METHODOLOGY FOR INTEGRAL ESTIMATION OF UKRAINIAN AGRICULTURE EFFICIENCY

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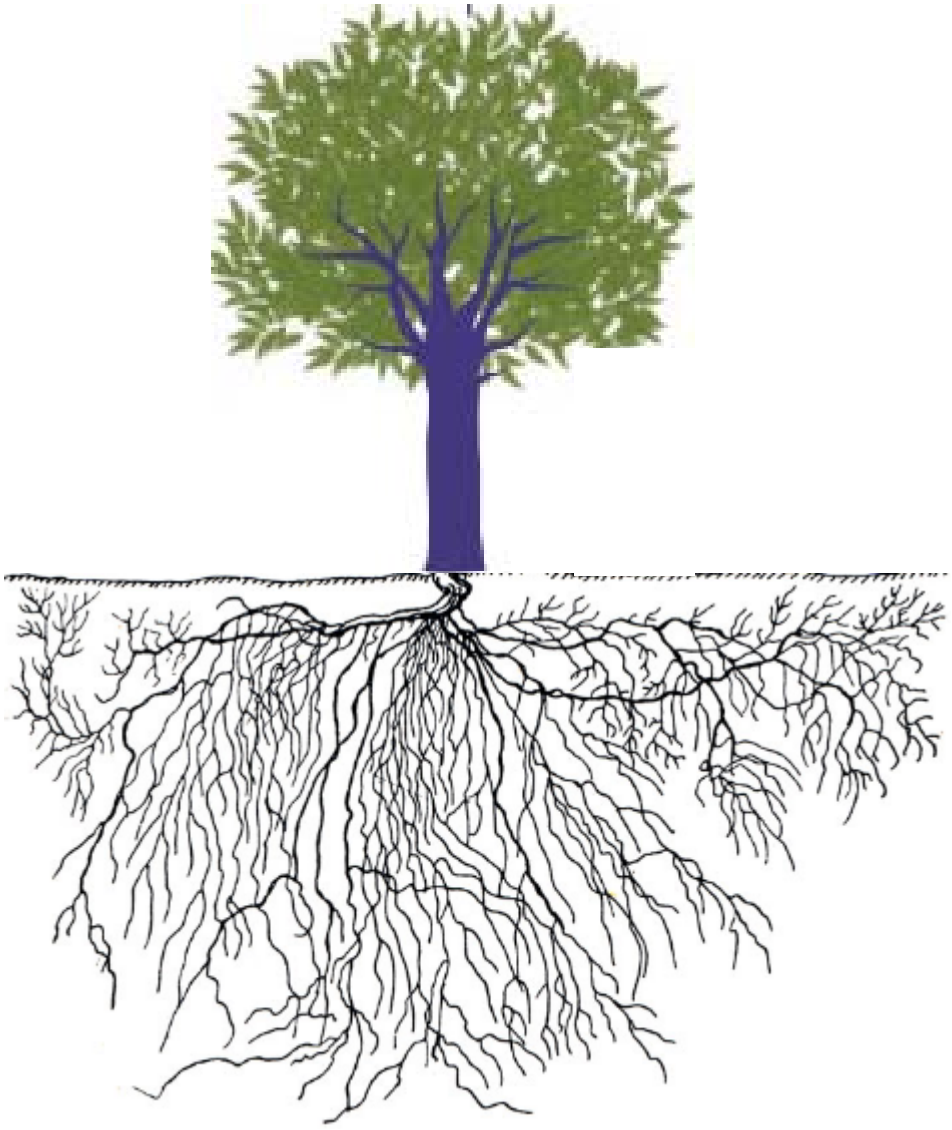
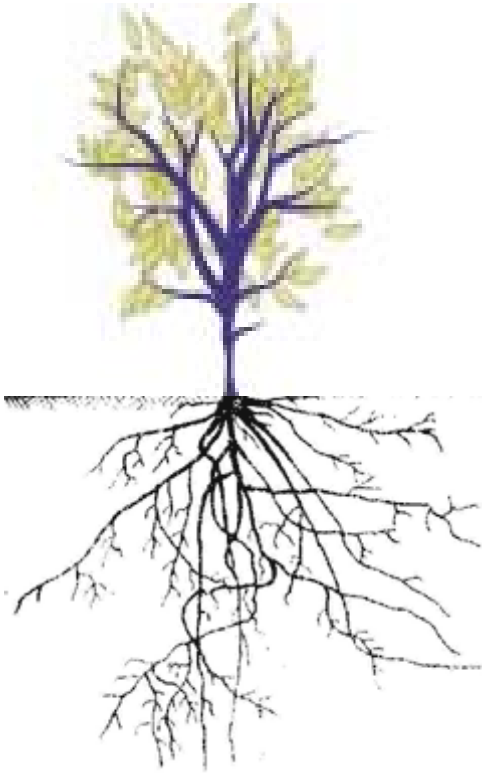
2 Visions rural development Ukraine

1990

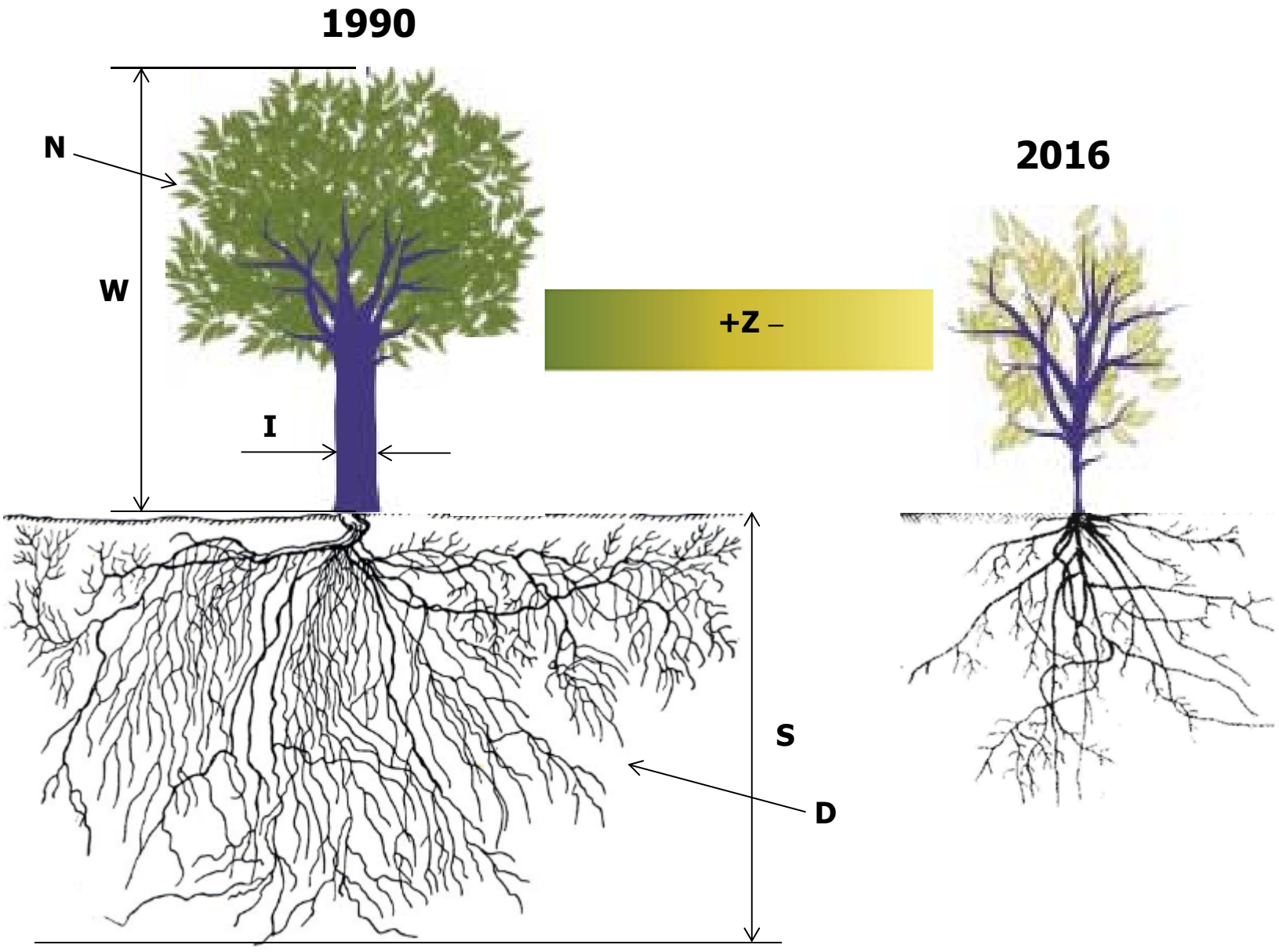


2016



Idea Y. Verhahena - Laureat DataFest 2015

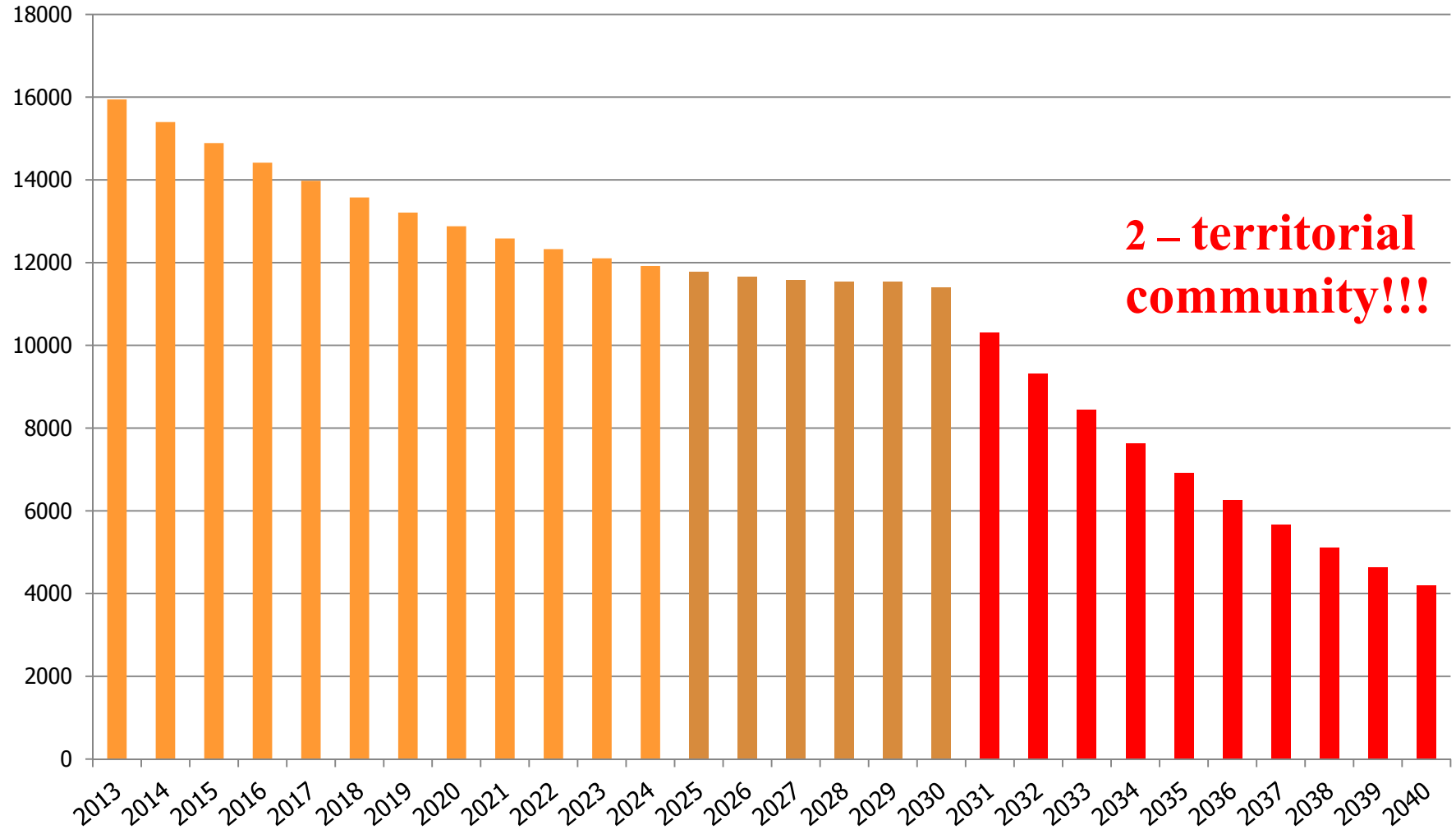
Visions rural development Ukraine



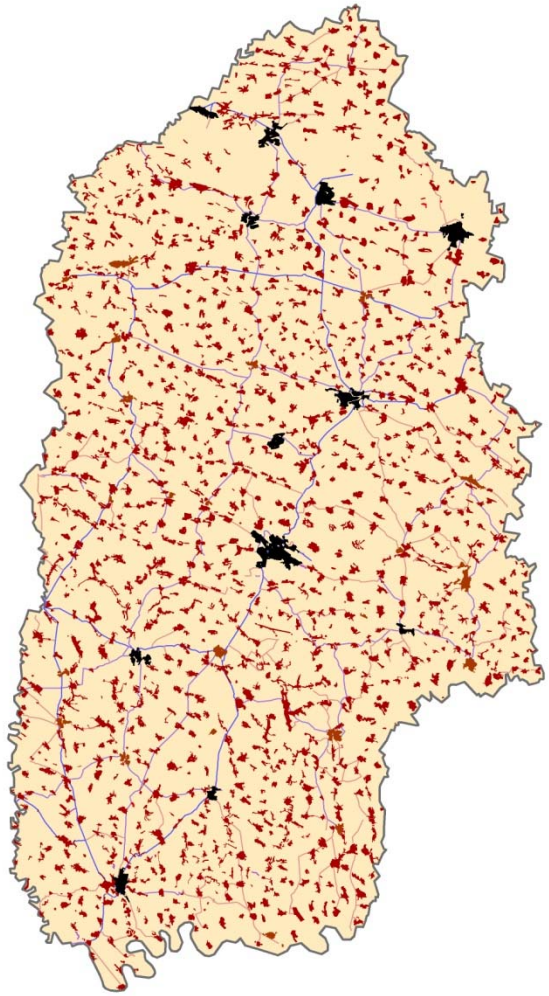
4 Characterization of Agriculture and Food Economy

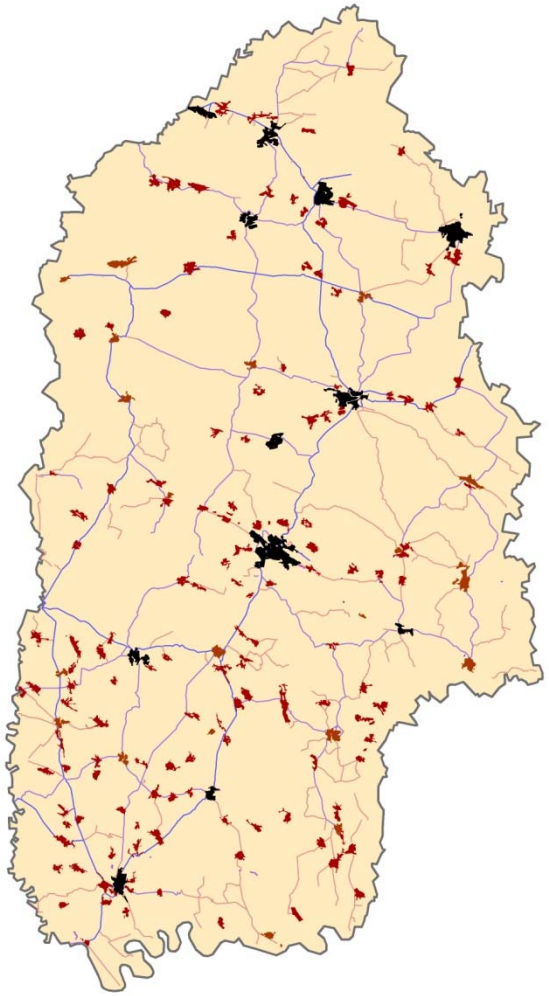
	Indicators	1990	2015	Threats
N	Rural population, mln	17	14	Risks to National Safety
W	Employment in agriculture, mln	5	1,4	
D	Level of diversification of agricultural production	0,9	0,4	
I	Index development of rural infrastructure	0,8	0,3	
Z	Index health of rural population	1	0,6	
S	The index of gross agricultural product	1	0,9	Loss of food independence Significant decrease in production strategically important food produc
	Details of production:			
	Sugarbeet production, mln t	44,0	5,6	
	Vegetables production, mln t	4,2	0,8	
	Production of flax, tobacco and hop, mln t	0,13	0,002	
	Cows, mln heads	8,4	2,5	
	Sheep and goats, mln heads	8,4	1,7	

The baseline forecast number of rural population Malyn district, Zhytomyr region

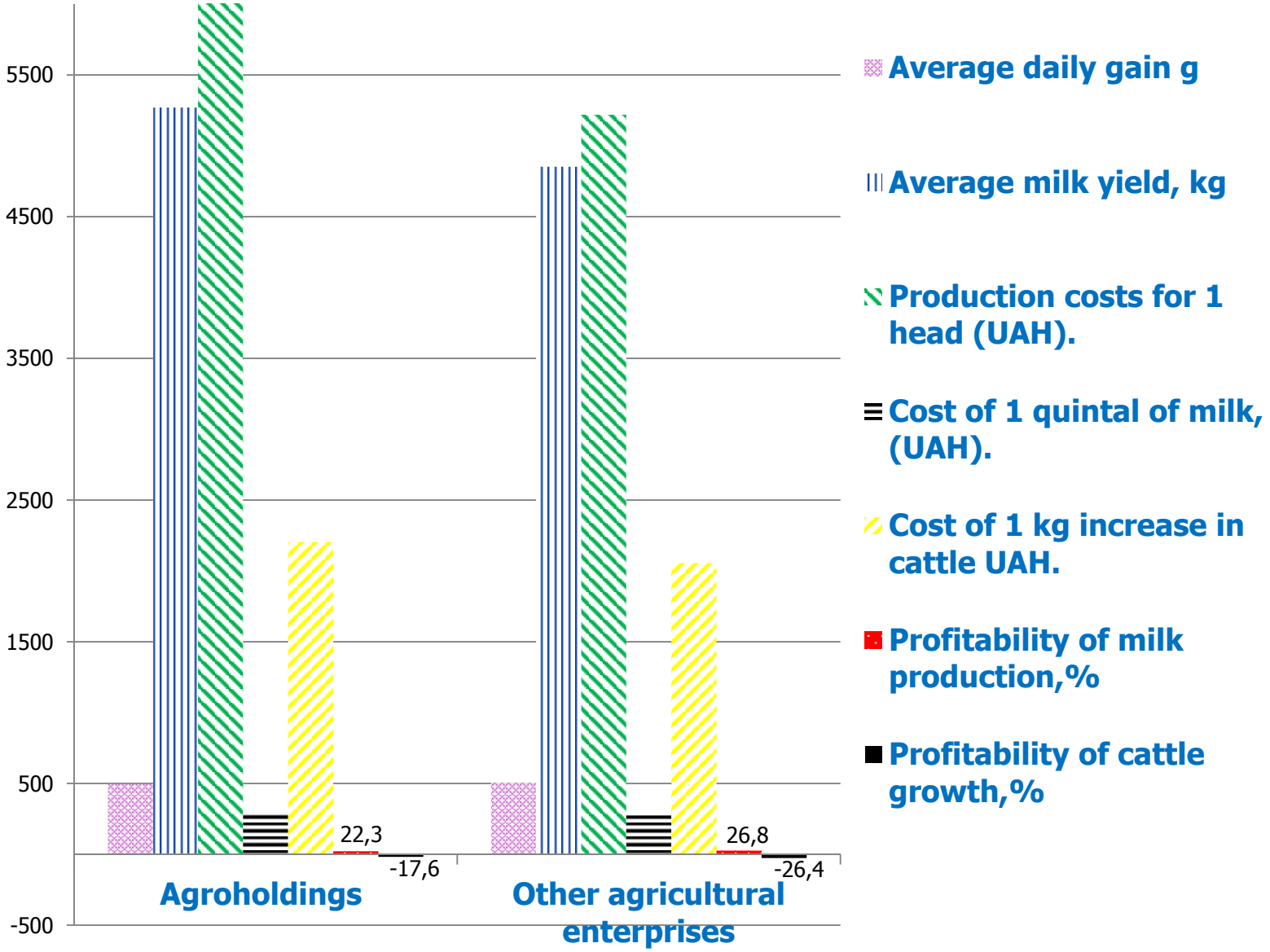


Forecast National Academy of Agrarian Sciences of Ukraine to accommodate settlements in 2035 (Khmelnitsky region)



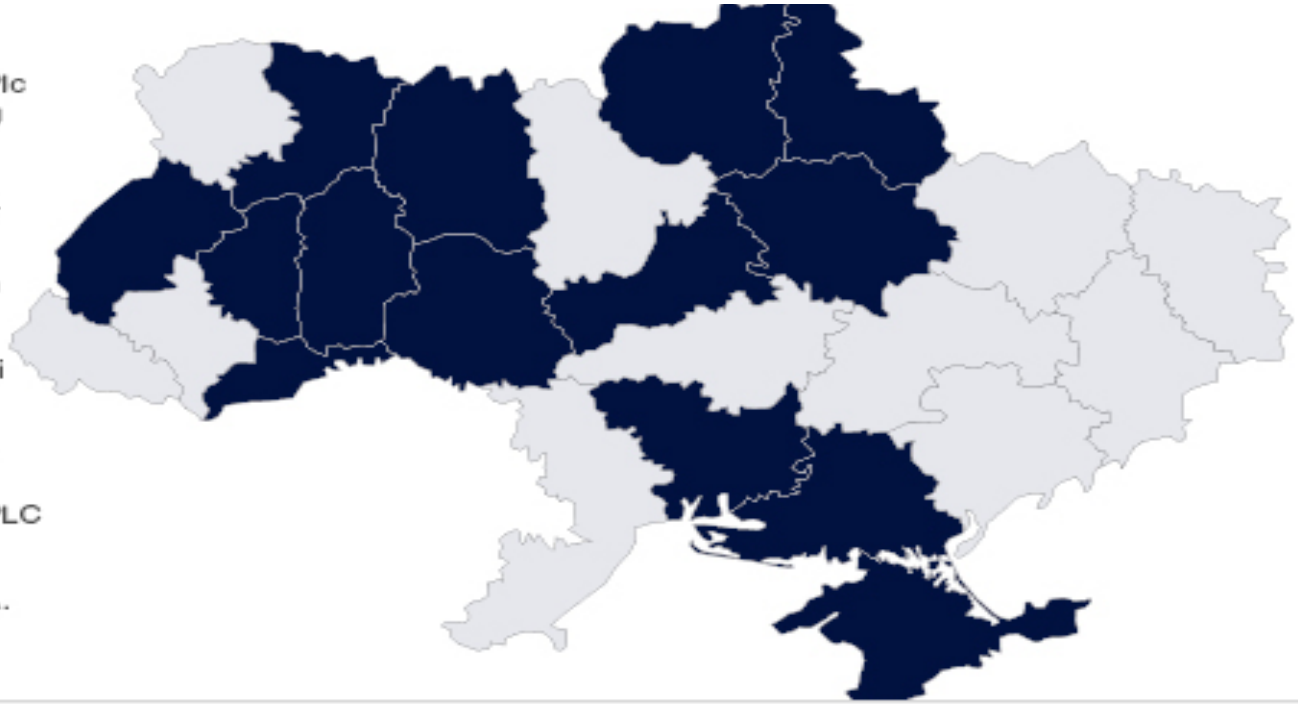


The structure of the main factors that affect the efficiency of dairy and meat industry in Ukraine (1 January 2015)



Geography of foreign capital in agriculture Ukraine

	Агрокомпания
Ukraine	Ukrlandfarming PLC
Ukraine	System Capital Management (SCM), Smart Holding
	Украинские аграрные инвестиции
China	Виктор Пинчук
	DARA Group, HuanFan Qu
USA	Aslan Global Management
	David D Sweere and Sons International Ltd
	NCH Capital Inc.
	David D Sweere and Sons International Ltd
	Archer Daniels Midland Company (ADM)
USA	DUI Holding A/S, David Sweere & Sons International Ltd
Denmark	DUI Holding A/S
Cyprus	Sintal Agriculture Plc
	Mriya Agro Holding
Germany	Bamstädt e.G.
	Alensys AG, Stadtwerke Schwäbisch Hall GmbH, Stadtwerke Uelzen GmbH
Saudi Arabia	Арабский инвестфонд Saudi Al Rajhi Group, Almarai Co.
Russia	Ренессанс Групп
Serbia	MK Group
Switzerland	Glencore Xstrata PLC
Sweden	Agrokultura AB
France	AgroGeneration
Luxembourg	Kernel Holding S.A.
Austria	MCB Agricole
Estonia	Trigon Capital



UkrLandFarming Public Limited Company

0,65 mln ha

AP Group

0,43 mln ha

KERNEL

0,39 mln ha

Ukraine's place in the global food market

№1

1.1. Production sunflower

1.2. Production and export of sunflower oils

№2

2.1.Exports of nuts

2.2. Export of grain

№3

3.1. Production and export barley

3.2. Ex%port rape

№4

4.1. Export Corn

4.2. Production Honey

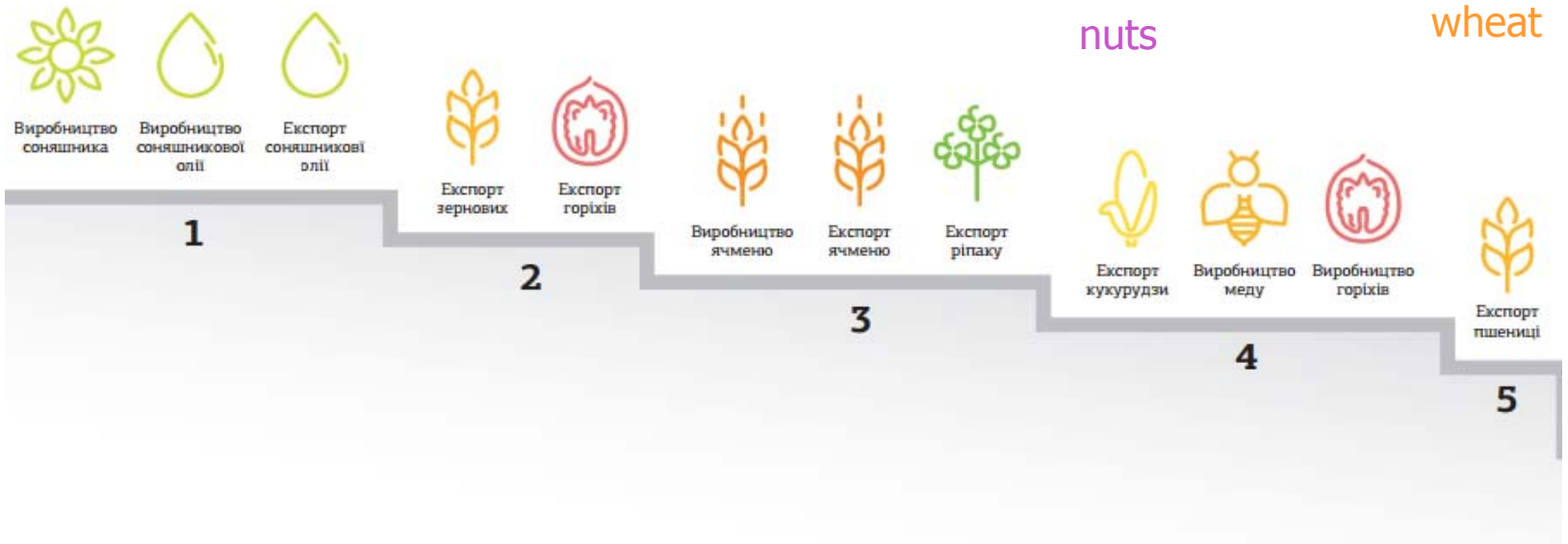
4.3. Production nuts

№5

Export wheat

№6-8

Production corn and wheat. Production and export soybean



Algorithm

1. To form an open dynamic system of indicators which, for the convenience purposes, can be written down by means of the matrix method, for example:

$$\Psi_k = \begin{pmatrix} \varphi_{11} & \varphi_{12} & \dots & \varphi_{1j} \\ \varphi_{21} & \varphi_{21} & \dots & \varphi_{2j} \\ \dots & \dots & \dots & \dots \\ \varphi_{k1} & \varphi_{k2} & \dots & \varphi_{kj} \end{pmatrix}, \quad k, j \in N. \tag{1}$$

Quantity of elements in such a system can be different and depends on the availability of statistics data and specifics of each stage in evaluation.

2. Using the method of comparison with the reference value, all statistical values are normalized to be further used in the dynamic series of integral indices, applying formula (2).

$$z_i = \begin{cases} \dfrac{x_i}{x_{i,\max}}, & \text{if } x_i \text{ is the stimulator}, \ i \in N, \ x_{i,\max} \neq 0; \\ \dfrac{x_{i,\min}}{x_i}, & \text{if } x_i \text{ is the destimulator}, \ i \in N, \ x_i \neq 0; \end{cases} \tag{2}$$

where z_i – the normalized statistical values of the indicators x_i; $x_{i,\min}$ and $x_{i,\max}$ – the smallest and the biggest values, accordingly

3. Then we can find the vector matrix of dispersions D_i and the matrices of the absolute values of the factor load A_i, using the axis rotation and quartimax normalization.

4. Then we find the weight of influence for each factor and we form the following matrix Ω_i :

$$\Omega_i = A_i \times D_i = \begin{pmatrix} d_1 a_{11} + d_2 a_{12} + \dots + d_j a_{1j} \\ d_1 a_{21} + d_2 a_{22} + \dots + d_j a_{2j} \\ \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \\ d_1 a_{j1} + d_2 a_{j2} + \dots + d_j a_{jj} \end{pmatrix}$$

where a_{jj} – the absolute values of elements in the matrix after the axis rotation and quartimax normalization; d_j – the values of dispersion (i, j – quantity of groups and indicators, respectively).

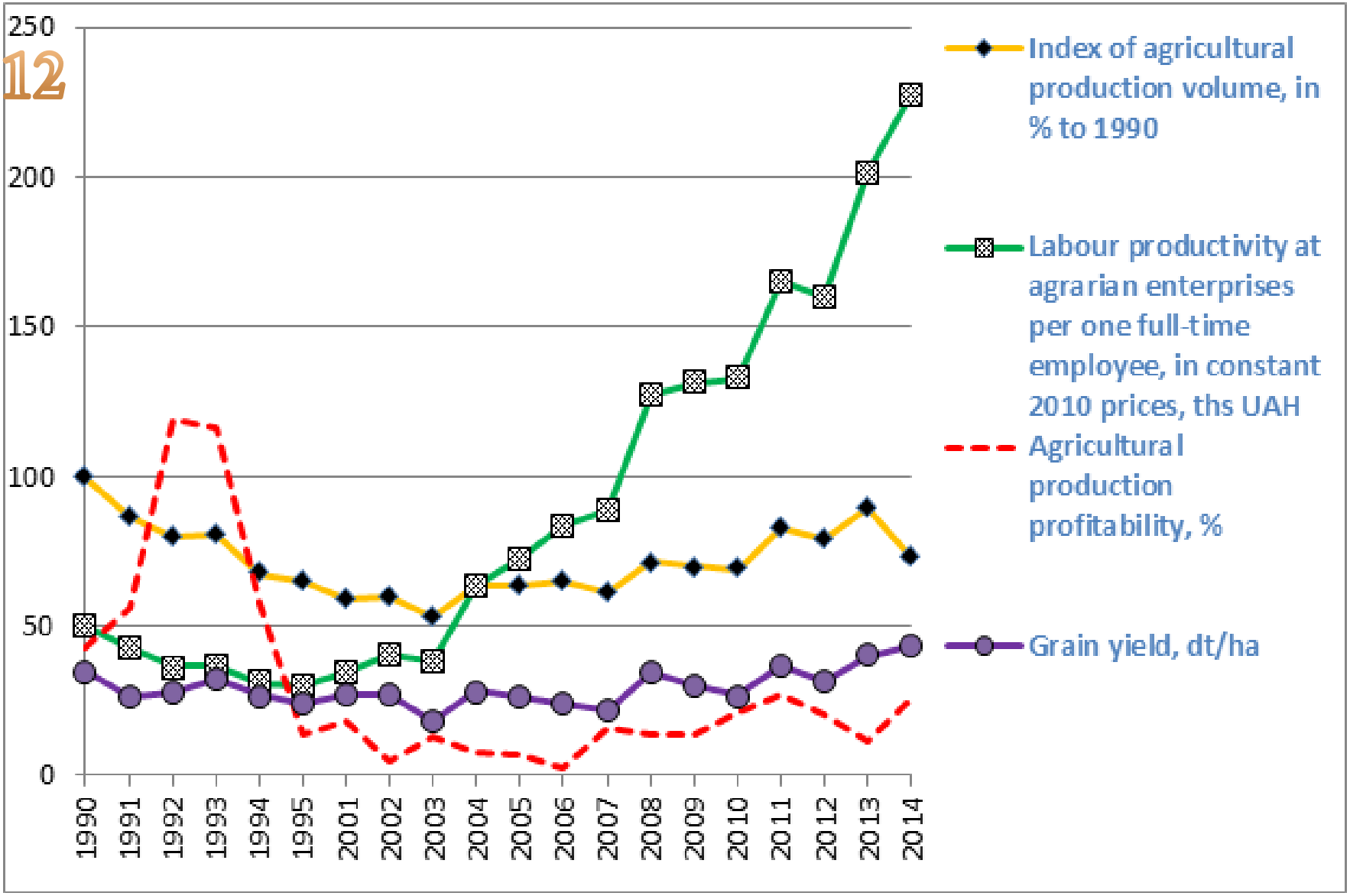
Then we can form the matrix of weights for each of the factors:

$$Y_i^{(1)} := kY_i, \quad k = \left(\sum_j \alpha_j \right)^{-1}.$$

This enables the final estimation of scalar values of the estimated integral index and the related subindices in the multiplicative form (2) which fully describes socioeconomic and administrative processes:

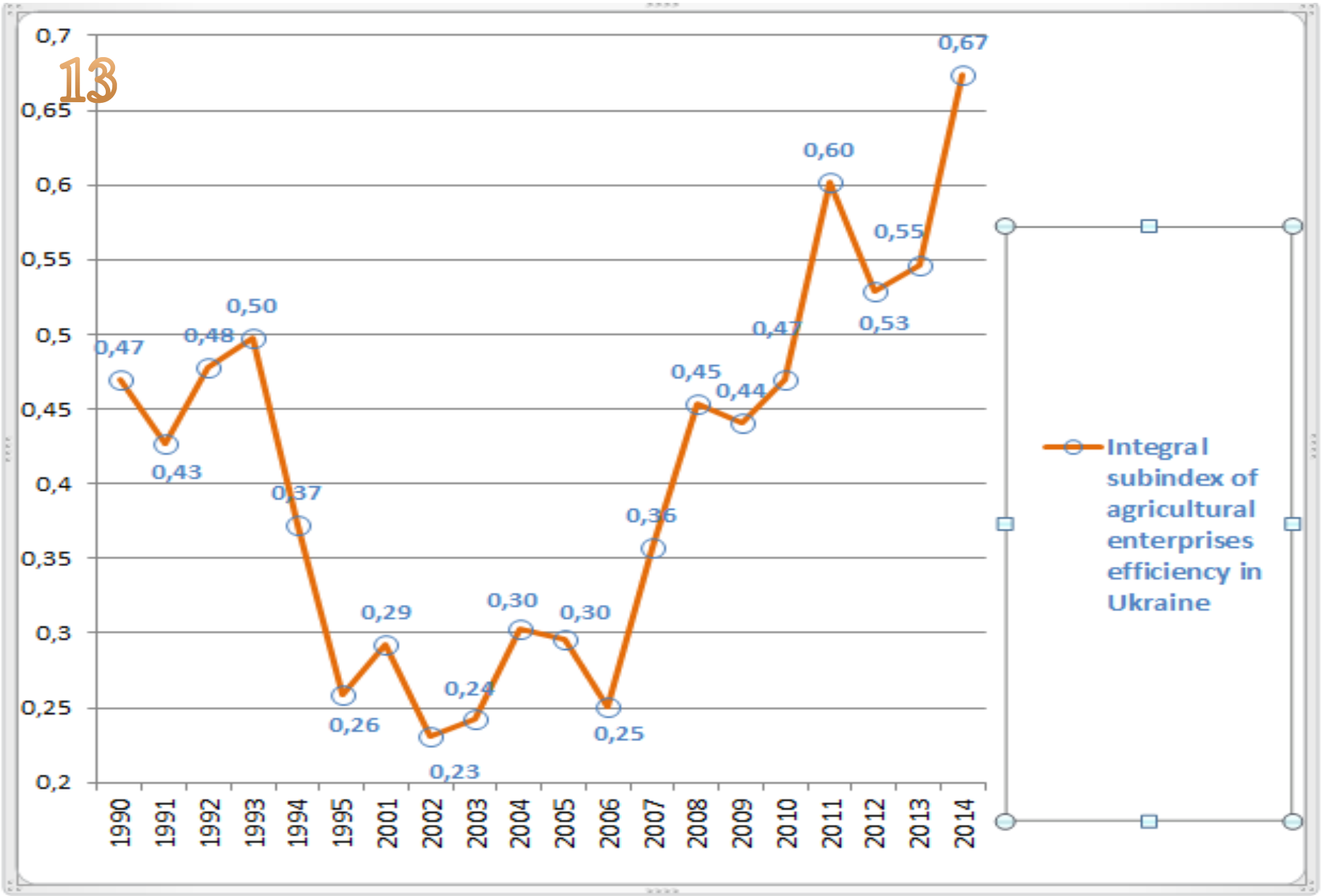
$$I = \prod_{j=1}^{n} z_j^{\alpha_j}, \quad \sum_j \alpha_j = 1, \quad \alpha_j > 0, \quad n \in N. \qquad (2)$$

5. After that we carry out the integral convolution in two stages: first – for separate groups of indicators, second – on the level of integral indices of groups. This process involves using the principal components method for determining the weight coefficients, and also T criterion – for grounding the margin values and some other features as well as the multiplicative form of the integral index and its key components which enables presentation of the final values in the dynamic series as tables (it is recommended to use Statistica 10 and Microsoft Excel 2010 for all calculations).



Dynamics of key indicators of agricultural production in Ukraine describing the efficiency of the resources used

Source: constructed by the author on the basis of (ukrstat.gov.ua)



The dynamics of integral subindex of agricultural enterprises efficiency in Ukraine

Source: calculated by the author using formula (2).

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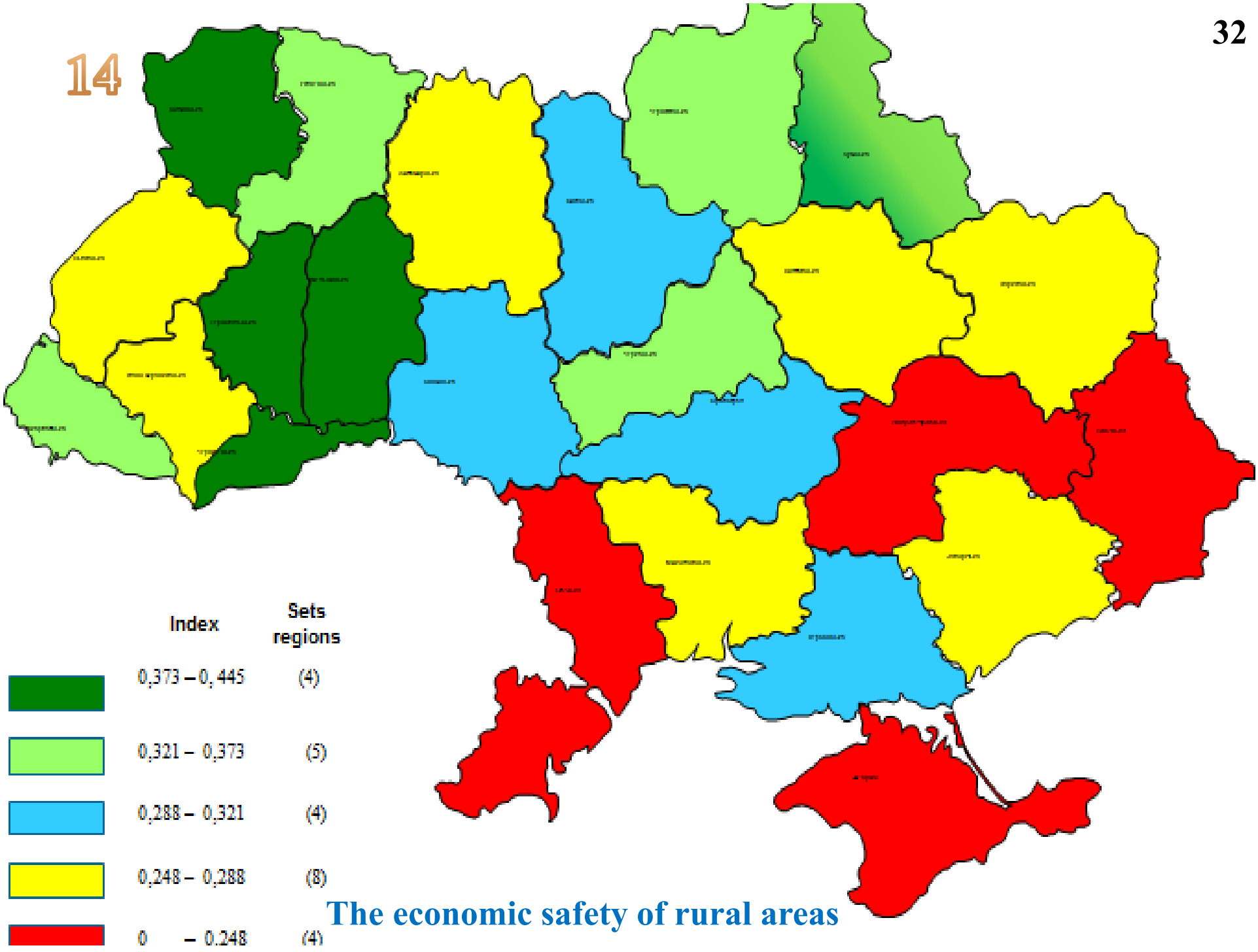


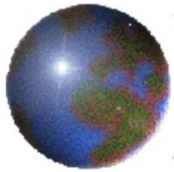
The economic safety of rural areas

Methodology for determining the key indicators of agricultural production which describe the efficiency of resource use includes the use of the following rather known notations:

$$I = \frac{I_{prodvol}}{I_{prodprice}} \cdot 100\%, \quad P = \frac{D_{sales}}{I_{prodprice} \cdot N},$$

$$R = \frac{VP}{C_{sales}} \cdot 100\%, \quad U = \frac{V_{prodvol}}{S_{land}} \cdot 100\%,$$

where I – the index of production volume (in % to the base year); P is labour productivity per one employed (in prices of the constant year); R – profitability of the sold product; U – yield, $I_{prodvol}$ – the index of production volume, $I_{prodprice}$ – the index of product prices, D_{sales} – income from the product sold, N – employees' quantity, VP – gross profit, C_{sales} – prime cost of the product sold, $V_{prodvol}$ – volume of the product grown, S_{land} – productive lands area.



Дякую за увагу !

Normalized values of key indicators describing the efficiency of agricultural production in Ukraine

Years	Index of agricultural production volume	Labour productivity at agricultural enterprises per one employee, in constant prices of 2010, ths UAH	Agricultural production profitability, %	Grains yield, dt/ha
1990	1	0,221241	0,358284	0,803204
1991	0,868	0,188039	0,472666	0,606407
1992	0,796	0,159689	1	0,638444
1993	0,808	0,161172	0,977292	0,734554
1994	0,675	0,136628	0,486123	0,613272
1995	0,65	0,13284	0,114382	0,556064
2001	0,589	0,151819	0,153911	0,620137
2002	0,596	0,178829	0,041211	0,624714
2003	0,53	0,166878	0,105971	0,416476
2004	0,635	0,27827	0,068124	0,647597
2005	0,635	0,318862	0,057191	0,594966
2006	0,651	0,368182	0,023549	0,551487
2007	0,609	0,388891	0,131203	0,498856
2008	0,713	0,559256	0,1127	0,791762
2009	0,7	0,576641	0,116064	0,681922
2010	0,689	0,582562	0,17746	0,615561
2011	0,827	0,725473	0,227082	0,846682
2012	0,789	0,701105	0,172414	0,713959
2013	0,894	0,883486	0,094197	0,913043
2014	0,731	1	0,216989	1