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STRATEGIC DIRECTIONS FOR FOOD SECURITY BY BALANCING THE REPORT OF DEMAND AND SUPPLY ON GLOBAL AGRICULTURAL MARKET

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Summary: *In this study I discussed about the results of the FAO studies, I used certain methods of forecasting supply and demand and I presented some solutions. Discussions on FAO results are based on population trends, both general and structured areas, urban and rural. Next I have predicted supply and demand for major food products in different geographic areas. These forecasts were established using economic-mathematical calculation methods. Thus, in terms of demand linear regression model was used to predict it simple and to offer trend extrapolation method was used to forecast production and to predict import simple regression linear model. Thus the two main components of the market, supply and demand in each of the areas examined were put in antithesis and each represented by a graph for each main agro-food product. The study concludes with several recommendations with which it can establish a balance between supply and demand; recommendations such as reducing yield gaps, boosting the production and reducing losses.*

Keywords: *food security, supply and demand for agricultural products, world population, consumption and production.*

INTRODUCTION

Initiate approaching this theme, the global agricultural market was stimulated by certain features of the agricultural sector, including the fact that it can influence economic growth, but another factor that may influence the agricultural sector, this time is the change and food security trends. The theme of this study is the global agricultural market and its implications on food security.

This study will present recommendations or solutions in terms of balance between supply and demand report on food security. On the one hand, global agricultural demand continues to grow rapidly, and on the other hand, it is obvious that the supply of agricultural products worldwide is not keeping pace with increasing demand.

There are significant factors in terms of increasing global demand for agricultural products, such as:

- continuous growth of the world population,
- revenue growth in developing countries,
- rapidly growing demand for bio-energy (biofuels).

There is a general consensus that the global population will continue to grow at rapid rates; growth has been, to date, about 12% in a decade.

According F.A.O. world population in 2013 was 7.16 billion; it is projected to grow by 2050-9500000000.

Global supply of agricultural products will not keep pace with increasing demand, the main reasons being:

- climate change,
- natural resource constraints (limited availability of land and water)
- technological restrictions.

MATERIAL AND METHOD

The outlook on the demand or the supply is very important because, knowing beforehand their trends, we can prevent and mitigate problems or deficits.

To predict the trend of supply and demand will use certain methods of budgeting and forecasting, especially linear regression model simple for demand the application is the dependent

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variable, and the population will be exogenous variables; and if the offer will be used linear regression model both simple trend extrapolation and the method.

Based on data presented in studies and FAO statistics on requests from previous years and the population can schematising a linear regression model simple application is the dependent variable and the exogenous variable is the population, as follows:

$$y = ax + b$$

$$\hat{y}_t = \hat{a} * x_t + \hat{b} + \hat{\epsilon}, \text{ where:}$$

y – the dependent variable (demand)

x – independent variable (population)

\hat{a} , \hat{b} – estimates coefficients

$\hat{\epsilon}$ – Error / residue

Through this model we calculate demand forecasts on specific geographic regions and product categories.

Supply of food products is based on two components, namely: the production and importation. So we offer analysis to predict trends and prospects of the two components.

To forecast production, importation and we use trend extrapolation method by which they will predict a period of three years:

By solving the following system will determine the coefficient function $y = a + bx + cx^2$:

$$\begin{cases} na + b\sum x + c\sum x^2 = \sum y \\ a\sum x + b\sum x^2 + c\sum x^3 = \sum xy \\ a\sum x^2 + b\sum x^3 + c\sum x^4 = \sum x^2y \end{cases}, \text{ where:}$$

n – the number of terms (years),

a, b, c – coefficients of the „y”function ,

x – takes values symmetrical to 0 (center terms),

y – value of production / import.

Thus, summing up the two components of the supply, we get a projected value of the offer. These values will be present to offer each geographical region partly structured by major foodstuffs.

RESULTS AND DISCUSSIONS

After applying the above mentioned methods, but also from the calculation itself, I present the following situation to forecast the demand and supply of agricultural products:

Table no. 1 Results forecasting demand of food products across geographies

Area	Demand for cereals (thousand tons)			Demand for meat (thousand tons)		
	2015	2016	2017	2015	2016	2017
Africa	206,494.30	204,451.30	202,380.68	20,748.21	21,458.73	22,178.86
Asia	1,287,626.76	1,315,373.59	1,342,404.91	154,615.37	158,878.21	163,031.12
North America	458,004.51	455,777.32	453,540.18	49,394.53	49,436.92	49,479.50
South America	183,667.50	186,522.88	189,328.10	26,988.22	24,705.97	22,463.81
Europe	567,423.39	571,766.34	574,920.53	78,419.95	78,664.74	78,842.53
Oceania	52,942.83	56,106.44	59,287.66	5,582.35	5,543.70	5,504.82
Area	Demand for milk (thousand tons)			Demand for vegetables (thousand tons)		
	2015	2016	2017	2015	2016	2017
Africa	56,662.06	58,429.02	60,219.88	83,232.02	85,650.72	88,142.84
Asia	340,021.91	349,650.54	359,030.88	945,904.85	971,331.14	88,102.12
North America	109,077.78	110,654.16	112,237.57	46,478.99	46,040.94	45,600.94
South America	80,993.65	83,737.12	86,432.41	29,580.34	30,314.39	31,035.55

Europe	269,315.54	269,584.49	269,779.82	137,936.10	138,754.94	139,349.64
Oceania	26,528.63	26,574.50	26,620.62	3,358.68	3,327.14	3,295.43

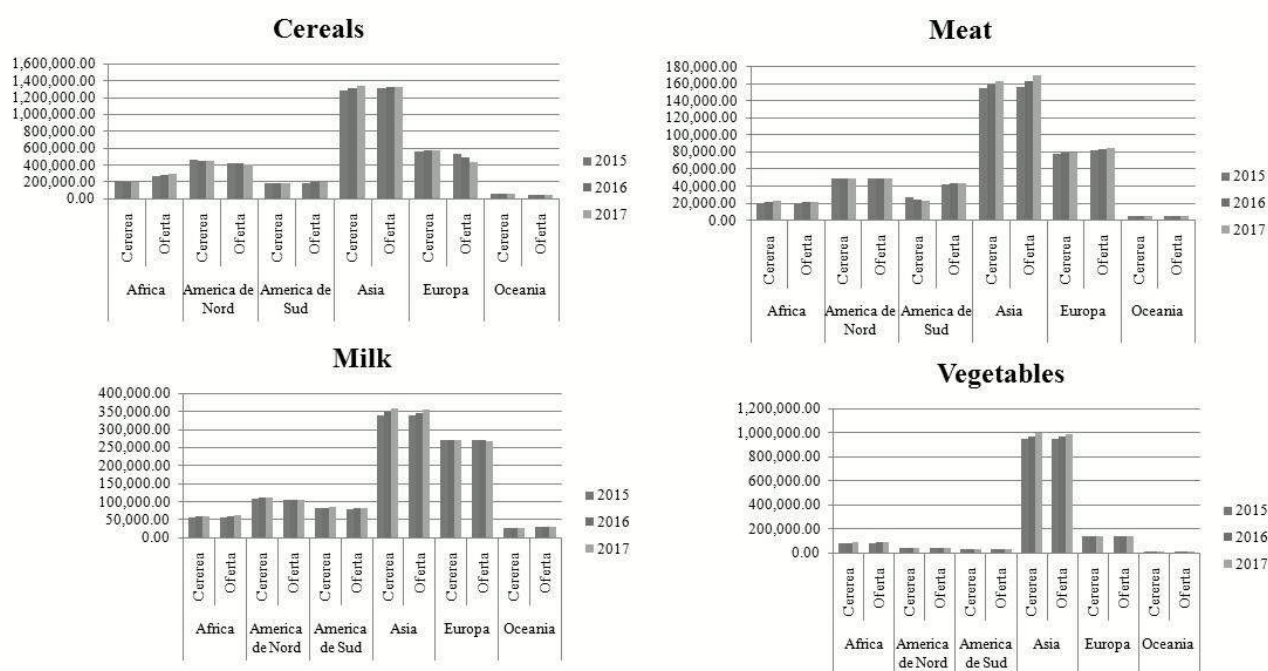
Table no. 2 Results forecasting agricultural products supply across geographies

Area	Supply for cereals (thousand tons)			Supply for meat (thousand tons)		
	2015	2016	2017	2015	2016	2017
Africa	268,467.47	282,528.91	297,988.26	20,618.82	21,348.14	22,104.43
Asia	1,311,873.65	1,324,983.31	1,332,116.44	156,633.76	162,922.48	169,684.55
North America	421,424.82	416,816.55	412,858.18	48,814.67	48,671.09	48,494.94
South America	188,360.80	192,681.26	197,397.92	42,265.14	42,798.60	43,278.42
Europe	528,881.66	490,613.55	437,571.88	81,933.97	83,141.05	84,349.48
Oceania	51,130.90	51,401.56	50,768.66	5,442.71	5,278.95	5,080.77

Area	Supply for milk (thousand tons)			Supply for vegetables (thousand tons)		
	2015	2016	2017	2015	2016	2017
Africa	56,962.71	59,502.76	62,328.96	84,023.35	87,718.61	91,852.01
Asia	338,191.93	347,013.26	355,447.73	944,705.01	968,869.37	992,153.80
North America	103,834.85	104,305.59	104,667.05	46,371.23	45,957.35	45,562.15
South America	79,247.01	81,167.08	82,854.12	29,693.45	30,564.31	31,465.51
Europe	271,119.72	270,292.95	268,932.24	140,435.85	138,953.00	136,187.27
Oceania	29,798.27	30,049.46	30,210.22	3,511.32	3,648.56	3,835.11

Indeed, having predicted the two sides of the market, ie demand and supply, we can compare them to see surpluses or deficits to agricultural products or geographic regions. The comparison between supply and demand by product category and by area, can be seen in the charts below.

Figure no. 1 Forecast of supply and demand for the main product categories



The report supply-demand for grain market will be different depending on the area. For Africa region demand for grain has a decreasing trend and offer an increasing trend, its values will be higher,

leading to a surplus of grain in the area. In North America, both components of the market downward trend, but offer value value will be below demand which will lead to a shortage of grain. In South America, demand and supply have a rising trend, but the tender amount will be higher than the demand. In Asia demand and supply will have an upward trend, but demand is growing faster than supply which will lead to a deficit in the area. In Europe demand for grain will be approximately constant, with a slight increase, but will supply about significant decrease. In Oceania cereals market demand will rise, but the supply is fairly constant, oscillating a little under demand. Thus in the near future in regions: North America, Asia, Europe and Oceania, demand will overcome the supply leading to food insecurity on cereals market.

Analyzing each region, the ratio of supply and demand in the future market of meat we notice the following: In Africa the report supply - demand will be quite balanced, both slightly increasing, the supply being very slightly lower than the demand. In North America demand for meat is greater than the supply, continuing to increase and supply will decrease. In South America supply meat market is higher than demand, with a downward trend, registering a substantial surplus. In Asia both components of the market, have an increasing trend, the supply being greater than demand. The same situation can be observed in Europe, which will lead in the near future at a surplus. In Oceania, supply and demand will show a decline, but demand remains higher than supply. Can be said that regions: South America, Asia and Europe, food safety meat market will not suffer.

On the milk market, the ratio supply - demand is quite balanced in each of the geographic regions analyzed. Thus, in Africa, supply and demand will tend upwards, and the supply will be slightly above both, the demand. In South America, will meet the same trend, but the proportions are reversed, so demand will be higher than supply. The situation in South America is the same as in the North, on the scale a little lower. In Asia demand and supply of milk are very balanced, very low difference in favor of the application, both recording increases. In Europe demand for milk will be almost constant, with a slight upward trend, and the offer will be decreasing, starting over demand in the near future recorded a balance. In Oceania supply and demand in the milk market will have an upward trend, the supply is higher than demand.

The vegetable market is a very important player represented Asia, where the ratio supply - demand is extremely high compared to other regions, thus supply and demand in this area will have an upward trend, although demand will be slightly higher than the offer during future. After Asia, Europe ranks submitting a vegetable ascending and descending offer, will be a point of equilibrium in the near future. Depending on the amount of supply and demand, we can place Africa on a three-zone, which is characterized by a ratio of supply - demand increasing, the supply being greater than demand. In North America, demand and supply for vegetables are almost steady, with a slightly decreasing trend, with very little demand is higher than supply. In South America the two components of vegetable market are quite balanced, both having an upward trend, offer being slightly higher than demand. In Oceania disputed quantities of vegetables on the market are quite small, demand will have a downward trend and supply increasing one.

CONCLUSIONS

Given the outlook for supply and demand we can say that they will maintain the same trend as in previous years, for certain products in certain areas having upward trend, for others in different parts downtrend. With forecasts we can avoid serious problems by preventing negative effects and methods repairers offer support where needed. Therefore I submit to several actions that present a negative character even any unusual recommendations:

Reducing the gap between yields

The yield gap represents the difference between realized productivity and the best that can be achieved using current technology and genetic material. The best yields that can be obtained locally depend on the ability of farmers, to access and use, among other things, seeds, water, nutrients, pest management, soil, biodiversity and knowledge.

Low yields occur because of technical restrictions that prevent local food producers to increase productivity, but also because of economic reasons arising from the market conditions. Recovery of the output gap should help boost food supply, but with uncertain impacts on the environment, and the potential feedbacks could undermine food production in the future. Food production has important negative "externalities", ie or environmental effects on the economy, that are not reflected in the cost of products. To address these negative effects is known broadly that production systems and food chain must become fully sustainable.

Reduction of losses

Approximately 30 to 40% of the food in both developed areas and in those under development are lost as waste, Although the reasons are different. In developing areas, the losses are mainly attributable to the absence of infrastructure food chain, and lack of knowledge or lack of investment in storage technologies.

In contrast, in developed areas, the losses are much lower before sale, but those arising from retail, food services and final consumption, stages of the food chain, recorded increases. Currently in this area of consumers the food are relatively cheap. Consumers have become accustomed to purchase food to the highest standards in terms of appearance; Such retailers take many edible products just because they have a small visual defect.

Of course, various strategies are required to address two types of losses. In developing countries, public investment in transport infrastructure would reduce the percentage of damage; while the better functioning of the market and the availability of capital increase the efficiency of the food chain. If food prices will rise, It is possibly the loss as waste volume to decline, in developed countries. Reducing wastage in developed countries is particularly difficult, because it is closely linked to individual behavior and cultural attitudes towards food.

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