GUIDELINES OF GREEN MARKETING STRATEGY IN EUROPEAN COUNTRIES: CORRELATION ANALYSIS APPROACH

SMERNICE ZELENE MARKETING STRATEGIJE EVROPSKIH ZEMALJA: PRISTUP KORELACIONE ANALIZE

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Abstract: *Values of harmful emissions caused by synthetic fertilizers were compared with the value of agricultural products produced in the years 2000 and 2011 in European countries and assessed whether higher yield crops require the use of resources that cause greenhouse gas emissions. The statistical analysis compares the countries that have increased the value of agricultural products by increasing harmful emissions with countries that have reduced emissions. Analysis of the comparison of the two groups reflects the guidelines of the future development strategy of green production of agricultural products and marketing.*

Key words: *sustainable management, green production, greenhouse gas emissions*

Sažetak: *Vrednosti štetnih emisija prouzrokovanih veštačkim đubrivom poređene su sa vrednošću poljoprivrednih proizvoda proizvedenih u 2000. i 2011. godini u evropskim zemljama, te je izvršena procena da li veći prinos useva zahteva upotrebu sredstava koja izazivaju emisije gasova staklene bašte. Statistička analiza poredi zemlje koje su povećale vrednost poljoprivrednih proizvoda povećavanjem štetne emisije sa zemljama koje su iste emisije smanjile. Analiza ove dve grupe odražava smjernice buduće strategije razvoja „zelene proizvodnje" poljoprivrednih proizvoda i marketinga.*

Ključne reči: *održivo upravljanje, zelena proizvodnja, emisije gasova staklene bašte*

INTRODUCTION

Through different time periods vary also managers' strategies. On the basis of a variety of strategies to adapt to the practices introduced to market conditions, operating both in the short as well as long term, and are adaptable to different norms. Strategy of the all European countries is geared towards generating profit, but some of them seem to achieve their goals using harmful drugs that harm the environment, while others are already consuming resources that are friendly to the environment. While taking into account the nature and the environment, the needs of present and future generations and taking into account the economic legitimacy, executive strategy is approaching to the concept of sustainable management. Management strategy for sustainable management is important at the same time to develop in all areas where economic factors operate. Operating on certain sectors only, leads those sectors to the non-competitive market position, since they can no

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longer compete with the high technology and with monopolistic industrial system, directional that specialize only in profitability as investment in nature and environment protection cost only, so they refuse it. However, modern and future community needs to be oriented on revitalization of natural resources, the reduction of the pumping action of these resources and technological progress. Current depleted natural resources is necessary to replace with the help of new technological innovations and with the acquisition of resources, with very small interventions in nature or even without them.

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AGRICULTURE - BEARERS OF THE GREEN REVOLUTION

In the second half of the 20th century's global output of agricultural products has increased dramatically. This increase was the result of technological advances and the use of new resources for the production of agricultural products so, therefore, this period is called the "green revolution". According to the Cunningham [1] production increase of crops has been the result of use of chemical fertilizers, synthetic herbicides and pesticides. By using these assets the producers have gained high-yield products. New technological-chemical innovations have enabled that the crops in the fields yield two or more times per year. An illustration of a drastic increase in agricultural production at a very small modification of additional land into cultivated fields is shown in Figure [01]:

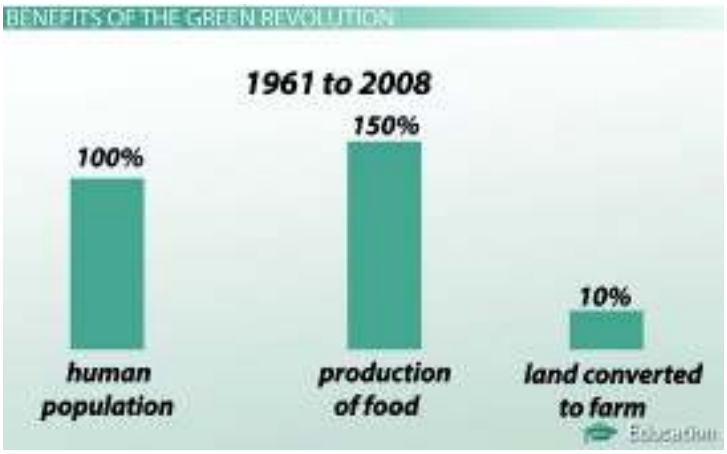

Figure [01]: Increment of population, food production and land converting in to farms

Fields were constantly loaded with growing plants. With the use of artificial fertilizers and chemicals the annual harvest increased significantly. This kind of farming reduces costs of

production and enables lower food prices in the market. Due to bigger hectare yields of agricultural crops in the same area, it was not necessary to reverse the forests or alter the natural areas on agricultural land. In the years between 1961 and 2008, the population has increased by 100 %, manufacture of food products for the 150 % and the conversion of agricultural land into only 10 %. Natural habitats, living in the forests were not yet at risk from excessive clear-cutting of forests.

Negative consequences and the acquisition of the green revolution

The consequences of the use of synthetic chemical substances in farming, cause also negative effects on people. Pesticides, which are used to kill pests, cause many diseases. According to estimation, the WHO are to blame for the formation of cancers resulting from exposure to organoclorydes, creosote and sulfates. Some of the preparations are promoters of the tumors, malignant lymphomas, leukemia, lung cancer, etc. Increase of crops in an era of the green revolution, with his income and spread of farming technologies saved lives to many nations that were suffering from hunger. Economists at Ford Foundation in 1959 predicted a terrible world hunger, but it is precisely because of the rapid growth of food production, which was a result of the green revolution, formed a global crop production. In particular, increased crop yields by earmarking wheat and rice. In Asia, the yields of rice from 1960 to 1990 have doubled, while the population only increased by 60 percent. To enrich the proteins in food is taken care by the American biologist Borlaugom who created the grain with rich bugs without a long useless stems. Having received the Nobel Prize for Borlaugha indicated that "more than any other person in this period to provide bread to a hungry world".

Prediction of the future of the green revolution

Population growth projections foresee a gradual reduction of the growth of the world population. In the middle of the last century was considered the world's population of 3 billion people, to this day, this number increased to 7.3 billion. Despite the anticipated slower growth it is assumed that by 2050 to be on Earth more than 9.5 billion inhabitants, as can be seen from the chart in figure (2).

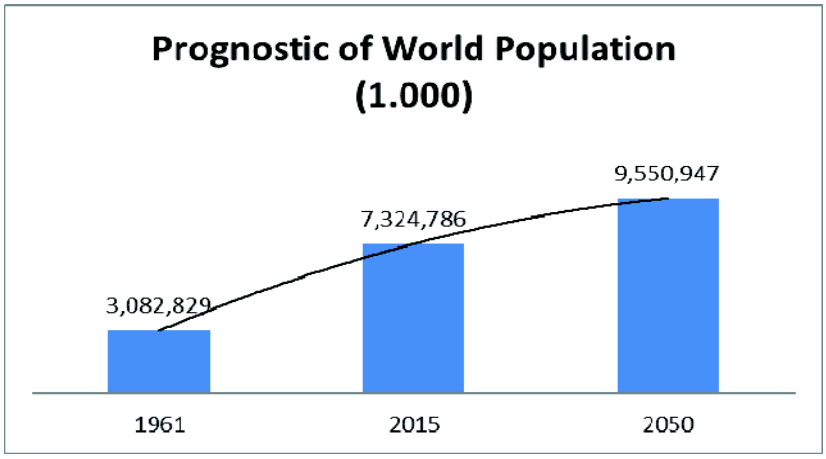

Figure [02]: Prediction of the growth of the world's population [2]

In order to ensure a sufficient quantity of food announces Folger [03] that we will need in the future a new green revolution. By R.T.Fraley, head of the technology of Monsanto, they have succeeded with the help of manipulation of plant genes to increase the field crop resistance to

drought and diseases. With the development of genetics, it is possible to produce more crops existing in such increased quantities. After the year 1990, 28 countries allow the use of crops that are genetically modified. In spite of everything, however, there are no clear assurances that genetically modified crops are safe. Proponents of classical and alternative method of food production seen in GM seeds only big earnings and monopolistic domination of the manufacturer. Monsanto does not permit the storage of seeds to grow, but only allow the purchase of another of their patented seeds at their stores. Farmers who planted such seeds can not worry more spraying with herbicides because the plants because of their genetic mutations resistant to herbicide drift, that is also produced by Monsanto. Modern agriculture with an ever stronger use of synthetic fertilizers and pesticides increasingly pollute the environment. The use of synthetic fertilizers which are made from fossil fuels creates greenhouse gas emissions greatly in the fields.

A representative of the Swiss Association of Biovision [04] H. Herren, however, is of the opinion that it is necessary to research and produce agricultural crops to a natural way of production without the use of synthetic chemicals. With donations collected by the financial resources he covers the cost of the scientists who study and advise the people of African countries how to produce with the use of natural resources. To effectively carry out the method of deflecting pests Push-Pul, where for repelling pests using desmodium plant, which is rich in flavonoids, alkaloids and pterocarpanoides. With its operation and consulting he wants to change the paradigm of the green revolution and tend to grow food efficiently without harmful synthetic chemicals and consequently without creating harmful emissions.

GUIDELINES FOR THE DEVELOPMENT OF ANIMAL PRODUCTION

At the end of the 1980s, some of the more developed countries in Europe have already banned the use of various additives for growth stimulation purposes, which effect on growth hormones. It is forbidden the use of some substandard feed, such as fish meal. With the standards of farming, they were at the beginning of the 1990s have already laid down the upper allowable animals which are reared on a farm should surface. The animals should be inspected regularly, but fodder is supposed to meet the relevant quality parameters. In modern livestock is already focused on the improvement of the well-being of the animals. State institution VEM [05] states that animals must be fed in a way that corresponds to each species of animals must be properly trained and provided with appropriate accommodation facilities for breeding.

Forced feeding is allowed only for medical reasons. The conditions for breeding, feeding and care must be appropriate to the physiological and ethological needs of the animals, others in foster care. This type of farming is already geared towards editing-friendly environment in which the animals are kept. Even in this mode, the rearing of animals less fattening on the same surface as it was in the past period, however, the animals are healthier, death is smaller and all results in total amount of healthy animals. Customer awareness of the meat in some European countries has already become so strong that it affects the purchase of meat. Example of good practice can be detected in Germany, where customers have a high enough level of awareness that is increasingly consumed meat, raised by the way, which is friendlier to the animals. Despite the fact that such meat is a slightly more expensive, but the origin offers to the buyers their revenues the purchase of meat originating in establishing breeding animals, which is nicer. To the producers of concentrated in farming, which is kinder to animals in Germany have introduced animal welfare Initiative (Initiative Tierwohl) [7].

IMPACT OF CEREAL AND LIVESTOCK PRODUCTION ON EMISSIONS

In a survey that we conducted we have chosen three groups. We were interested how does the ten-year change in the gross value of production of crops and animals impact to the emission of the greenhouse gases CO_2 and N_2O, which are resulting from agriculture in the countries of Europe. Data for the year 2000 and 2011 are presented in the Table [01] were obtained from FaoStat [02].

	Crops*		Livestock*		Emission**	
	(million US$)		*(million US$)*		*(Giga-grams)*	
	2000	**2011**	**2000**	**2011**	**2000**	**2011**
Albania	358	1.023	526	1.186	78	235
Austria	1273	3.834	2.573	4.858	762	556
Belarus	1420	4.753	524	2.669	1.807	3.880
Belgium	2.436	3.979	2.481	3.545	0	0
Bosn and Herzegov	265	847	161	486	179	154
Bulgaria	897	3.311	741	1.216	935	2.395
Croatia	826	1.498	191	608	749	379
Czech Republic	1223	3.520	1.692	3.116	1.697	1.827
Denmark	1667	3.353	4.095	7.488	1.510	1.203
Estonia	99	357	178	602	145	192
Finland	737	1.493	1.266	2.326	1.078	1.004
France	23.419	46.552	19.352	32.307	14.951	12.552
Germany	9863	22.929	17996	36.394	11.925	10.588
Greece	7561	12.475	2254	4.544	1.840	905
Hungary	1725	5.649	1.874	3.102	2.065	1.916
Iceland	12	12	170	187	84	68
Ireland	457	861	3631	7.097	2.378	1.743
Italy	21.159	34.653	9.093	12.788	5.344	3.334
Latvia	177	717	219	634	184	399
Lithuania	470	1.601	227	774	633	339
Luxembourg	41	85	172	228	0	140
Malta	41	73	61	82	3	2
Netherlands	2.997	6.027	3.796	6.226	1.936	1.370
Norway	480	897	1373	3.081	658	617
Poland	4913	12.095	5222	10.890	5.785	9.383
Portugal	2.376	3.882	1.437	2.324	729	792
Moldova	364	1.006	170	534	32	124
Romania	4152	15.097	2555	7.227	1.544	2.022
Russian Federation	13306	49.389	10941	45.977	6.196	8.151
Serbia (Srb+Mont)*	1069	4.613	251	728	935	1.495
Slovakia	463	1.651	540	721	530	577
Slovenia	224	436	396	637	225	172
Spain	17.906	30.248	9.553	16.099	7.189	5.465
Sweden	968	2.032	1.860	2.675	1.270	1.096
Switzerland	1.407	2.782	3.184	5.522	312	302
FYR Macedonia	332	908	144	316	124	117
Ukraine	5204	26.567	1614	5.586	2.259	5.802
United Kingdom	6.770	13.741	6.695	11.227	7.197	6.455

*GVP - Gross Production Value

** Synthetic Fertilizers / Emissions (CO2eq/N2O (Gigagrams)

From the survey are due to lack of data exempted Member States Andorra, Channel Islands, Faroe Islands, Gibraltar, Holy See, Isle of Man, Liechtenstein, Monaco and Montenegro.

Table [01]: The value of production of crops, livestock and the emission of CO_2/N_2O for European countries in the years 2000 and 2011

Analysis of data correlation matrix of European countries for the value of production of agricultural products and emissions of synthetic fertilizers in 2000 and 2011

For an overview of the integration variables, we compute the *Pearson correlation coefficient*. The results of the calculation shown in Table [02] reported relationship and the existence of a linear relationship between the variables of production value crops and value of livestock production, both expressed in US $ million. Variable emissions of CO_2 and N_2O is expressed in gigagrams, and carried out a comparison of the data in the years 2000 and 2011.

	Crops 2000 *(mio US$)*	**Crops 2011** *(mio US$)*	**Livest 2000** *(mio US$)*	**Livest 2011** *(mio US$)*	**Emiss 2000** *(gigagr.)*	**Emiss 2011** *(gigagr.)*
Crops 2000 *(mio US$)*	1					
Crops 2011 *(mio US$)*	0,923173	1				
Livest 2000 *(mio US$)*	0,850612	0,82401	1			
Livest 2011 *(mio US$)*	0,751405	0,862315	0,90904	1		
Emiss 2000 *(gigagr.)*	0,836515	0,807147	0,960085	0,845666	1	
Emiss 2011 *(gigagr.)*	0,734483	0,807039	0,86252	0,834436	0,934388	1

Table [02]: Correlation matrix of variables of production value crops, livestock production value and emissions of CO_2 and N_2O for countries of Europe in 2000 and 2011

The correlation coefficients indicate that exists between research variable very strong positive relationships. *Pearson correlation coefficient* is the weakest expressed as a value between variable $Emission_{2011}$ and variable $Crops_{2000}$, and the value is r = 0.735. The most powerful linear relationship reflects the values of the $Emission_{2000}$ and $Livestock_{2011}$, that is r = 0.960.

In table [3] we present the results of the calculated level of characteristics between pairs of Emission and the value of the Livestock and variable between pairs of variables Emission and the value of Crops for European countries in 2011.

	Emission 2011 *(gigagram)*	**Livestock 2011** *(mio US$)*	**Emission 2011** *(gigagram)*	**Crops 2011** *(mio US$)*
Observations	38	38	38	38
Pearson Correlation	0,834435832		0,807038677	
P(T<=t) one-tail	0,001134255		0,000359858	

Table [03]: Two-sided t-test for independent variable emission, variable and depend on the value of farmed livestock and value of harvested crops to European countries in 2011

As can be seen the results obtained with the help of statistical analysis of the t-test is the level of features for both pairs variable P < 0.01 show us high level characteristics of the analyzed data.

Interpretation of the data

The value of the crops from 2000 to 2011 in Ukraine increased the most for 511%, Serbia for 432%, Latvia for 405%, Russian Federation for 371% and Bulgaria for 369%.

The value of livestock in the same period increased the most in Belarus for 509%, Russian Federation for 420%, Ukraine for 346%, Lithuania for 341% and Estonia for 338%.

Emissions of greenhouse gases CO_2 and N_2O have increased the most in Moldova to 384%, Albania to 300%, Ukraine by 257% to 256% in Bulgaria and Latvia by 217%.

Emissions of greenhouse gases CO_2 and N_2O have decreased the most in Greece 51%, Croatia 49%, Lithuania 46%, Italy 38% and the Netherlands 29%.

The Figure [3] shows a graph in which is classified with the largest reduction in five countries and five countries with the largest increases in greenhouse gas emissions, expressed as a percentage of the index between 2000 and 2011. For comparison, they added more crops and livestock values changed values expressed as a percentage of the index between 2000 and 2011.

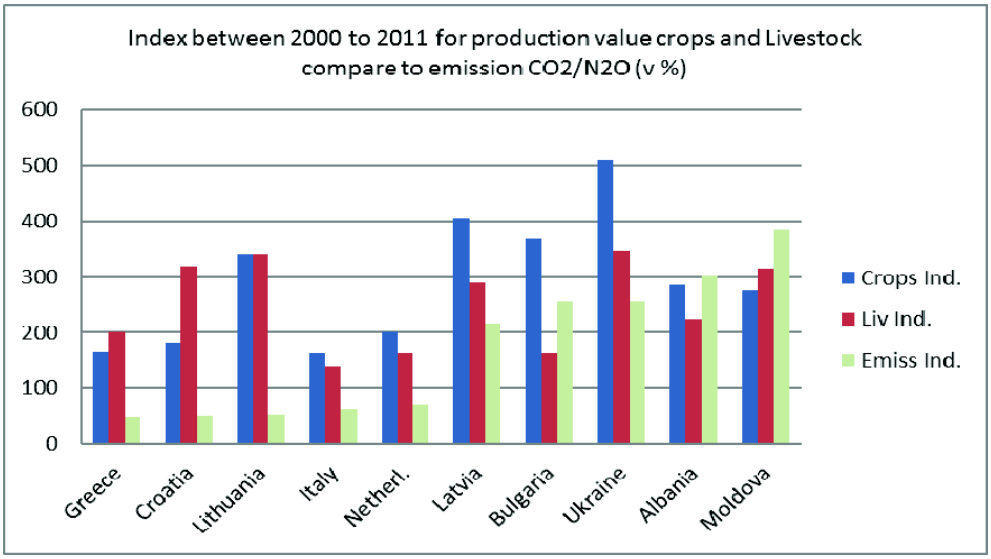

Figure 03: Index changes of the emissions of CO_2/N_2O and the value of crops and livestock in the years 2000 and 2011

The first group of countries (Greece, Croatia, Italy, the Netherlands, Lithuania) despite the reduction in the emission of CO_2/N_2O increased production of crops and livestock production. This group of countries is oriented with its agrarian policy in the nature protection and conservation of clean, non-polluting sources of natural goods. The maximum value of the crops and livestock in this period reached Lithuania at emission reduction for the 46% increase in the value of the crops and livestock to the value of 341%.

The second group of countries (Latvia, Bulgaria, Ukraine, Albania, Moldova) is using synthetic fertilizers increased the degree of contamination of greenhouse gases CO_2/N_2O. Having the largest increase in emissions for 384% Moldova increased production of crops for 276% and production value of animal husbandry for 314%.

Comparison of the Lithuania, which is the most reduced the amount of greenhouse gas emissions and Moldova, which have increased the most in the period from 2000 to 2011 that it is possible to achieve excellent production results in agriculture, in spite of the reduction of

fertilization with synthetic fertilizers that contaminate the land, air and water, and are also present in our food.

CONCLUSION

The relationship between the variables that we have research between European countries was confirmed by the correlation matrix. Also was confirmed the relationship between variables by using t-test, which is performed for the data of European countries in 2011, and show us a high level of features. Both statistical models have to fulfill all the assumptions so researched data may be used for prediction. On the basis of confirmation of the statistical results with certainty we maintain that there are ways of increasing production of agricultural products while reducing greenhouse gas emissions and reducing the contamination of land, water and crops. Guidelines on the development of agricultural policy it is necessary to steer in the countries that are in a timely manner apply organic fertilizers and environmentally friendly means to encourage the growth of crops, while suppression of pests and improve the yield of crops. In order to achieve such results, it is necessary to follow those research institutions that deal with the study of organic food. Managers of the companies for the production and processing of agricultural products must, in its long-term strategy to implement the development of organic produce and to achieve good results with the relevant professional institutions.

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