FARMS AND AGRICULTURAL ENTERPRISES FOR SUSTAINABLE SMART COOPERATIVES DEVELOPMENT: A MULTI-ACTOR APPROACH USING DIGITAL FARM MANAGEMENT

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Conference “The common Agricultural Policy of the European Union – the present and the future”,
05-07 December, Stare Jabłonki, Poland

CONTENT

1. Introduction

- Smart cooperatives refer to the economic aspects of enforcing cooperation based on some common activities or objectives.
- This paper presents a multi-criteria mathematical model which is able to facilitate the formation of smart cooperatives and to collect behavioral data about small farmers.
- The value of this behavioral, qualitative data is unique and can be valued in a large range of domains.
- Two of these domains regard the banks and insurance companies.
- To distinguish the risk profile of the individual farmers.

1. Introduction

- Connections between farm modernization and rural development.
- Agricultural and food sector need to change systemically.
- Possibilities for, and drivers and limitations of sector change in four thematic areas: the resilience of farms and rural areas; prosperity and wellbeing; knowledge and innovation, and; the governance of agriculture and rural areas.
- Major mismatch between visions and strategies on the one hand, and market developments, policy measures and outcomes on the other.

2. Behavioral Digital Farm Management

- The design of targeted, well-tailored policies in the agriculture, articulated with the CAP is flawed by the particularities Small farms, the mainly concern being the size of the allocated subsidies.
- Inability to form associative structures like for example agricultural cooperatives, based on common activities is usually assigned to a historical bad period when that was enforced against the will of the proprietors.
- Nowadays, general discussions about the optimal functioning of the cooperatives in agriculture are carried, with the scope to improve on efficiency and achieving economies of scale or from environmental concern.

2. Behavioral Digital Farm Management

- Scopes and reasoning of the small farmers differ from a behavioral perspective from those large farms.
- In the process of production, substitutability between factors of production,

  - the vulnerability to the weather conditions or

  - the simple ignorance about the specific solutions or

  -the ignorance of the official recommendations about the specific conditions

- Are all distorting the formation of the expected gross margin, as it is predicted by the farmers themselves.

2. Behavioral Digital Farm Management

- The correct estimation of the gross margin as a proxy for the dynamics of future profits.
- This is why, the existence of a reliable, real data base on behavioral data about the expectation formation regarding the current and future gross margin stay at the base of the success of any action in the small farms.
- The software proposed is built on an innovatory mathematical model, following a multi-criterial approach.
- The model constructed using this technique is entirely original and it was tailored for the specific needs of the Bulgarian agriculture.

2. Behavioral Digital Farm Management

- Several focus groups allowed for the construction, confirmation and estimation for this prototype and specific derivations, like the estimation of the cash flow, break-even point or the risk profile of the users.
- Software program allow to the farmers to be more and more conscious about:

- of the structure of the variable costs
- on the errors in the estimation of the gross margin
- on better adjusting their expectations and also on the options they have about costs
- of the degree of substitution between factors of production.

- Perhaps one of the most important other achievements is the possibility to aggregate these behavioral data on reports to be used as meaningful references of performance comparisons and to assist in the design of optimal agricultural policies.

2. Behavioral Digital Farm Management

•While the model is build using the Analytic Network Processes (ANP) theory to incorporate behavioral decisions at the level of small farms regarding the substitution in between factors of production with the aim of determining the expected gross margin (GM):

- It is anchored on a standard calculation of the GM

- The calculation of the GM follows the next theoretical idea:

- Consider there is a farmer's production function

- Y=Y(Labor, Nutrition, Chemicals, Canopy , Machinery, Irrigation…) where Y is the yield and Labor, Nutrition, Chemicals, Canopy , Machinery, Irrigation are all factors of production.

- Gross Margin (GM) can be regarded as a proxy for the dynamics of the profits, being calculated as

- GM=Y* Average Gross price-Variable Costs, where

- Variable Costs=wL*Labor*+wN*Nutrition*+…..WI*Irrigation* +….

2. Behavioral Digital Farm Management

- Where Labor*, Nutrition*, Irrigation* and so on represent the optimal demand functions for the correspondent input factors of production after minimizing the cost of producing an arbitrary level of output Y.
- It is customary to place the issue of determining the gross margin under the theoretical assumption of separabitlity of the factors of production, yet this hypothesis is mostly contradicted for small farms.
- This fact leads to significant discrepancies between the theoretical-standard estimations of the GM and the actual ones, these discrepancies being further interpreted as departures from some efficiency –optimal –standard values.
- These departures impede on further derivations like a correct determination of future cash flows, break-even point and future profits
- and through that, conduce to an improper estimation of the farmers risk profile and management efficiency and thus to an inadequate financing of the specific agricultural activities.

2. Behavioral Digital Farm Management

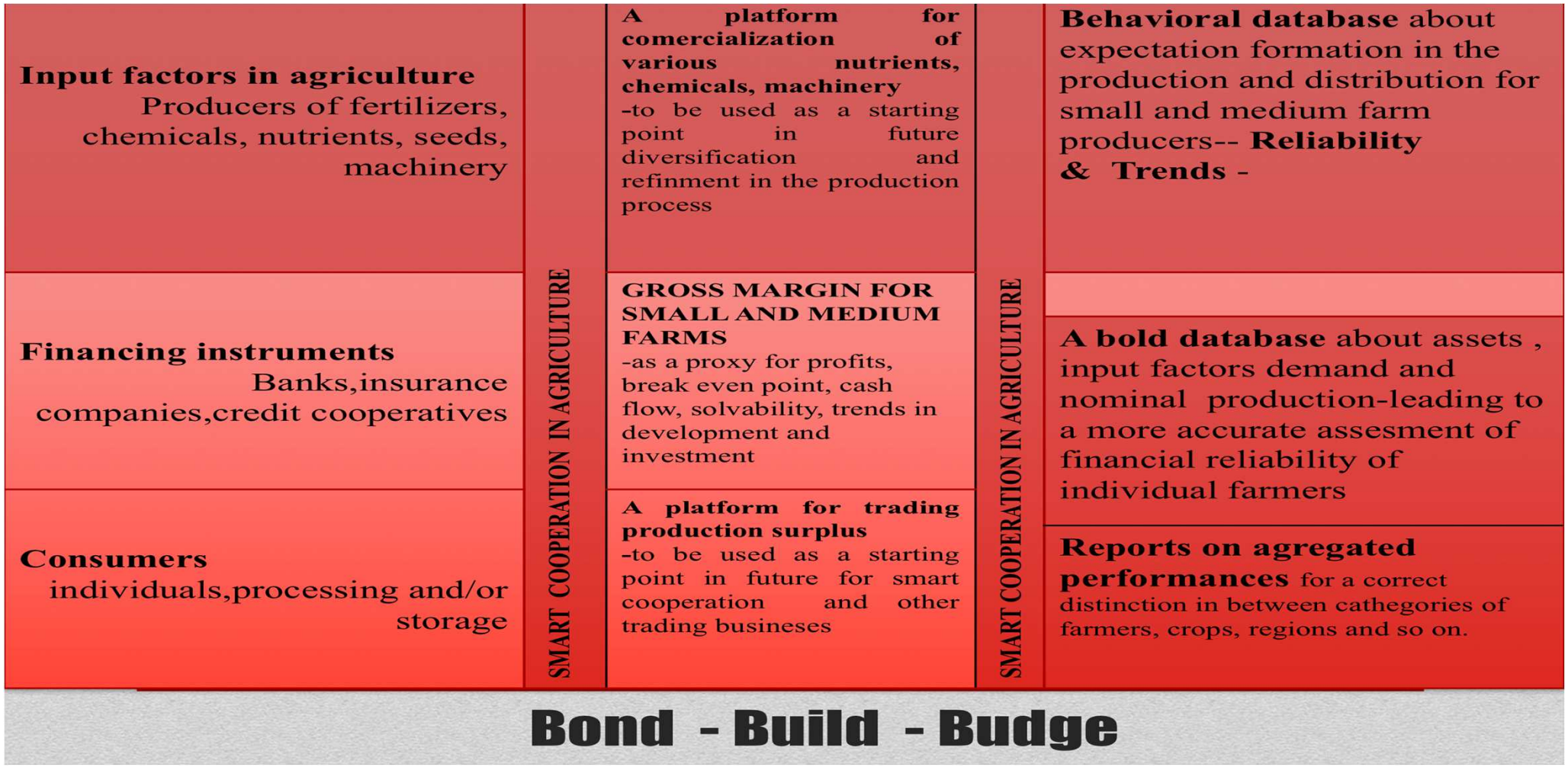
•To sum up, the main two theoretical assumptions in the neo-clasicall theory of production function ,

- the separability of the factors of production and

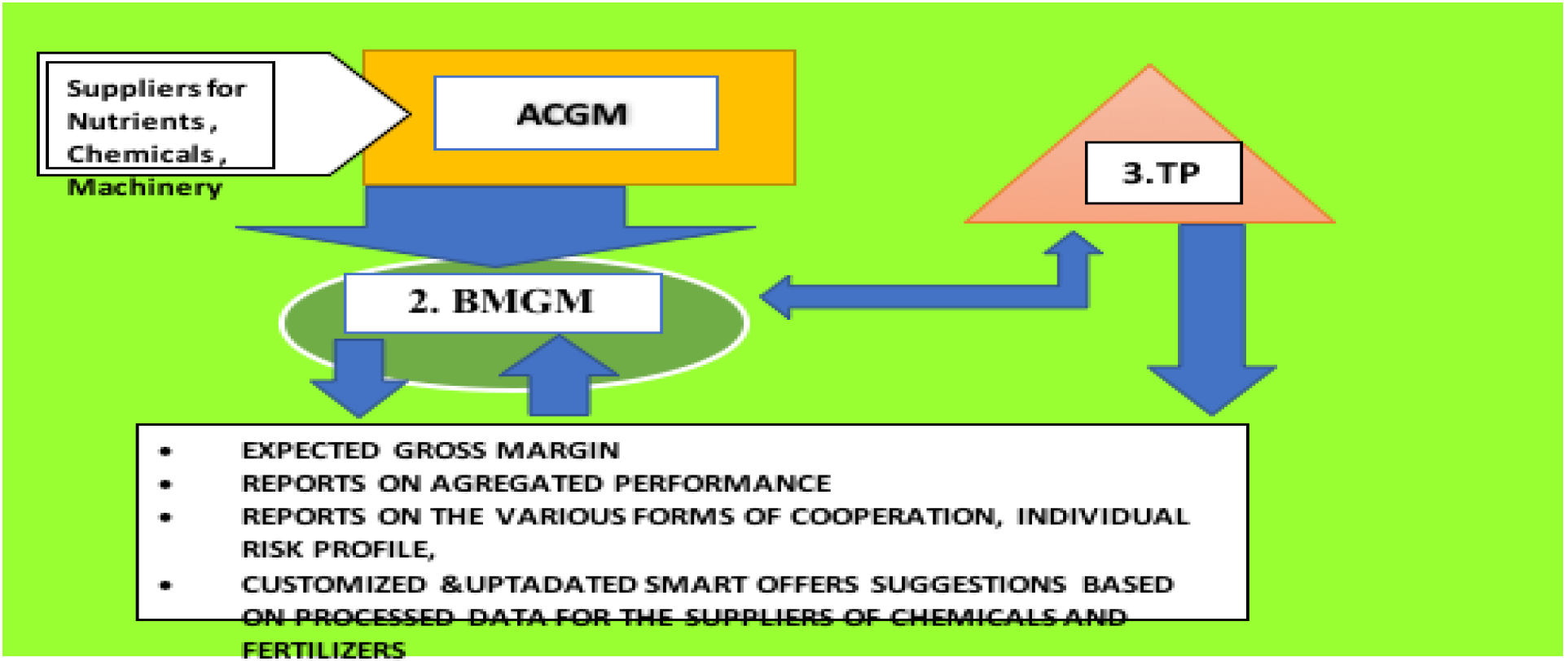
- the dependence between the output and the selling price in the context of market characterization are addressed by this model and replaced by the next two assumptions:

- The interdependence (substitutability) of the factors of production in the case of small farms, interdependence being inverse proportional with the size of the farm.
- The construction of the cluster matrix assessing the comparative importance of all the variables participating at the formation of the GM address exactly the two theoretical drawbacks previously mentioned.

3. Smart Cooperation in Agriculture



3. Smart Cooperation in Agriculture



3. Smart Cooperation in Agriculture

a tool for

-simulate the **expected gross margin** depending on the tacit

input factors substitutions and various

scenarios

- Behavioral micro-data on farmers
- Various correlations; Eg: the connection between years of experience and types of fertilizers
- Risk profile on number of trials and consistency index
- Keep track of how the farmer chooses to change the preferences
- Keep track of the categories considered for „what if „ scenarios

THANK YOU FOR YOUR INTENTION!