SMART AGRICULTURE VERSUS CONVENTIONAL FARMING

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Abstract: *The Common Agricultural policy, as the general European wide guideline is setting out the general guidelines for Europe's farms, farmers, products and consumers. The selected indicators are meant to bring a long-term assurance for all involved entities. The new technologies and the fast evolving IT&C can bring more transparency in the food chain production, which can assure the visualisation of the available stocks and evolving food prices.*

Monitoring the production and manufacturing of the production going hand in hand with the management system of the agricultural production and subsidies are helping the operationalized food process in order to optimize the use of resources in order to have the transition to the new smart and automated agriculture.

The IT specialist can relieve the farmer from his new activity by supporting him through monitoring and implementing the new "chip-sets" which more easily operationalizes the food-chain production.

Key words*: The Common Agricultural Policy, Product Monitoring, European Farmer*

INTRODUCTION

The European Commission through its „Agriculture and Rural Development" policies is conducting extensive actions which should be followed at a European wide level in agriculture and within the rural development. Through its strategies generically called CAP (Common Agricultural Policy).

The European Commission is seeking to support European farmers in order to develop their own business so that the food needs for 50 million Europeans are covered. As these documents state, the main objectives are the production of food at affordable prices so that both consumers and producers are evenly protected and satisfied. It is already known that in Europe there are 10.8 million agricultural holdings with a total of 9.5 million active working farmers. [12]

Statistically speaking this means that 50 Europeans need to be fed from one farm, and over 23 Europeans are fed from the activity of one farmer worker.

These figures shows us that regarding the agricultural domain, there needs to be well defined and correct strategies, which are viable at the European and as well at the national level. The European Commission proposed to monitor the achievement of the CAP in each country. [3,4,5].

MATERIALS AND METHODS

The CAP implementation in the period 2014-2020 will be measured through a set of indicators converging a wide range of issues which provides informations of interest for specialists and decision-takers.

These indicators can be grouped in 4 categories [10,11]:

- "Output indicators", which make reference to the degree of achievement of the strategic activities (ie. Total public expenditure, the total investment, etc.);
- "Result indicators" which measures the direct and immediate effects of the policies and strategies in the field (such as the number of created jobs in agriculture, or the number of new created farms, etc.);
- "Impact indicators", which sow the long term effects;
- "Context indicators", which reflect the aspects relevant to the context of the economic tendencies and the social environment.

The achievement of these indicators at high levels implies actions and proper measures under the wide known circumstances of the migration of the population from the rural to urban areas.

The use of new information and communication technologies can make a big impact in the modernization and optimization of the agriculture domain [8].

Besides the known statistics, these can be corroborated with the physical localization of the farm, which by example if in connection with the local and/or European market can deliver in real time the production and stock availabilities, so that the prices and the end user, the consumer, can have an better overview of the seasonal agriculture production and in order to visually witness the evolution of the offer and request.

There are more talks, which are also applied in many farms, about the new concept of "smart agriculture", meaning that the entire chain of the agricultural food production is assisted by computer (from the seeding to the final product) [6].

Therefore in order to apply the CAP implementation with all it's indicators, there needs to be an applied methodological approach of the implementation. These indicators make strict reference to the underlining post effect of the guidelines given by the Commission.

In order to follow the implementation there needs to be set a number of mechanism which follow the product from the seed to the final destination the consumer. Therefore as shown in the study conducted by Prof. Dr. Jörn von Lucke from the Open Government Institute, near the Zepplin University of Friedrichshafen in Germany, the emerging technologies can be applied at various stages in the agricultural [9].

Below the mentioned elements:

A. Actions of information, documentation, analysis and decision

1. Monitoring systems:
   - Monitoring of production and manufacturing;
   - Monitoring of production;
   - Monitoring of pests and diseases;
   - Monitoring of supply and sale;
   - Monitoring of subsidies.
2. Management system:
   - System for data management and agricultural production subsidies.
3. Analysis decisions based on information obtained using electronic sensors:
   - Information about the herd viable using the "chip-sized"
   - Weather correct fertilizer needs.

B. Actions regarding system optimization

1. Process Optimization:
   - Optimising land use in agriculture and forestry;

- Storage automated horticulture and forestry;
- Optimization of food control.

2. Optimize the use of resources:
   - Smart in construction of housing;
   - Smart food supply in the stables (the livestock);
   - Seeding and fertilizing crops smart.
3. Support Systems in the production and exploitation in agriculture:
   - Smart agriculture with automated management of crops and livestock;
   - Intelligent supply and smart evaluation;
   - Remote veterinary assistance.

Without doubt the above listed aspects assume the realization of IT&C systems with all its specific components: dedicated equipped systems with "chips" which ensure an online communication channel, software systems that can deliver real-time informations, operated from IT specialist regarding the agriculture domain [7].

This new visualisation of the farm informations in real-time can bring a new transition in the management of the public information which can assure more transparency [1,2].

RESEARCH RESULTS

By making these informations public in order to circulate to the wide common European market, by implementing the new green and IT&C in the food chain process, by publishing the data on the internet, where the Commission has full access, the European consumer and farmer will both have a win-win situation, because throughout the circulation of goods and services and connecting the local grocery store direct with the field of production.

The consumer will also can remotely check the physical location of the farm by accessing the internet and tracking back the product to its origins, a sort of looking back of the principle from the "ton to the plate".

This will facilitate also a more easy access for the consumer, having the possibility to order directly from the farmer, which can assure an extra income, which in turn he can again invest back in his business. Therefore implementing the new chip-sets in the food chain process can highlight the European vision of having clean, tasteful and fresh products on the market with a correct pricing. Even food crisis will be more easily prevented, like the one's Europe witnessed in the past decade, because implementing these new technologies, there will not be the case of eradicating entire tons of so called "infested" food.

The application of IT&C in agriculture at the farm level in which one must meet a known demand of crops while respecting ecologically based production constraints. The problem has two decision levels.

Firstly the division of the available heterogeneous arable areas in plots has to be determined, so that the demand is met, and secondly it is necessary to determine, for each plot, the appropriate crop rotation schedule.

Therefore a different type of approaches could be the assumption of the intrinsically multi-objective nature of these decision problems and tries to deal with it. A multi-criteria analysis applied to agricultural resource management sees the main goal, as to classify and evaluate which criteria are usually used for modelling agricultural systems and to identify the difficulties for practitioners in applying the methodology.

Frequently the data that feed the models are not known with precision, either because it has not been collected in the past or because it refers to the future. In both cases, estimations have shown that a better use of IT&C can be made and used sometimes to bring an additional level of uncertainty to the decision making process. In this context, the land-use planning problem for optimal production of several seasonal crops in a planning year, could lead to the utilization of total cultivable land, supply of productive resources, with aspiration levels of several crop productions as well as the total expected profit from the farm.

A possible solution is compared with the existing cropping plan of the region as well as with another solution for the problem, obtained by using previous solution techniques.

The advantage could be that the decision for proper allocation of cultivable land for production of seasonal crops can be made on the basis of the need to society, even in an environment of uncertainty.

Dealing with different uncertainties: the risk of the agricultural risk, production uncertainty, price uncertainty, technological uncertainty and policy uncertainty, and provide an exposition of expected utility theory and of the notion of risk aversion. But there should not be ignored the potential of the Agricultural insurance and the hazard and adverse selection problems that arise in the context of crop insurance.

Regarding the farm efficiency, the aim of the state and the EU is to help the local government to define the objective criteria assigned by the EU subsidies to growing the farmers speciality.

EU regulations demand objective criteria for the subsidy allocation Operations Research in Agriculture: Better Decisions for a scarce and uncertain world system and in a sector where more than half of the farms would have negative returns without the EU agricultural subsidies, it is difficult to access the real efficiency of the farms.

A new Farm Efficiency index could be set along calculated by decomposing overall scores, by means of internalizing the positive and negative externalities of agricultural activity.

The EU uses already an index which together with the chip-sets proposed, could be tested for example on a sample of a couple of thousands of real farms, where the data taken from the administrative subsidy database could be visualised also remotely by the end-user, the consumer. But more important than different decisions concerning the subsidies attribution, there is generally a lack of information which do impede a proper and grounded decision.

Leaving the farm level, the multi-criteria decision-making is still a powerful tool to model situations in which conflicting objectives arise. It is also the case in situations when the impact of policy changes lead to changes in the behaviour and reactions of the farmers. A multiple decision-making methodology can be used to analyse shifts in the utility function of the farmers. The change from price support to direct income support can decrease the relative importance of the risk objective, while the environmental objective is gaining importance.

A multiobjective methodology can be a useful framework for a better understanding of the farmers reactions to different policy reforms.

However, the state which can have implications in the production of the marketed commodities and protection of natural systems often conflict with the intent, which has the intention to continue to bridge the gap between economics and the agricultural domain through integration of it’s different modelling techniques of it’s different policies. A single

focus only on one goal, can result in large losses in other goals and may result in inefficient and unsustainable outcomes for the farmers and their products.

The dynamic which can lead to an evaluation in the different land use decisions by finding acceptable alternatives for both the economic and the ecological point of view.

The introduction of IT&C in the agricultural production could set up a time-frame for corps production which shape the landscape of the agricultural production which could cover a long time frame programming the land-use of a long period of time.

The end-results of the agricultural usage in the EU could lead to better market results which could improve the current conventional farming by moving towards the smart and green agriculture.

CONCLUSIONS

Europe's Common Agricultural policy, as the general European wide guideline is setting out the general guidelines for Europe's farms, farmers, products and consumers. The selected indicators are meant to highlight the long-term assurance for all involved entities regarding the food production.

Implementing the new technologies and the fast evolving IT&C in the farming process by implementing new chip-sets and connecting the farm with through the internet with the physical map, can bring more transparency in the food chain production, which can assure the visualisation of the available stocks and evolving food prices.

Monitoring the production and manufacturing of the production going hand in hand with the management system of the agricultural production and subsidies are helping the operationalized food process in order to optimize the use of resources in order to have the transition to the new smart and automated agriculture.

The IT specialist can relieve the farmer from his new activity by supporting him through monitoring and implementing the new "chip-sets" which will more easily operationalizes the food-chain production**.**

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