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A PROPOSAL FOR BIODYNAMIC AGRICULTURE TO IMPROVE THE RELATIONSHIP OF FARMERS WITH RESEARCH INSTITUTES AND GOVERNMENT IN MOLDOVA

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Abstract Family farming employs 10 million people in Brazil in the countryside, small farmers contribute R$ 131.7 billion in the Brazilian Gross Production Value, according to the IBGE. In Moldova, the agricultural sector is in a critical situation and Brazil can learn a lot with the problem and the solution presented in this work. The recent situation created by the rising cost of non-renewable energy sources and their derivatives makes it necessary to re-examine the agricultural practices in Moldova. It is time to move quickly to the biodynamic cooperative model of agriculture. Cooperatives improve the loan exchange of inputs and machinery, help improve education, reduce family poverty and information redundancy due to the creation of a mutual knowledge base and a high level of trust between members. Providing a new perspective to the existing literature, this paper presents a Culture - Knowledge - Intelligence - CKI model that explains the impact of culture on knowledge and intelligence. The study concludes that culture change is necessary for small farmers to become open to learn modern agricultural practices and business language.

Keywords family farming; cooperatives; culture; knowledge; intelligence.

Resumo A agricultura familiar emprega 10 milhões de pessoas no campo brasileiro, e os pequenos agricultores representam 131,7 mil milhões de reais do Valor Bruto da Produção (VBP) do Brasil, segundo o IBGE. Na Moldávia, o sector agrícola enfrenta uma situação crítica, e o Brasil pode aprender muito com o problema e a solução apresentados neste trabalho. A conjuntura atual, impulsionada pelo aumento do custo das fontes de energia não renováveis e dos seus derivados, torna necessário reavaliar a forma de praticar a agricultura na Moldávia. É tempo de avançar rapidamente para o modelo cooperativo biodinâmico. As cooperativas facilitam o empréstimo de insumos e maquinaria, contribuem para a melhoria da educação, reduzem a pobreza familiar e a redundância de informação devido à criação de uma base de conhecimento mútuo e de um elevado nível de confiança entre os membros. Este artigo apresenta uma nova perspetiva para a literatura existente, um modelo Cultura-Conhecimento-Inteligência (CCI) que explica o impacto da cultura no conhecimento e na inteligência. O estudo conclui que a mudança cultural é necessária para que os pequenos agricultores estejam abertos a aprender práticas agrícolas modernas e a linguagem empresarial.

Palavras-chave agricultura familiar; cooperativas; cultura; conhecimento; inteligência.

INTRODUCTION

The family is a central institution in agriculture (Stiglbauer; Weiss, 2000; Hansen et al., 2022, Bertolozzi-Caredio et al., 2020). This evidence is referred in the literature as intangible asset transfer (Grubbström; Sooväli-Sepping, 2012).

In addition, livestock production contributes 40% of the value added by the agricultural sector and one third of global human protein intake (Steinfeld et al.,2006). However, the livestock sector no longer exists in the Republic of Moldova and the family farming model is in a critical situation for the following reasons:

1. Lack of basic education, leading to the assumptionthat farmers have limited knowledge about agricultural practices, such as new irrigation systems and trade-offs with alternatives to fertilizer production
2. Limited access for farmers to the knowledge and experience concentrated in research institutes.
3. Failure to encourage young people to remain in rural areas due to the lack of access to universities.
4. Low availability and use of agricultural seeds
5. Few examples of crop diversification and recycling

6. A very limited number of cooperatives and training institutions,
7. Lack of new mechanisms for farmers to communicate with investment banks and traders, as the economy is family-based and farmers are therefore unfamiliar with business language.
8. farmers are reluctant to take out formal loans because they do not know how to complete the required documentation, have not received loan offers, lack a credit history, and face the absence of a well-designed agricultural agricultural insurance system.
9. there is no solid plan to recreate the livestock sector and integrate it with family farming.

This paper proposes a biodynamic farming model and implementation plan for family farming in Moldova. In order to understand how agricultural techniques should be developed and applied in Biodynamic Agriculture, a National Program of Technical Assistance and Financial Support for Family Farming is proposed, to be implemented through local administrations and institutions. The main objective of the initiative is to stimulate the process of generation and application of new knowledge, with particular attention to national and international cooperation in the field of Science, Education, and Innovation, promoting research and training and fostering the retention of qualified and committed human resources within local communities.

It is proposed to establish a biodynamic agriculture programme based on mentoring, best practices and lessons learned with a strong emphasis on training courses to facilitate farmers' access to agricultural knowledge and information. When farmers are well trained, in a long-term perspective of the relationship between government and farmers, the quality of popular participation in agricultural projects will increase significantly.

There are several issues of concern to family farmers. Most recently, the issues that deserve greater attention are:

(i) The need to expand studies on greenhouse gas measurement.

(ii) A strong emphasis on precision farming (more efficient use of inputs and resources, less carbon intensive production, etc.);

(iii) Promotion of the development and widespread use of "land-saving"/resource-efficient technologies, making it possible to maintain the trajectory of reduced deforestation and expanded production.

(iv) Comparison of irrigation techniques

(v) Re-creation of the livestock sector and integration with family farming

(vi) Procedures to save and collect water

(vi) Recycling and fertilisation

(vii) Advantages of crop diversification

Given these needs, this paper presents a theoretical model to elucidate the relationships among national culture (values, beliefs and assumptions), knowledge management practices (the creation and sharing of relevant knowledge) and organizational intelligence (interpretation and application of this knowledge). It is intended that this model, referred to here as the Culture, Knowledge and Intelligence (CKI) Model, is intended to serve as a starting point for further applied and empirical research on the design of biodynamic projects in the family farming sector.

This article is structured as follows. In addition to the introduction and conclusions, Section 1 reports some best practices and lessons learned from biodynamic farming for the soils of Moldova. Section 2 explains the integration of knowledge management and organizational intelligence concepts and practices. Section 3 presents the topic of cultural intelligence together with the Culture - Knowledge - Intelligence - KIC model, combining the various theoretical elements gathered throughout the previous sections.

BEST PRACTICES AND LESSONS LEARNED FROM BIO-DYNAMIC AGRICULTURE FOR MOLDOVAN SOIL

According to World Wildlife Fund (WWF), agriculture is the world's largest industry, employing more than one billion people worldwide and generating more than USD1.3 trillion worth in food annually. Morseletto (2019) argues that the so-called "green revolution" has been characterized by intensive agricultural practices in developed countries, where the overuse of chemical fertilizers and pesticide use, monoculture production, intensive irrigation, and deforestation have been common practices.

The green revolution has failed to gain widespread adoption on because it has significantly reduced production and productivity, without balancing job creation and food subsistence, even at the household. This was due to excessive focus on environmental aspects, without a balance with the community, livestock and marketing of part of the production. An important alternative to industrial agriculture, which is also in decline due to excessive mechanisation, chemical manipulation and use of herbicides, as well as disregard for environmental conservation, is biodynamic agriculture.

Biodynamic agriculture goes beyond organic farming because it takes a holistic, ecological and ethical approach to farming, gardening, food and nutrition, It represents a way of living, working and relating to nature and agricultural vocations grounded in common-sense practices, awareness of the uniqueness of each landscape and the inner development of each individual and, consequently, of all practitioners within the community.

Biodynamic agriculture has its roots in the work of the philosopher and scientist Dr. Rudolf Steiner, whose 1924 lectures to farmers introduced a new way of integrating scientific understanding with an awareness of the spirit in nature. Crops serve a variety of purposes, including human food, animal feed, biofuels and other non-food products (Cassidy et al., 2013). Cover crops also contribute to soil fertility by adding plant diversity and bringing life and vitality to the soil through oxygen and nitrogen.

Crop rotation helps balance the needs of each crop and allows for creative diversity in soil expression. Together, these practices reduce or eliminate the need for imported fertilizers and allow the farm to move toward balance and resilience (Zaller, 2004). Common-sense practices include: striving to be self-sufficient in energy, fertilizers, plants and animals; structuring activities based on working with the rhythms of nature; using diversity of plants, fertilizers, and animals in a healthy manner; approaching work with seriousness, neatness, tidiness, focus on observation and attention to detail; ensuring timeliness in carrying out tasks (Paull, 2011).

Campbell and Watson (2012) and Raupp (2001) found that soil improvement, within the biodynamic farming approach, is achieved through proper humus management, for example, by applying sufficient manure and organic compost in an optimal state offermentation; proper crop rotation; effective soil functioning; protective measures such as windbreaks; cover crops, green manures and diversified cropping systems rather than monocultures; and mixed cropping allowing plants to support one another.

Boris, Coșman and Chilat (2020) determined the amount of mineralized organic matter required to achieve the expected yield of different crops in rotation with and without perennial grasses. Soil organic matter balance was assessed by comparing the amount of mineralised organic matter for yield formation and the amount of newly formed organic matter (humus) from crop residues and manure. The authors propose a model to evaluate the provision of dairy cattle with forages and, concomitantly, the capacity of soils to compensate, through manure application, the mineralization losses of soil organic matter for the formation of the expected level of production (Boris; Coșman; Chilat, 2020).

The general rule is that soil-depleting crops, such as maize and potatoes in the field and cabbage and cauliflower, etc. in the garden, should alternate with soil-replenishing crops, such as those of the legume family (peas, beans, clover, etc.). Also, deep-rooted crops should alternate with shallow-rooted crops, and crops that require fertilizer should alternate with those that can grow without it. In this context, a national policy and programme of technical assistance for family farming, with implementation through local administrations and institutions, will benefit smallholder farmers through subsidized inputs and technical support (Mazhar et al., 2021), will help encourage improved farming practices through crop diversification (Nyantakyi-Frimpong et al., 2015), and new mechanisms for farmers to communicate with investment banks and traders, as well as social organizations (producer association) to facilitate participation in state-promoted programs and projects (Junquera et al., 2022).

In the context of biodynamic agriculture, FAO (2021) reports that sustainable agricultural practices can help reduce damage to ecosystems and help maintain food production despite climate change, extreme weather, drought and other disasters, as well as progressively improve land and soil quality (FAO, 2021).

In terms of fertilization, in addition to determining the appropriate amounts of nitrogen fertilizers (nitrates) to be used, two other issues must be considered: when and how to apply them. The timing of fertilizer application varies according to the crop and the climate, particularlythe distribution of rainfall.

In terms of seed use, the main advantage of mechanical sowing is to saving time and placing seeds at the appropriate depth. Threshing is the process of separating grain from the straw or husks after the crop has been harvested. It can be done by hand or with a machine to separate the grain from the plant material.

With regard to irrigation, it is noted that comparisons among irrigation infrastructures are rare in the literature, but a clear advantage of drip irrigation is the uniform delivery of water directly to each plant during the growing season, according to the specific water requirements of each crop. Irrigation interval and frequency must be maintained as these vary across crops.

Other advantages of drip irrigation over sprinkler irrigation are: 1 - Water and energy savings in pumping water and field operations2 – The possibility of applying fertilizers through the irrigation system. 3 - Reduce the risk of weed growth. 4 - Maintenance of soil structure and texture.

The main disadvantage is the initial cost. It is also important to note that localized flooding may occur. In this regard, it is essentialto be aware of the trade-offs in the agro-zootechnical context of family farming. For example, in the absence of measures to restore soil fertility, irrigation contributes to the intensification of soil organic matter mineralisation processes, with negative consequences. Nevertheless, drip irrigation remains the most suitable technique for the type of soil in Moldova, namely heavy clay loam Chernozem soils combined with the country's low levels of rainfall, especially during the summer.

One of the limiting factors for cultivation in Chernozem soils is nitrogen deficiency. However, nitrogen levels in Moldova can be increased through biological means, by reintroducing leguminous crops, especially alfalfa, into the soil, thereby reducing the need to import nitrogen fertilizers. Qualifying and quantifying the soil quality constraints in agriculture involves multiple fields of knowledge and requires the integration of experiences to propose effective solutions.

Notwithstanding soil quality constraints and the techniques available for supplying necessary nutrients, Moldova must also mitigate the effect of weather conditions.

Agriculture is the main livelihood in most developing countries, but climate change has complicated agricultural production and food security (Ray et al., 2015). This has reduced crop yields by up to 60%, depending on the crop, location, and future climate scenario (Rosenzweig et al., 2013; Asseng et al., 2015).

Greenhouse gas (GHG) emissions from agriculture (e.g. rice cultivation, enteric fermentation, manure and synthetic fertilizers), land-use change and forestry contribute to climate change.

It is essential for the Republic of Moldova to conduct further studies on biodynamic agriculture to enable guidance for family farmers, the main beneficiaries of this learning process and a win-win relationship with the government, the private sector, research institutes, chambers of commerce and cooperatives.

Communication between researchers, development banks and family farmers can be strengthened through the creation of cooperatives which, in addition to addressing the issue of technical training, provide financial support to family farming initiatives. However, while the creation of cooperatives is a good solution, people need to be educated in this, as well as in knowledge management, especially in terms of mentoring, best practices and lessons learned.

With the support of the International Labour Organization - ILO, Maria and Ilie Tonciu, from Giurgiulesti in the Cahul district, Moldova, established in 2020, the first sheep farmers' cooperative to have a sales market, but also to exchange ideas and equipment with other farmers. The ILO Partnership with the Local Employment agency was launched in April 2019, involving more than 20 national and local public and private partners and by mid-August 2020 the project had already helped create more than 260 jobs.

KNOWLEDGE MANAGEMENT PRACTICES

In general, scholars suggest that governments need to ensure that science is at the forefront of strategiesfor economic recovery and economic growth. For this perspective, science generates knowledge and, consequently,innovation, which improves quality of life, democracy, economic growth, and the capacity to address complex problems. However, Rothberg and Erickson (2004) argue that knowledge is static and ultimately, it only has value if people use it. In 1989 Richard Ackoff established a simple taxonomy of environmental stimuli that has been widely adopted as concerns Knowledge Management - KM, proposing that four classes of inputs exist for any system: data, information, knowledge, and intelligence (Ackoff, 1989). Davenport and Prusak (1998) conducted an influential study on the differences among data, information, and knowledge.

Data consist of discrete, objective facts about events. In an organizational context, data are most usefully described as structured records of transactions. Like many researchers who have studied information, we will describe it as a message, usually in the form of a document or an audible or visible communication. As with any message, it has a sender and a receiver. Information is intended to change the way the receiver perceives something, to have an impact on his judgment and behavior. Most people have an intuitive sense that knowledge is broader, deeper, and richer than data or information.

Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of individuals. What this definition immediately makes clear is that knowledge is neither neat or simple. It is a mixture of various elements; it is fluid as well as formally structured; it is intuitive and therefore hard to capture in words or understand completely in logical terms (Davenport et al., 1998). The transformation of knowledge into intelligence is an operation accomplished by the human capacity to interpret, analyze, integrate, predict, and act.

Information is analyzed in the context of the personal standards, criteria, and expectations of the decision-maker, thereby becoming knowledge. Finally, the decision-maker applies this knowledge to a particular situation to generate intelligence.

Rothberg and Erickson (2004) clarify that knowledge is socially constructed through collaborative activities, but access to this knowledge does not guarantee success in decision making, since knowledge without application is innocuous. In summary, knowledge is the foundation of intelligence, since intelligence is knowledge in action to solve problems.

Bali, Wickramasinghe, and Léaney (2009) define Knowledge Management - KM as a set of tools, techniques, tactics, and technologies designed to leverage the intangible assets of an organization by extracting data, pertinent information, and relevant knowledge to facilitate decision making. KM is a set of practices aimed at fostering interaction between tacit and explicit knowledge to acquire and create new competencies (knowledge + skills + attitudes) enabling an organization to act intelligently (transform complexity into meaningful simplicity) across different environments (De Angelis, 2013).

Knowledge Management practices are grouped into three dimensions: people, processes, and technologies. People dimension, the best-known practices are: Forums (face-to-face or virtual) / discussion lists, Corporate education, Narratives, Coaching, Corporate Universities, Mentoring, Communities of practice or knowledge communities. In regard to practices in the area of process management, the most commonly used practices are: Internal and external benchmarking, Best practices and lessons learned, Bank of organizational and individual competencies, Mapping or knowledge audit, lessons learned, Competency-based management system, Management of intellectual capital or intangible assets. Regarding the practices in the technological area, we have the following practices: Electronic document management (EDM), Collaboration tools: Portals, internet and extranet, Workflow systems, Data waréouse, Data mining, Content management, Customer Relationship Management (CRM), Balanced Scorecard (BSC), Decision Support System (DSS), Enterprise Resource Planning (ERP) and Key Performance Indicators (KPI).

THE CULTURE-KNOWLEDGE-INTELLIGENCE MODEL

In an increasingly unpredictable and complex world (risks, breakthroughs and crises), a profound cultural change is required in the areas of family agro-zootechnical farming, given the advantages of personal skills. This cultural change underpins the creation of a Strategic Plan for Biodynamic Agriculture.

Under this plan, cooperatives, with the support of the Chamber of Commerce and research institutes, are tasked with organizing mentoring programs and sharing lessons learned and best practices, including through training courses with farmers to develop and integrate different skills: Intellectual Competence (IC)-Critical judgment and strategic perspective; Managerial Competence (MC)-Engaging communication, resource management and empowerment; Emotional Competence (EC)-Self-awareness, emotional resilience,

influence and motivation; and Spiritual Competence (SC)-Intuitiveness, selflessness, transrationality and higher ways of knowing.

Silva and Salanek (2006) found that 60 agricultural cooperatives showed a significant increase of 130%. Due to their ability to create and apply collective knowledge, cooperatives have achieved significant results in process of local and national development. Cooperative institutions are present in various sectors of the economy, such as agriculture, health, credit, transport, education, etc. Of these sectors, the one with the best structure and which is given great national and international importance is agriculture.

Cooperatives have emerged as a viable alternative for socio-economic development, but critics argue that there is insufficient methodological consistency to support such a claim, so they dismiss the research issue. Nevertheless, the substantial potential of cooperatives to facilitate the creation, development and accumulation of social capital through strategic actions that enhance mutual trust among members and then the exchange of goods, knowledge and experience within this collaborative environment is undeniable. This is made possible by the results of interaction between cooperative members composed of supportive and collaborative farmers with the common goal of promoting resilience and mutual growth of the whole community.

Interaction, trust, the definition of common goals and the structuring of social network are essential aspects for understanding the cooperative process and the relative importance of social capital for the development of the territories where it takes place.

The idea of creating cooperatives in rural areas of the Republic of Moldova has substantial potential for the formation of social capital, as it promotes actions that aim to bring together not only the group of cooperative members but also the local community.

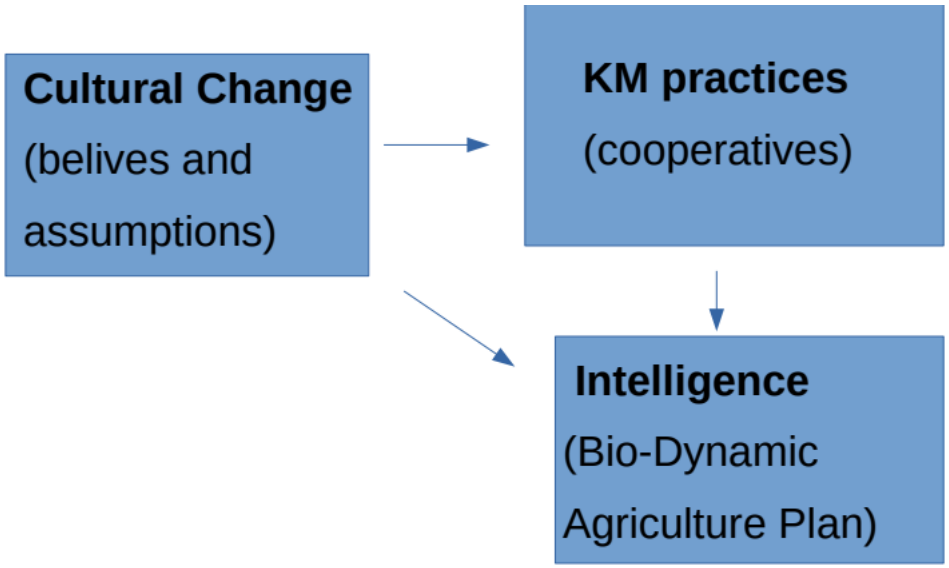
Cooperatives have the function of providing services to their members, such as technology transfer, directed technical assistance, loan exchange of inputs and machinery between members, procurement of inputs, production of seeds and fertilizers, processing of other productions (storage and drying), transportation and marketing.

The creation of cooperatives depends on educating farmers in this respect and, as the culture is based on families with a very high level of mistrust, a cultural change is needed.

National culture influences organisational and societal behaviours, how people will act in a given situation, such as thinking and decision-making (Schein, 1985), and active knowledge management is essential. In this sense, this article proposes a model that explains the impact of cultural change on Knowledge Management practices as applied in cooperatives, and in the Proposal of a Technical and Financial Assistance Model for Small Family Farmers.

Figure 1 shows the biodynamic family farming model.

Figure 1 - Biodynamic family farming model



Source: Authors (2022).

The CKI model demonstrates that cultural change among small family farmers has a positive impact on the knowledge management practices applied within cooperatives and also on the development and implementation of the Farmers' Technical and Financial Assistance Plan (intelligence).

Consistent with previous literature, the results of this study suggest that the development of an organizational culture (macro-level national culture) supports the application of knowledge management - KM practices (Davenport; Prusak, 2000; Nonaka; Takeuchi, 1995; Gold et al., 2001; Janz; Prasarnphanic, 2003; Lee; Choi, 2003; Donate; Guadamillas, 2010).

Some authors point out that organizational culture is not only a critical success factor for CM, but also the most difficult and important factor to address, especially when an adequate culture does not already exist (Davenport and Prusak, 1998). However, changing a culture in an organisation or community is a formidable challenge. The process of cultural change encompasses the following requirements:

1. People must be willing to cooperate (there must be appropriate incentives and rewards);
2. A basic understanding of how CM can improve communication between farmers, academia, the private sector and government.
3. Networking to promote cultural change;

Culture also plays an important role in creating the conditions for learning with the internal and external environment. This research empirically tests three hypotheses (Table I):

Table I – Assumptions in the CKI model

Hypothesis	Source	Results
Cultural change has a positive impact on Knowledge Management (KM)	Many authors point out that organizational culture is not only a critical success factor for KM, but also the most difficult and important factor to address, especially when an adequate culture does not already exist (Davenport and Prusak, 1998).	SUPPORTED
Cultural change has a positive impact on intelligence	Culture affects organizational and societal behaviors, how people will act in a given situation, such as thinking and decision making (Schein, 1985).	SUPPORTED
Knowledge management (KM) has a positive impact on intelligence	Active knowledge management is essential to enable improved organizational performance, problem solving and decision making (Liebowitz, 2019).	SUPPORTED

Source: Authors (2022).

RESEARCH METHODOLOGY AND DATA COLLECTION

The interview (see appendix) was the data collection criterion. According to Miller and Glassner (2004), interviews are designed and conducted to understand and give voice to participants' experiences, behaviors and attitudes in a non-threatening, confidential and non-evaluative manner. Interviews are particularly useful for obtaining the story behind a participant's experiences. The interviewer can pursue in-depth information around the topic (McNamara,1999). We conducted the interviews based on individual interviews and compared and contrasted the results ourselves, avoiding focus groups because of their high potential for consent bias (Schaffer; Riordan 2003).

The survey, available in the appendix, was conducted with the support of the Selecția Agricultural Research Institute, located in Balti, Moldova. This research is based on a survey conducted in rural Moldova. A total of nine (9) interviews were conducted with family farmers.

RESULTS AND DISCUSSIONS

All farmers answered the first question by selecting the option "I strongly agree". The same was true for question four (4) on Culture. This protective behavior together with anawareness of the need to change the culture, by the time the farmers start to trust the new (pro-EU) government, are the result of the long and hard learning-suffering process with the Russian Federation fighting for the reintegration of Moldova on their territory.

This finding also helps the impact of culture on knowledge and intelligence, as people in Moldova tend to place strong emphasis on relationships and hard work, especially with their hands, and therefore usually have no time for technical knowledge. On the other hand, we have to take into account that the communist system created such economic crises in the country that persistently low wages. The reduced access to technical knowledge, which is part of the culture of the Republic of Moldova, leads to difficulties in in the agricultural and livestock market.

Nevertheless, farmers demonstrate strong practical knowledge, as reflected in the "strongly agree" or "agree" answers to question four (4) on Knowledge. This pattern is also evident in the responses to question 3, Knowledge (strongly agree or agree). In addition, the majority of farmers consider the creation of cooperatives important, which is clear in the answer to question 4, Culture section (strongly agree or agree).

Thus affirming Hypothesis 1.

In the interviews of Culture, the vast majority of farmers, reported that they share their feelings and problems with family and friends in face-to-face conversations, indicating the influence of culture on tacit knowledge. Explicit knowledge is not important to them as most of them are not in the habit of reading. In the Intelligence survey, they are aware of the trade-offs in the agro-family farming areas but cannot take appropriate action due to lack of financial and educational support.

Farmers expressed a desire to see concrete signals from the government through financial or educational support. One farmer does not agree with the need for a biodynamic farming program. The other 8 farmers strongly agree with question 4 on intelligence.

The farmer who rejected the need for the need for, and contribution of an governmental assistance program in partnership with the local government and local institutions is that he got used to surviving without any help and does not trust the government, explaining also that fees required to obtain loans to increase production is too high and involves a complex procedure. They don't know about the Lavender Programme, created by the European Union to support small farmers.

In addition, "systemic risks such as drought and frost", which particularly affect small farmers and place their investments at risk, require the design of a viable agricultural insurance system, which is currently lacking (World Bank, 2015).

It is clear that there is a considerable communication problem between the capital and the other regions of the country, as the national government, as well as the local government, still does not know how to "enter" the homes of farmers and communicate their initiatives to support them by creating a mutually beneficial relationship based on trust, order and progress. Farmers say the local government doesn't even have the money to collect garbage from rural areas. Because of the toxic waste, the plantations near the dump (an open area in nature) produce substantially less as those a little further away, and the wind disperses plastic bags, pet bottles and tins, even if in smaller volumes. The rural population of Marianest, a rural area of the municipality of Balti in the Republic of Moldova, do not approach the Town Hall to request solutions and ask for a solution, because they consider that this situation with garbage is not relevant compared to the problem of the need for financial support, not to mention the need for technical assistance that most small farmers do not consider important, which is not the case for the medium-sized farmers, also interviewed.

These findings therefore support Hypothesis 2.

The interviews clearly indicate that the lack of production intelligence is not due solely to the absence of financial support, as farmers acknowledged. The problem of lack of knowledge is clear, particularly among small farmers. The more educated middle farmers find knowledge more relevant to achieve better results in their efforts.

Gutiérrez et al. (2021) point out that deficient knowledge is an issue that limits tillage capacity and therefore a factor affecting soil degradation. Caloghirou et al. (2004) state that the availability of knowledge will increase individuals' ability to search for, recognise and frame a problem, and to assimilate and apply new knowledge to solve problems. Halal (1998) argues that intelligence is the ability of an organization to create knowledge and use knowledge to strategically adapt to its environment. These three additional findings help to confirm Hypothesis 3.

A BIO-DYNAMIC PLAN FOR AGRO-ZOOTECHNICAL FAMILY FARMING AREAS

A systematic analysis of the family farming environment to identify the main trends, opportunities and threats is highly recommended. Based on this assessment, the government should open new agricultural schools and promote campaigns to encourage people to study, with the help of the Chamber of Commerce, the Research Institute and cooperatives.

As farmers reduce their social exchanges with neighbors and peers, they may increasingly rely on alternative sources of agricultural information and guidance, such as agribusinesses, government offices, rural savings and credit institutions, insurance companies, and educational and extension institutions - such as, in this case, the local agricultural college (Junquera; Rubenstein; Grêt-Regamey; Knaus, 2022).

It evident that there is a strong need to establish a National Policy and a National Technical Assistance Program for Family Farming to be implemented through local administrations and institutions, particularly the Chamber of Commerce and Research Institutes.

This Program should include the reconstruction of the livestock sector with economic, organisational, educational and financial measures.

In this regard, the government should actively listen to farmers, and this can only be done through the creation of cooperatives, that rely on socio-educational events to transmit knowledge and intelligence to farmers. Cooperatives should receive knowledge from chambers of commerce and research institutes, which at present, due to the lack of cooperatives, find it difficult to approach farmers.

Low participation in social organizations (producer association, cooperatives) makes it difficult for farmers to engage in state-promoted programs and projects (Anang; Asante, 2020). Another point is the quality of participation and therefore knowledge management practices (mentoring, lessons learned and best practices), together with training courses, are paramount in this win-win relationship between government and farmers in a long-term perspective.

Another solution lies in recognizing the essential role of diverse social contacts, local knowledge exchange and application, and cooperation in promoting the resilience of rural areas to global changes, by organizing on-farm events, creating spaces for spontaneous meetings or supporting various associations in rural communities (Junquera; Rubenstein; Grêt-Regamey; Knaus, 2022).

The European Union has developed a territorial cohesion strategy through a set of structural funds aimed at reducing regional inequalities, based on:

(i) a balanced urban system through multiple centers (polycentrism) and new forms of city-rural relations;

(ii) equal accessibility to infrastructure and knowledge.

(iii) multi-level and participatory governance system b involving European, national, regional, and local authorities.

In the same direction, the Federal Government of the Republic of Moldova should establish the National Policy and Programme of Technical Assistance and Rural Extension for Family Farming. Among other benefits, it should promote the creation of training courses, employment generation, induction of investments and implementation of social programs and projects, taking into account economic, social and environmental dimensions.

This national policy should focus addressing farmers' limited access to knowledge and expertise, concentrated in research institutes, isolated farms and a small number of cooperatives. A national policy and a national technical assistance programme for family farming, implemented through local governments and institutions, will benefit small farmers through subsidized inputs and technical assistance (Mazhar et al., 2021), will help

encourage better farming practices through crop diversification (Nyantakyi-Frimpong et al., 2015), and new mechanisms for farmers to communicate with investment banks and traders, as well as social organizations (producer association) to facilitate participation in state-promoted programmes and projects (Junquera et al., 2022).

The government faces difficulties in reaching family farmers, especially in more remote regions, so the creation of new cooperatives and integration with existing ones will contribute to the adoption of the biodynamic farming model, since the techniques of this new model require training. This training, like funding, should be regarded as an investment and not an expense, because agriculture is a flagship of the economy and it is paramount to improve the communication between government and farmers and the education in the agriculture sector.

RECOMMENDATIONS FOR FUTURE RESEARCH

Future research could replicate this study in other rural areas of Moldova in order to further examine the government's difficulties in reaching the low income farmers because it cannot set up field teams to visit them, thus preferring to maintain the image of corruption of previous governments and disintegration with the rural population. The isolation between the urban and rural areas and the very low cultural intelligence of Moldova, geographically isolated and without any low-cost airline companies to travel and understand the situation by comparison with knowledge-based countries, does not stand a chance against the Russian army, even with super American help. They actually are in the hands of the Russian president and the possible decision of using the two Russian-Turkish occupations to invade the rest of the small country, as he has already done in Ukraine, with a much larger territory. The idea is, besides the financial and educational supports to the agriculture, is to check the possibility to invite the refugees from Ukraine to work in collaboration with the small farmers.

CONCLUSIONS

The article demonstrated through interviews and a literature review that a cultural change among smallholder farmers would lead to the use of good knowledge management practices, especially mentoring, best practices and lessons learned. In addition, this cultural change would support the development and implementation of a technical and financial assistance plan. These relationships are clearly illustrated in the CKI model. Small farms do not have communication with medium-sized farms because there is no place to exchange knowledge and experience, as well as machinery such as tractors, ploughs, harrows, spreaders and harvesters. One possible solution could be to set up cooperatives to help medium-sized farmers with fuel and running costs if they help small farmers with soil preparation.

Cooperatives would also be responsible for transferring relevant knowledge and facilitating access to credit lines for farmers. In addition, it is necessary to understand the countryside

not only as a space of biodiversity and conservation of natural life, the ecological-environmental countryside, but also with the function of providing food, fiber and raw materials, namely the agricultural countryside. Furthermore, the countryside should be recognized as a vocation for tourism, particularly rural tourism, which remains in its early stages of development.

To motivate this discussion and others, such as the best agricultural technique in terms of the Bio-dynamic Agriculture model, this paper proposes the establishment of a National Policy and a Technical Assistance Program for Family Farming, to be implemented through local administrations and institutions will seek technical skills and expertise that contribute to a) technical-operational knowledge on irrigation, fertilization, etc...) the limitations imposed by soil conditions, in particular increasing the organic matter content in sandy substrates c) subsidizing inputs together with the design of a viable farm insurance system. The expected outcomes of the proposed National Policy and Technical Assistance Program include improved farmer education, strengthened communication with academia and government, and enhanced access to financial support.

QUESTIONNAIRE ON FAMILY FARMING

CULTURE

1. I am aware that the values, beliefs and assumptions of family-based Moldovan culture strongly influence my thoughts and actions.
2. Despite the advantages of family-based culture, mainly trust, I am aware that this culture may lead me to place less value on technical knowledge from the universities and research centers about modern agricultural techniques, as well as business language for eventual marketing of products.
3. I am aware that in times of crisis it is necessary to unite with other families, as well as to understand the proposals and guidelines of the new and less corrupt government, and especially the knowledge produced by the research centers transmitted through the agricultural cooperatives. From this point of view, it would be important to promote resilience in rural areas through organizing events with farmers, creating spaces for spontaneous interaction and the support of educational-social association in rural areas, a cooperative.

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1 I am aware that a limiting factor for planting on chernozemic soils is the lack of nitrogen and a promising approach would be the gradual reintroduction of alfalfa with plant biomass fermentation through methanization with bio-gas complemented by perennial vegetable crops.

2. I would like to become a more independent farmer and for that I am open to training courses (new irrigation systems and trade-offs with alternatives to fertilizer production) that make it possible to integrate scientific understanding with an awareness of the spirit in nature and to develop business language skills necessary to access financial support.
3. I am familiar with various family farming techniques such as composting fertility, integration of livestock with agriculture, cover crops and crop rotation.
4. I am aware that the general rule of thumb is that soil-depleting crops, such as maize and potatoes in the field and cabbage and cauliflower etc. in the garden, should alternate with soil-replenishing crops, particularly members of the legume family (peas, beans, clover etc.).

INTELLIGENCE

1. I recognize that life can only be understood in retrospect; but it must be lived moving forward, with awareness of why I do what I do.
2. I develop a sense of self that is not merely the result of ideas or views or opinions or experiences, but reflects a deeper and more natural way of living–is heir to.
3. I am able to reflect on my previous thoughts and experiences from new contexts and perspectives, seeking to understand the deeper causes of events.
4. I believe that a National Program of Technical and Financial Assistance for Family Farming is necessary, to be implemented through local administrations and institutions. This program will benefit small farmers through subsidized inputs and practical technical knowledge.

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