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Methods of decision making supporting state regulation of crop production development in the regions of Ukraine

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ABSTRACT

This article deals with the prospects and trends of crop production development in Ukraine, as well as the methods and ways of supporting this industry by the state. According to the article, the primary objective of the state is to create conditions through the reallocation of resources and facilitate the introduction of new forms of economic activity in the regions, which are depressed in terms of agriculture today. It is noted that to justify the need for institutional changes in crop production we must take into account the appropriate specifics of agricultural production in some areas. The article reports that, a large number of similar types of agricultural enterprises, unlike in other sectors of the economy, allow us to group the results of their activity: in terms of forms of management, on a territorial basis or according to other types of features for further comparative analysis. Therefore, the article offers the crop production regions clustering in certain areas, to determine which areas need the state aid priority. It is noted that in terms of crop production it is possible to increase the efficiency of agricultural activity due to a better use of agricultural land, as well as by an increase in average crop yield per 1 hectare. Therefore, it is offered to use the integral index of crop production position of each region, based on the ratios of extensive and intensive load. The extensive load factor represents the degree of agricultural land use.

The intensive load factor reflects the effectiveness of land fund usage, that is, the average yield, which is produced from the agricultural land of the same region. However, the average yield cannot directly serve as the basis for calculation, because the structure of the sown area of each region is heterogeneous. In this study, while calculating the intensive load factor, it is offered primarily to carry out the procedure of yield rate normalization for each group of crops separately.

Using the method of integral estimation of crop development, the autor has made an appropriate ranking of Ukraine regions according to the area of sown crops in Ukraine, based on which 4 sectors of Ukraine areas have been allocated and grouped by crop production development level. The article goes on to give the recommendations for decision making supporting investments and state aid for each of the selected sectors to further develop crop production in the regions of Ukraine.

Keywords: crop production, regions clustering, estimation of plant growing, intensive load factor, crop capacity.

1. Introduction

The development of institutional direction in modern economic science has become an objective response to the systematic failure of the economic mechanism, dysfunction of market institutions, as well as the ideological crisis of the society. The national economy provides for appropriate social and economic institutions through which it is concretized and adapted to reform [Obozna 2014].

The agricultural sector plays a major role in the Ukrainian economy. Ukraine has approximately 43 million hectares (ha) of agricultural land, including 32 million ha of arable land, an area equivalent to one third of the arable land in the European Union (EU). Half of it is black soil, the highest productive soil type in the world and a commodity in such demand that an illegal market has developed in selling it [OECD

Eurasia 2015].

It is a fact that some transnational agribusinesses are increasingly investing in Ukraine, including Monsanto, Cargill, and DuPont. The named corporations are taking over all aspects of Ukraine's agricultural system [The Oakland Institute 2014].

Thus, a general assessment of the agricultural sector and rural areas is crucial for the development of proper strategies and policies [FAO 2012].

Although the essence of the agricultural sector performance analysis and institutional reforms modeling to ensure the competitiveness of the agro-industrial complex of the country has much in common with other sectors of the economy, the specifics of agriculture have some features to consider. These include:

1. The results of the agribusiness activities have a strong dependence on climatic con-

ditions of the geographical area. Therefore, taking into account the significant territorial area of farmland in Ukraine and its geographic location, it is appropriate to divide the whole territory of Ukraine into different areas, which are connected to each other by some common existence conditions, for example, the administrative characteristics.

2. Areas of agriculture in any country are characterized by a vivid production seasonality, with a period of one year. Consequently, there is uneven use of labor, non-current and current assets, for example, some types of agricultural machinery are used only 20-30 days a year.

Thus, a long period of the production cycle with the uneven use of the resources and capital in agriculture leads to the fact that the full analysis of the results of the activities must be performed on the result of the entire year. Also when we are building models for the agricultural sector of the country, it is advisable to use a discrete type models, where the simulation period is one year.

3. As farming deals with living organisms, its level of development is influenced not only by economic factors, but also by biological and physico-chemical properties and laws. This significantly complicates the predictability of the industry and the assessment of impact factors on the formation of the final result.

Therefore, unlike traditional industries, related with material and non-material production, where the economic results are well described by mathematical economic models, the agricultural sector is characterized by a high degree of uncertainty.

This leads to the fact that by using economic and mathematical models, based on the scenario approach, we can provide only general advice on the management of the sector. However, it is almost impossible to calculate the final result of the agricultural sector activities during the year with an acceptable level of accuracy.

4. The main production resource is agricultural land, the performance of which (crop yield) is not the subject to the exact calculation. In addition, with a proper use, including the implementation of a complex of agro-technical actions, this resource cannot be worn out, and it is also able to increase its productivity.

We also know that in industry it is possible to produce certain products by using a certain type of equipment. Land in this case is a versatile production factor: it can be used for the cultivation of any crops. In terms of economic and mathematical modeling it means high mobility for growing different kinds of crops.

5. A large number of similar types of agricultural enterprises, unlike in other sectors of

the economy, allow us to group the results of their activity: in terms of the forms of management, on a territorial basis or according to other types of features for further comparative analysis.

2. Literature review and the problem statement

The reasons for the insufficiency of the agrarian reforms efficiency and opportunities for improving the agriculture of Ukraine are actively studied by national and foreign scholars, including: Lendel [2001], Golyan [2006], Revenko [2011], Sabluk [2011], Skidan [2010], North [1991], Makarenko [2006], Sigg [2014], Van Leeuwen et al. [2012], Van Winden [2013], Visser et al. [2011], Warner et al. [2008] and others.

To justify the need for institutional changes in crop production we must take into account the appropriate specifics of agricultural production in some areas. The development of crop production in Ukraine is not homogeneous in its quality. Therefore, the primary objective of the state is to create conditions through the reallocation of resources and facilitate the introduction of new forms of economic activity in the regions, which are depressed in terms of agriculture today.

The aim of the article. Thus, we are faced with an important, scientific problem of the assessment of crop production development, clustering in certain areas, determining which areas need the state aid priority, and giving recommendations for decision making supporting the investment and institutional changes for each of the selected sectors to further develop crop production in the regions of Ukraine.

3. Research results

The prerequisites for such a generalizing evaluation are as follows:

1. The result of any economic activity depends on quantitative (extensive) and qualitative (intensive) factors. The quantitative factors require attraction of additional resources, and the quality factors – a more efficient use of available resources. In terms of crop production to increase the efficiency of agricultural activity can be due to the better use of agricultural land, as well as by an increase in average crop yield per 1 hectare. Therefore, an integral indicator of the crop production of each region should be based on the ratios of extensive and intensive load. In order to be able to ensure the comparability of the results, these factors should be normalized from 0 to 1. Thus, the integral index of the crop production of each region will be calculated by the formula:

$$K_i = k_{i,exc} \times k_{i,int}, \quad (1)$$

where K_i - integral index of the i -region development of plant cultivation;

$k_{i,exc}$ - extensive load factor of the i -th region;

$k_{i,int}$ - intensive load factor of the i -th region.

The conditions for rationing should provide that the best coefficients of the extensive or intensive load are when they are closer to 1, and vice versa. With this limitation, our target indicator will also take the values from 0 to 1.

2. The extensive load factor represents the degree of the agricultural land use and is calculated using the formula:

$$k_{i,ext} = \frac{S_{i,\Pi}}{S_{i,Y}}, \quad (2)$$

where $S_{i,Y}$ - area of the available agricultural land in the i -region, thou. of hectares;

$S_{i,\Pi}$ - areas of agricultural land which were used in the i -region (посівна площа), thou. of hectares.

Since $0 \leq S_{i,\Pi} \leq S_{i,Y}$, the extensive load factor $k_{i,ext}$ will vary from 0 to 1. Larger values of $k_{i,ext}$ will fit better usage of the land fund for agricultural production.

3. The intensive load factor $k_{i,int}$ should reflect the effectiveness of land fund usage, that is, the average yield, which is produced

from the agricultural land in the i -region. However, the average yield cannot directly serve the basis for calculating $k_{i,int}$, because the structure of the sown area of each region is heterogeneous. The available data from statistic reports concerning the production of agricultural crops in different regions are grouped in the following main types of crops:

- grains and legumes;
- technical culture;
- potatoes, vegetable-melon crops;
- forage crops.

Each of these groups has its own crops and the highest possible average annual yield. For example, the yield of the potato and vegetable-melon crops, according to the statistics, is 4-6 times higher than the yield of the grain and leguminous crops, provided that the other conditions are equal (tonnes / ha). Therefore, if in one region a cultivated area in the first type of crop which occupies the largest share, and in another area its the second type of crop, comparing them with each other in terms of an average yield is incorrect.

In this study, calculating the intensive load factor $k_{i,int}$ is offered, primarily to carry out the procedure of yield rate normalization for each group of crops separately. To do this we offer conventional symbols. Let the matrix of acreage be S , the volume of crop production be Q , and productivity be Y , the calculations are as follows:

$$S = \begin{bmatrix} S_{11} & S_{12} & \dots & S_{1m} \\ S_{21} & S_{22} & \dots & S_{2m} \\ \dots & \dots & \dots & \dots \\ S_{n1} & S_{n2} & \dots & S_{nm} \end{bmatrix}; \quad Q = \begin{bmatrix} q_{11} & q_{12} & \dots & q_{1m} \\ q_{21} & q_{22} & \dots & q_{2m} \\ \dots & \dots & \dots & \dots \\ q_{n1} & q_{n2} & \dots & q_{nm} \end{bmatrix}; \quad Y = \begin{bmatrix} y_{11} & y_{12} & \dots & y_{1m} \\ y_{21} & y_{22} & \dots & y_{2m} \\ \dots & \dots & \dots & \dots \\ y_{n1} & y_{n2} & \dots & y_{nm} \end{bmatrix} \quad (3)$$

where s_{ij} , q_{ij} та y_{ij} - accordingly, sown area, the volume of crop production and average yield of j -th of crops and the i -th region.

The columns of considered matrices characterize the value of targets in each area for j -th groups of crops. Matrix lines - value targets for each group of crops in i -th region.

Matrix S and Q are incoming and are formed according to the annual state statistical reporting. Accordingly, the matrix Y elements are calculated based on the following formula:

$$y_{ij} = \frac{q_{ij}}{s_{ij}}, \quad (4)$$

For the next calculation of the integral indicator crop development in each area, we perform normalization of matrix Y elements, using the following formula:

$$\bar{y}_{ij} = \frac{y_{ij}}{\max(y_{ij})}, \quad (5)$$

That is, first we find the maximum yield value for each column of the matrix Y , and then divide on them each element of the matrix. The result is a matrix of normalized yield values \bar{Y} , where for each j -th group of crops normalization was done separately. That is, each column of the matrix \bar{Y} takes values from 0 to 1. Moreover, the normative value 1 is the region with the highest yield in Ukraine from this group of plants. So we neutralize the fact that different groups of crops have different values of the maximum yield, and therefore the area with different structure of acreage could not be compared with each other.

Then, the intensive load factor $k_{i,int}$ according to a weighted arithmetic mean formula takes the form:

$$\frac{\sum_{j=1}^n \overline{y_{ij}} \times \pi_{Bij}}{\sum_{j=1}^n \pi_{Bij}} = \frac{\sum_{j=1}^n \overline{y_{ij}} \times \frac{s_{ij}}{\sum_{j=1}^n s_{ij}}}{1}, \quad (6)$$

$$k_{i,INT} =$$

where π_{Bij} – the proportion of cultivated area j -th crop and a i -th region.

$$K_i = k_{i,ekc} \times k_{i,INT} = \frac{S_{i,II}}{S_{i,V}} \times \frac{\sum_{j=1}^n \overline{y_{ij}} \times \frac{s_{ij}}{\sum_{j=1}^n s_{ij}}}{1} = \frac{S_{i,II}}{S_{i,V}} \times \frac{\sum_{j=1}^n \left(\frac{y_{ij}}{\max_i(y_{ij})} \times \frac{s_{ij}}{\sum_{j=1}^n s_{ij}} \right)}{1}, \quad (7)$$

Depending on the values we can perform a ranking of the regions of Ukraine in terms of crop development considering the extensive and intensive factors; thus:

– on the one hand, the indicator assesses the level of acreage usage which is in our possession;

– on the other hand, the indicator also takes into account the efficiency of their use due to the reduced weighted average yield.

Using the method of integral estimation of crop development, we will make an appropriate ranking of Ukraine regions according to the area of sown crops in Ukraine, and calculate the value of the extensive load factors, i.e the percentage of agricultural land usage. This coefficient fluctuates within a range between 47.33% (Zakarpattia Oblast) and 93.39% (Kirovohrad Oblast). Ukraine's average percentage of agricultural land use is 78%.

The extensive load factor on a territorial basis is not proportional due, primarily, to the differences in climatic conditions, existing infrastructure, financial resources and material, technical equipment of agricultural enterprises. At the same time many regions of Ukraine have significant reserves to improve the indicator. Among them there are such areas as: Zakarpattia Oblast, Luhansk Oblast, Lviv Oblast, Volyn Oblast, Zhytomyr Oblast, Chernihiv Oblast, Chernivtsi Oblast, Rivne Oblast etc. The percentage of using their farmland does not exceed 70%.

The leaders of using the agricultural land are Mykolaiv Oblast, Vinnytsia Oblast, Dnipropetrovsk Oblast, Cherkasy Oblast, Poltava Oblast and Kirovohrad Oblast with the index exceeding 88%.

The elements of the matrix Y have been calculated according to the formula 4 in Table. 1.

Substituting formula (2) and (6) (1), we get the final view of the integral index of the plant industry development in the i -th region:

In addition, table 1 shows, the maximum average yield for each group of crops, which are necessary for the normalization procedure.

As can be seen, the average yield in Ukraine, the maximum and minimum yield in areas for different crops are as follows:

– grains and legumes - 4.31 tonnes / ha to 6.2 tons / ha in Sumy region and 2.73 tonnes / ha in the Zaporozhye region;

– technical cultures - 3.33 tons / ha against 10.63 tonnes / ha in Ternopil region and 0.72 tonnes / ha in Kherson region;

– potatoes, vegetables and melons - 18.83 tonnes / ha against 23.56 tonnes / ha in the Khmelnytsky region and 11.19 tonnes / ha in the Luhansk region.

These data show that the maximum yields per hectare for different crops are in northwestern Ukraine, and the reduced productivity – in the southeastern part of the country. This is because the South-East of Ukraine belongs to the zone of risky agriculture, primarily because of the high probability of dry weather and lack of irrigation of agricultural land. In addition, the zone of the antiterrorist operation in the Luhansk and Donetsk regions also adversely affect the agricultural development of these areas.

To calculate the intensive load factors, normalized values of the yield were found together with the proportion of cultivated areas of the j -th type of crops in the i -th region. Within each crop, the indicator can take the values from 0 to 1. Based on the calculation of the normalized value of the maximum yield for each crop, they have been brought to a comparable form.

Table 1: Average crop yields in 2014 in areas, tonnes / ha

Oblast of Ukraine	Including			
	grains and legumes	technical crops	Potato, vegetable and melon	forage crops
Ukraine	4.31	3.33	18.83	13.22
Vinnitsia Oblast	6.03	7.54	21.00	19.15
Volyn Oblast	3.81	9.51	17.72	8.65
Dnipropetrovsk Oblast	2.83	1.73	16.21	10.46
Donetsk Oblast [†]	3.32	1.72	15.40	9.22
Zhytomyr Oblast [†]	5.07	3.66	22.05	10.24
Zakarpattia Oblast	3.85	1.11	22.11	5.91
Zaporizhia Oblast [†]	2.73	1.29	15.01	7.87
Ivano-Frankivsk Oblast [†]	4.80	3.74	16.02	10.97
Kiev Oblast [†]	5.97	4.66	19.86	15.39
Kirovohrad Oblast	4.34	2.35	13.34	13.42
Luhansk Oblast [†]	2.97	1.53	11.19	4.99
Lviv Oblast [†]	4.68	8.94	19.14	9.73
Mykolaiv Oblast [†]	3.02	1.70	19.32	11.19
Odessa Oblast	3.09	1.82	17.36	11.56
Poltava Oblast	5.06	4.52	21.24	18.13
Rivne Oblast	4.72	6.48	20.42	10.72
Sumy Oblast	6.20	1.88	21.44	18.88
Ternopil Oblast	5.48	10.63	21.59	19.02
Kharkiv Oblast [†]	4.47	3.94	18.64	14.21
Kherson Oblast [†]	2.79	0.72	18.00	8.43
Khmelnitskyi Oblast [†]	6.01	6.94	23.56	15.38
Cherkasy Oblast [†]	5.79	3.94	16.03	19.52
Chernivtsi Oblast [†]	5.25	1.91	21.55	10.43
Chernihiv Oblast [†]	5.61	2.50	19.20	14.68
Maximum productivity	6.2	10.63	23.56	19.52

Source: www.ukrstat.gov.ua.

According to the calculations, the sown area based on the example of the Vinnitsa region was distributed as follows:

- grains and legumes – 52%;
- technical culture- 32%;
- potatoes, vegetables and melon – 8%;
- forage crops – 9%.

Finally, the integral index of crop development has been calculated in each area; tab. 2:

According to this integral indicator, the authors have carried out a procedure of ranging areas, column (5). Better values correspond with lower ranks, and vice versa.

As we can see, among the leaders in the development of crop in Ukraine are the Vinnitsia, Ternopil and Cherkasy region. At the same time, Lugansk, Zaporozhye and Kherson regions have the worst indicators of value, compared to other regions.

In addition, table 2 contains the data on the average value of factors for the entire Ukraine. These values of factors may make a starting point of reference for the classification of areas according to the development of crop production. A graphic idea of this may be obtained from figure 1.

Table 1: Average crop yields in 2014 in areas, tonnes / he

Oblast of Ukraine	Rank			
	1	2	3	4
Ukraine	0.780	0.583	0.454	-
Vinnitsia Oblast	0.883	0.885	0.781	1
Volyn Oblast	0.641	0.643	0.413	16
Dnipropetrovsk Oblast	0.886	0.376	0.333	19
Donetsk Oblast [†]	0.750	0.413	0.310	20
Zhytomyr Oblast [†]	0.646	0.641	0.414	15
Zakarpattia Oblast	0.473	0.607	0.287	21
Zaporizhia Oblast [†]	0.763	0.321	0.245	23
Ivano-Frankivsk Oblast [†]	0.763	0.639	0.488	9
Kiev Oblast [†]	0.763	0.765	0.584	6
Kirovohrad Oblast	0.934	0.476	0.444	13
Luhansk Oblast [†]	0.496	0.330	0.164	24
Lviv Oblast [†]	0.621	0.741	0.460	12
Mykolaiv Oblast [†]	0.882	0.390	0.343	18
Odessa Oblast	0.839	0.422	0.354	17
Poltava Oblast	0.933	0.705	0.658	4
Rivne Oblast	0.687	0.709	0.487	10
Sumy Oblast	0.754	0.766	0.577	7
Ternopil Oblast	0.831	0.920	0.765	2
Kharkiv Oblast [†]	0.793	0.620	0.492	8
Kherson Oblast [†]	0.806	0.337	0.272	22
Khmelnyskyi Oblast [†]	0.758	0.845	0.641	5
Cherkasy Oblast [†]	0.914	0.747	0.683	3
Chernivtsi Oblast [†]	0.686	0.631	0.433	14
Chernihiv Oblast [†]	0.649	0.731	0.475	11

Source: by the authors

The dotted line in figure 1 indicates calculated values for the whole Ukraine. Accordingly, we can distinguish 4 sectors, which are characterized by the following features:

- sector I - the most successful region in Ukraine in terms of crop production development. As for the indicator of using the available agricultural land, and on the weighted normalized level of productivity, the level is a higher than the average in Ukraine. The first sector includes: Vinnitsia, Ternopil, Cherkasy, Poltava and Kharkiv regions. The recommendations for the state regulation of the institutional change is the full cooperation of market relations development in the sphere of production, supply

and marketing of agricultural products; prevent monopolization of the market and so on.

- sector II - its composition includes the same region with high yield, Khmelnytsky, Lviv, Sumy, Kiev, Chernigov, Rivne, Zakarpattia, Zhytomyr, Volyn, Chernivtsi and Ivano-Frankivsk regions. However, the level of usage of the existing farmland in this case is substantially inferior to the average Ukraine index. This applies particularly to Zakarpattia, Lviv, Zhytomyr and Volyn regions. Public policy regulation in the field of institutional changes should be focused on attracting additional investment resources to the industry, expansion of production and promotion of small and medium businesses.

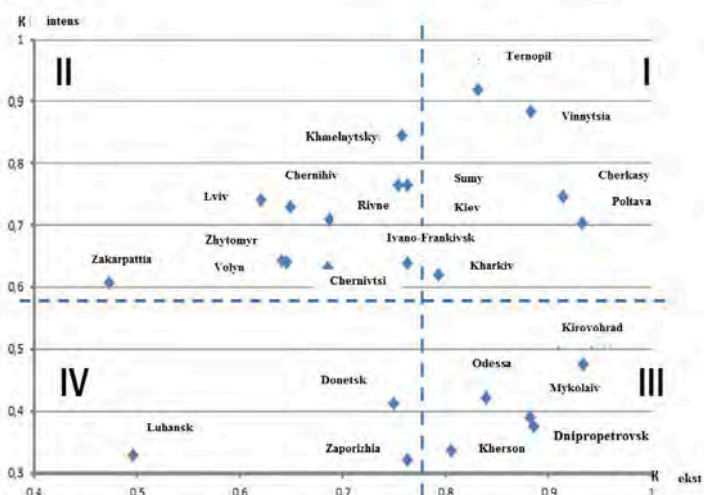


Figure 1: Classification of the regions of Ukraine according to the crop growing development

Source: by the authors

- sector III - characterized by a high level of usage of the available land resources; however, the level of productivity is lower than the average in Ukraine. These criteria are inherent in Kirovograd, Odessa, Mykolaiv, Dnipropetrovsk and Kherson regions. Particular attention should be paid to Kherson and Dnipropetrovsk regions, where the yield is very low. The state policy in the sphere of agriculture should be focused primarily on the study of the causes of the low productivity in the regions. Soil fertility can be improved by reducing the load on the ground efficiently using various types of fertilizers or changing the crops grown. However, the problem of the crop in these areas is the lack of efficient irrigation systems and a dry, hot climate in the summer. Households, farmers and other private enterprises cannot solve this problem on their own because of the lack of investment expenditures and high capital investment required. Therefore, the policy of institutional changes at the national level should solve this problem by involving public and private investment, long-term development programs, lending entities, etc.

- sector IV - the least successful region in Ukraine for the development of crops. These areas are inferior to other regions both in yield and in terms of useful usage of the available land. Among them are: Lugansk, Donetsk and Zaporizhye regions. Such an objective state of affairs is a reflection of the geopolitical processes taking place in recent years. Governmental steps in institutional changes must be based

on a comprehensive development program for agricultural development because it has all the problems of the regions listed above for the regions from sectors II and III.

4. Conclusion

All in all, the article offers a presentation of crop production regions clustering in certain areas to determine which areas need the state aid priority, classifies the condition of each area, formulates recommendations for the urgent institutional changes at the national level. The recommendations for state regulation of institutional changes in the first sector are the full cooperation of market relations development in the sphere of production, supply and marketing of agricultural products; prevention of the monopolization of the market and so on. In sector two, public policy regulation in the field of institutional changes should be focused on attracting additional investment resources to the industry, expansion of production and promotion of small and medium businesses. In the third sector the policy of institutional changes at the national level should solve this problem by involving public and private investments, long-term development programs, lending entities, etc. In sector four governmental steps in institutional changes must be based on a comprehensive development program for agricultural development because it has all the problems of the regions listed above for regions from sectors II and III.

References

- FAO Regional Office for Europe and Central Asia, 2012, *Assessment of the Agriculture and Rural Development Sectors in the Eastern Partnership countries*, The European Union's Neighbourhood Programme.
- Golyan, V., 2006, *Problems of institutional environment of the national economy in market conditions*, Actual Problems of Economy, No. 5 (59), pp. 4-11.
- Lendel, M., 2001, *New institutional mechanisms for regional development in Europe*, Regional Studio. Vol. 1., pp. 18-28.
- Makarenko, P., 2006, *Market transformation of the agricultural sector: Theory and Practice* [monograph]. Zaporozhye, Zaporizhzhya National University. 2006, 373 p.
- North, V., 1991, *Institutions*, *Journal of Economic Perspectives*, Vol. 5, No. 1. Winter, 109 p.
- Obozna, A., 2014, *State regulation of the institutional changes in the agri-food sector of Ukraine*: Monograph. Mykolaiv.
- OECD Eurasia, 2015, *Review of Agricultural Investment Policies of Ukraine*, Sector competitiveness strategy for Ukraine – phase III,
- Revenko, M., 2011, *Improvement of state regulation of agrarian sector*, *Economics of Ukraine*, No. 12, pp. 51-55.
- Sabluk, P.T., 2011, *Institutional frameworks for Transformations in Agriculture*, National Research Center "Institute of Agrarian Economy", 64 p.
- Sigg, T., 2014, *Essay on Development Policy, Sustainable impact of organic market development and posts of contribution of development cooperation to organic market development*, NADEL-MAS Cycle 2012-14.
- Skidan, O., 2010, *Institutional mechanisms of the agro-food areas of region*, Balanced regional development in a globalizing. International scientific conference. Zhytomyr. Ruta, 404 p.
- The Oakland Institute, 2014, *Corporate Takeover of Ukrainian Agriculture*, Country Fact Sheet.
- Van Leeuwen, M., Salamon, P., Fellmann, T., Banse, M., von Ledebur, O., Salputra, G., and Nekhay, O., 2012, *The agri-food sector in Ukraine: Current situation and market outlook until 2025*, JRC Scientific and Policy Reports, European Commission, Luxembourg.
- Van Winden, A., 2013, *Greenhouse industry: the competitive edge*, Paper presented at the 4th International Conference "Commercial Horticulture in Ukraine" 21 February 2013, Kyiv.
- Visser, O., Mamonova, N., 2011, *Large-scale land acquisitions in the former Soviet Union - A study of rural social movements and land conflicts*, IS Land Academy Report (revised version).
- Warner, M., Kahan, D., Lehel, S., 2008, *Market-oriented agricultural infrastructure: appraisal of public-private partnerships*, Agricultural Management, Marketing, and Finance Occasional Paper No. 23 of the United Nations Food and Agriculture Organization.