

CHALLENGES AND OPPORTUNITIES FOR A SUSTAINABLE AGRICULTURE IN THE CONTEXT OF THE GREEN AND DIGITAL TWIN TRANSITION. HOW CAN WE INCREASE THE RESILIENCE OF THE AGRICULTURE IN THE CURRENT CONTEXT?

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Abstract

The climate changes and the impact of the COVID-19 pandemic most recently have generated an increase interest and support for the topic of agricultural resilience. First of all the European Union Member States have discovered that the current pandemic has generated immense troubles in both the supply chains (that were often over extended and vulnerable) and the supply of the population inside the EU. This only added to the troubles generated already by climate changes (draughts, water shortages, extreme climate variations, etc.) All these acted like a wakeup call for the policy makers and other stakeholders. We have started to realise that we need to build up a resilient agricultural system that can sustain all the citizens involved. This resilience building process is a very complex and requires a lot of transversal actions and a whole-of-society approach. What is it needed? First of all we should innovate and train the farmers. Secondly we should developed the local and national infrastructure needed for agriculture. The use of financial instruments and institutional mechanisms are also needed to support the farmers. All these measure should be taken only after a thorough research process that draws a map of the realities in place, of the upcoming challenges and of the measures needed to solve them.

Key words: resilience; agriculture; whole-of-society approach, innovation, training, foresight.

INTRODUCTION

In the last couple of years we have been witnessed to the rise in both academic and practitioner speech of the concept of “resilience” seen as a way to promote a better European Union and a better agriculture.

The term has started to make a name on itself and became a buzzword as the COVID-19 pandemic generated the need of a new approach towards the development of the European Union. The economic crisis generated by the supply problems, the long chains of production generated the need for a redrawn of the economic system. In the context the recovery and resilience mechanism one first official definition of the resilience “means the ability to

face economic, social and environmental shocks or persistent structural changes in a fair, sustainable and inclusive way” (Regulation (EU) 2021/241). Thus the main idea was to have a coordinated European answer that implies both a financial effort and new approaches than in the same time favours the economic and social cohesion, the resilience and the twin green and digital transition. The solution was NextGenerationEU (European Commission, 2021a).

This came on an already strong trend toward developing a resilient agriculture that can only further profit from this penchant for the green and digital transition.

The COVID-19 Pandemic forced the realisation that the European Union is over reliant on outside suppliers for agricultural products. That made the green dimension even more important at time when the EU needs to support “a sustainable bio economy seeks the transformation of Europe’s agricultural and industrial base through the creation of new bio-based value chains, as well as greener, more cost-effective industrial processes.” (European Commission, 2020).

Furthermore a series of 2021 analyses done at the EU level show a dramatic impact of the climate changes on agriculture. “Over 40% of the EU’s agricultural imports could become highly vulnerable to drought by 2050, inducing competition for water and fertile land” (European Commission, 2021b).

As a result of these evaluations at the EU level was also drafted a European Resilience Dashboard that has a green dimension. According to the European documents the green resilience is “about reaching climate neutrality by 2050, while mitigating and adapting to climate change, reducing pollution and restoring the capacity of ecological systems to sustain our ability to live well within planetary boundaries.” (European Commission, 2021c).

Besides the EU made analyses, we also have to take into consideration the important role of the agriculture in the realization of the UN 2030 Agenda and its 17 Sustainable Development Goals (SDGs). The agriculture has a critical role as achieving food security is a prerequisite for achieving the goals of the 2030 Agenda (FAO & OECD, 2019).

MATERIAL AND METHOD

The current research papers is built upon the use of desk research methods. It is built upon the literature review of academic literature and official documents. It explores the concept of resilience, the economic and social context that requires a new sort of approach. These would be applied in the area of agriculture in order to see how and if the agricultural sector could become more resilient.

RESULTS AND DISCUSSION

Taking into consideration the above mentioned issues it is clear that the link between climate change and agriculture has been established as the main challenge is to build what the experts call climate-resilient agriculture. This sort of agriculture needs to address both the climate change related challenges, the aspect related to food security and the sustainability part. For some experts it is composed of three aspects, as follows:

- increasing the agricultural productivity and incomes in a sustainable manner;
- building resilience to climate change;
- reducing and/or removing greenhouse gases emissions. (Parvatha, 2015).

This requires a complex effort, on various areas and is not an effort that a single farmer can do it but it is a collective effort that needs to go beyond the strict agricultural approach and toward a whole of society approach.

It is obvious if we analyse the other related term, that of sustainable agriculture, that for some authors is just another synonym of the resilient agriculture. One such definition, from 1990, describes the sustainable agriculture as: “an integrated system of plant and animal production practices having a site-specific application”. It is a system that over the long term, needs to accomplish a series of five conditions, described below:

1. “satisfy human food and fiber needs
2. enhance the environmental quality and the natural resource base upon which the agricultural economy depends
3. make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls
4. sustain the economic viability of farm operations
5. enhance the quality of life for farmers and society as a whole” (Lengnick, 2015).

So the question arises: how to deal with all these challenges and yet inculcate resilience to agriculture? How to develop a strategic framework to ensure the resilience of agriculture in face of challenges?

One such answer is the need of a leap of knowledge, especially when we are dealing with abiotically stressed environments. We need to know more about the physical impact of such stressors and develop proper simulation models to see how they affect the agricultural policies. Another answer is the use of new technologies meant to reduce the stress. We can therefore mention

the use of techniques and approaches ranging from conservation agriculture (CA) to Integrated Farming Systems (IFS), from integrated soil fertility management to agroforestry, etc. (Paramjit et al., 2017).

Of the above mentioned techniques I would just mention further the issue of conservation agriculture that implies a series of practices meant to have a reduce mechanical soil disturbance; to maintain a permanent mulch cover with organic matter and also implying the diversification of species (Friedrich et al., 2017).

Another envisaged solution for increasing the agricultural resilience is the use microbial nanotechnology for climate resilient agriculture. “Nanotechnology in combination with microbial biotechnology has led to the rapid development of marketable formulations involving deployment of artificially designed nanoparticles for crop improvement and combating biotic and abiotic stresses.” (Kashyap, 2018).

Another similar set of policy recommendations aims at accelerating the process of resilience building through innovation and training. Adopting modern technologies, drought-tolerant and water-efficient crop varieties and technologies and the use of information and communication technologies are key for a more resilient agriculture. Also enhancing the technical, financial and business management skills and capacities of the farmers is a critical thing to do (Abebe, 2018).

Facing the climate changes requires a climate-smart agricultural value chains that are up to the task. For that is required a profiling of each link in the value chain, have a clear map of all the connexions and of the associated risks (Mwongera, 2019).

A special attentions needs to be directed toward the use of degraded lands area that have been so far ignored due to high costs associated. Yet now by using specifically adapted crops and plants, with the use of supplements we can use the degraded areas for enhancing food security and climate change resilience (Saqib, 2019).

Also non-technical measures can be taken in order to have a resilient agriculture. A series of authors spoke about a series of institutional mechanisms that includes measures such as: crop insurance, which would provide financial stability to farmers; the existence of remunerative prices and well developed agriculture markets and other similar measures (Anantha, 2020).

CONCLUSIONS

The above mentioned aspects show that at the level of practitioners as well as in academia there is a real interest in transforming the agricultural sector into a resilient business. The causes are multiples. First and foremost is the inescapable reality of climate changes that generated a huge level of stress on the agricultural production. Secondly is the ever-changing reality of today societies, marked by a rapid urbanization and increase of the population that requires a good level of food security. All these makes the process of building agricultural resilience an urgent one. The approach is been rather clear and is being teste throughout the world, not only in Europe but also on other continents. Is a mix of innovation of all sorts and training, of institutional and financial reforms and institutional building.

At the end of the day the end result would be a resilient agricultural system that would withstand all challenges and provide to all those involved with substantial benefits.

Acknowledgments

Research financed through the project entitled SUSTAINABILITY OF THE ACTIVITIES AND QUALITY IMPROVEMENT FOR THE FUNCTIONING OF THE POMICOLA RESORT – THE UNIVERSITY OF ORADEA, CNFIS – FDI -2021, D3 Gardens & Resorts

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