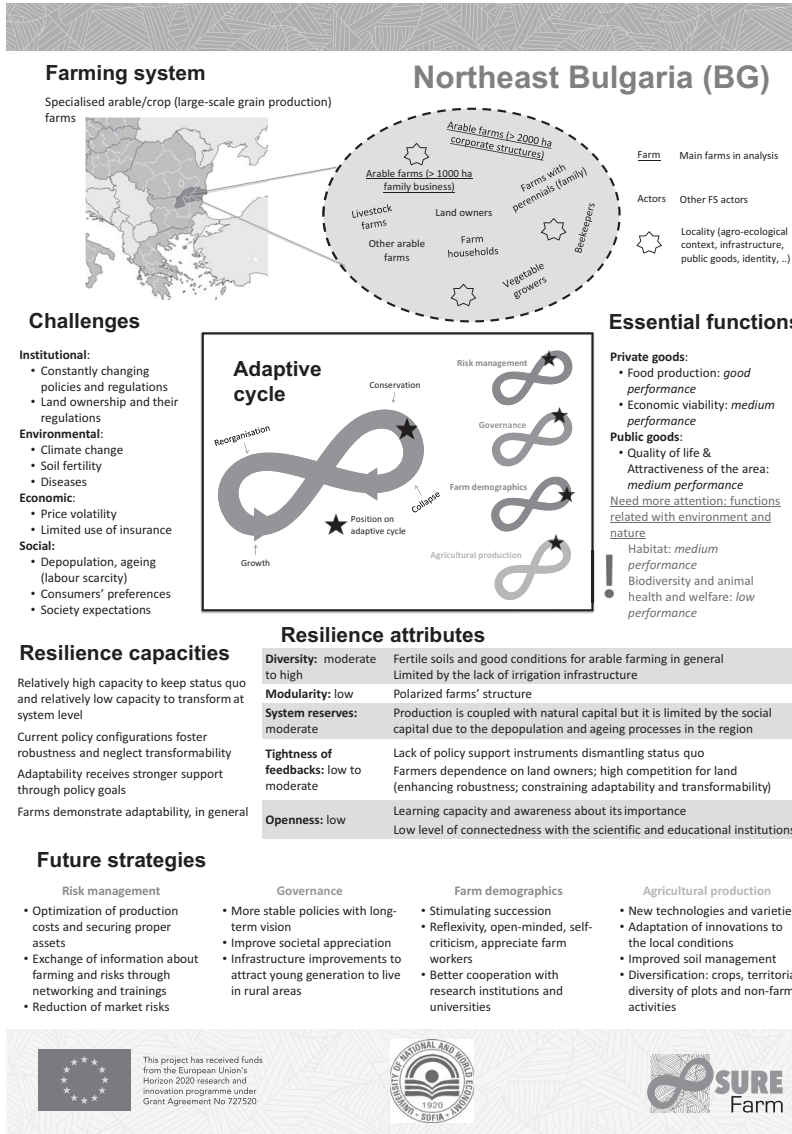
with the newest technologies and innovations than researchers and lecturers. The point is that due to underfinance of science and education in the agriculture field, farmers have better opportunities as long as they decide to invest and ensure funding.

The key strategies for the future system's resilience will be the stimulation of succession and improved attractiveness of the sector. The realization of any mentioned strategy depends on human capital. Moreover, the process of first-generation change in the grain production system is observed at the moment, keeping in mind historical developments and the fact that the tradition of farm inheritance was broken for many years. In regard to these strategies, policy support is important. The experience and results from the implementation of young farmer support schemes show its capacity to enable farming accession and to accelerate succession, which positively impacts farm demographics. The strategies increase the influence of the farmers' children as they grow up and contribute to the decision-making on the farm. They also influence the strategies related to the use of information sources due to increased use of the internet and social media.

Another important part are the strategies for improvement in societal appreciation, which significantly influences the cooperation, the succession and the willingness of locals to work for and together with the farmers. These strategies include participation in open farm days (increased transparency and trust) and actively engaging with the local community by organizing fairs and public events.

7.6 Conclusions

The studied grain farming system in Northeast Bulgaria is very important in the context of the regional and national development of agricultural and rural areas. The system demonstrated capacities to achieve effectiveness in economic terms due to large-scale production structures and specialization. However, there are shocks and pressures challenging the future system's performance and stimulating implementation of strategies targeting improvements in its resilience. The actions related to the environmental and social domain are considered crucial to trigger the system's adaptability and transformability in the future. The policy is important to support the performance and success of the strategies formulated by different actors, to smooth adaptations and transformations to new realities and to enable the overall resilience of the studied arable system.



Annex 7.1 Factsheet synthesizing resilience of the current farming system in Northeast Bulgaria.

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