

Part 2. STRATEGIC MANAGEMENT TOOLS AS A BASIS FOR ENSURING COMPETITIVE DEVELOPMENT OF ENTERPRISES

2.1. MARKETING LOGISTIC BUSINESS MODEL OF VEGETABLE MARKET DUE TO ZONAL SPECIALIZATION

The objects of the food market infrastructure include wholesale and retail enterprises, auctions, fairs, exhibitions, commodity exchanges, communication systems, state institutional structures. Providing trade, marketing, logistics, information services, as well as services in storage, transportation and packaging of products, objects of the food market infrastructure should contribute to creating the necessary conditions for the effective operation of market entities and timely provision of food products to the population¹.

Despite some positive changes, the level of infrastructure development remains a deterrent to the functioning of the market. In the system of commodity sales of agricultural products, the organization of the functioning of wholesale markets needs to be improved; information provision of market participants is inadequate, and the data they submit requires further processing.

In order to improve the functioning of the food market of the region and to establish stable relations between commodity producers and consumers, the creation of a network of inter-regional wholesale food markets, which will promote the effective promotion of food products to the final consumer, should be considered as a priority². Solving this problem requires the processing of data of different classes (geographical coordinates, distances, volumes of supplying goods, prices for goods, etc.) with the help of information systems³. It is necessary to justify the choice of both the information system and the methods of data processing in it.

Effective system of distribution of vegetable products through wholesale markets, firstly, guarantees to agricultural producers and processing enterprises equal conditions of sales of products; and secondly, it provides the supply of food for the population of cities and large settlements during the year; thirdly, weakening the dependence of agricultural products on the monopoly of processing enterprises; and finally provides support for the national commodity producer.

In addition, the organization and functioning of the broad-based wholesale market in Ukraine⁴ will significantly weaken the activities of intermediary structures, accelerate the advancement of trade flows, reduce losses and preserve the quality of vegetable products.

The presence of numerous sales channels does not always provide a positive result, enterprises can focus on contractual relations, a stable market.

Determining the variant of products transportation, finding optimal deliveries of products from the manufacturer to the consumers processing enterprises, wholesalers and retailers will allow reducing costs and increase profitability⁵.

The vegetable market should be distinguished as a separate, independent one. The reason for this is a large total volume of manufactured goods and a part in the production of all regions of Ukraine. After the transition of Ukrainian agriculture to market relations in trade of vegetable products, certain changes took place.

The cancellation of the state order and the suspension the operation of the procurement network of consumer cooperatives for the objective reasons led to a sharp decrease in the volumes

¹ Kolomiets K. (2017): Improvement of the system of state regulation for providing the food security of the state. Market Infrastructure 12, p.49-54

² Allen T, Prospero P. (2016): Modeling Sustainable Food Systems. Environmental Management 57, p.956-975

³ Li X. (2014): Operations Management of Logistics and Supply Chain: Issues and Directions. Discrete Dynamics in Nature and Society 2014, p.1-7

⁴ On the production and circulation of organic agricultural products and raw materials (2014) Legislation of Ukraine. <http://www.zakon.rada.gov.ua/go/425-18>. Accessed 02 Apr 2019

⁵ Li X. (2014): Operations Management of Logistics and Supply Chain: Issues and Directions. Discrete Dynamics in Nature and Society 2014, p.1-7

of production and sale of vegetable products by large specialized enterprises, as well as significant structural changes in production and production sales channels, and there was a tendency to reduce purchases of vegetable products by procurement organizations and increased sales of vegetables on the market, to commercial structures¹.

Vegetable producers have some difficulties with the marketing of grown products. The implementation of these products is significantly complicated by the lack of small commodity formations, which on a contractual basis could guarantee the supply of a certain volume of products to wholesale markets or processing enterprises. Instead, most intermediaries raise sales prices or supply imported products to the market, artificially reducing the access of most people to vegetables consumption.

Since the development of vegetable growing significantly depends on the deepening of its agro-industrial integration with industrial processing of vegetables and the expansion of processing and storage of products in the places where they grow, they should study carefully the possibilities of rational use and increase of capacities of the canning industry, strengthening the material and technical base of subsidiary industries of farms and ensuring their vegetable stores, certain changes in the structure of production².

At this stage of development of vegetable products market, an important element of forecasting is also the definition of promising yields. As you know, the level of productivity of vegetable crops depends on many factors: soil and climatic conditions, technologies of cultivation and storage of crop, varietal composition, etc. It should be noted that these factors are interrelated and operate in the complex.

In the conditions of limit and sharp increase on prices for resources, one of the main factors in ensuring the maximum return on investment and the necessary rates of increase in volumes and achievement of the stability of the production of vegetable products is to improve the territorial organization of the industry in the system of the agro-industrial complex of Ukraine.

Data processing in the regions of the country showed a significant differentiation of indicators of production and consumption of vegetables in general in Ukraine³. Satisfaction of the offer on the market of vegetable products within separate regions is considerably different, and these differences increase with years.

At the same time, there is a situation in which the high level of vegetables consumption in some cases corresponds to a relatively low level of production⁴.

The solution of this problem can be achieved by using the optimal distribution of vegetable production in the natural and climatic zones of Ukraine, taking into account the production volumes of the main types of vegetables and the necessary minimum amount of their consumption.

In our opinion, the target function may be the minimum cost of transportation of vegetable products. However, for its calculation it is necessary to forecast the supply volumes and consumption volumes of vegetable products for the current and subsequent years.

As it was already noted, the vegetable production gradually shifted from the Steppe and Forest-Steppe zones to Polissya and the Carpathians zones (Table 1).

As a result of the performed calculations (Table 2): the data on optimal volumes of sales of the main types of vegetable crops in the natural and climatic zones of Ukraine were obtained, taking into account the volumes of their production and the minimum required consumption volumes. Taking into account the data of the conducted research, the lack of production of tomatoes was found, which does not allow to sufficiently satisfy the needs of the population of the country (the

¹ Agbo M., Rousselière D., Salanié J. (2015): Agricultural marketing cooperatives with direct selling: A cooperative–non-cooperative game. *Journal of Economic Behavior & Organization* 109, p.56-71

² Pysarenko V. (2018): Marketing of vegetable products (methodical and practical aspects): Market of vegetable products: market conditions, subjects. https://agromage.com/stat_id.php?id=324. Accessed 02 Apr 2019

³ Pysarenko V. (2018): Marketing of vegetable products (methodical and practical aspects): Marketing research of consumers, the retail and wholesale segment of the vegetable market. https://agromage.com/stat_id.php?id=325. Accessed 02 Apr 2019

⁴ The future of food and agriculture (2017): Food and Agriculture Organization of the United Nations, Rome. <http://www.fao.org/3/a-i6583e.pdf>. Accessed 02 Apr 2019

deficit is 658,2 Kt). However, in the production of other types of vegetable products there is a surplus in relation to the needs of the population.

Table 1. Summary table of zonal production of vegetable products in Ukraine (average for 2010 - 2018): Kt

| Index | Cabbage | Cucumbers | Tomatoes | Table beets | Carrots | Onions |
|-------------------|---------|-----------|----------|-------------|---------|--------|
| Production, total | 1556,8 | 591,9 | 1137,9 | 580,6 | 505,9 | 556,9 |
| Including zones: | | | | | | |
| Steppe | 558,1 | 90,8 | 809,3 | 168,4 | 135,6 | 268,9 |
| Forest-Steppe | 502,3 | 239,6 | 241,8 | 221,2 | 210,8 | 192,5 |
| Polissya | 348,8 | 222,4 | 46,5 | 149,8 | 132,7 | 72,4 |
| Carpathians | 147,6 | 39,1 | 40,3 | 41,2 | 26,8 | 23,7 |
| Need, total | 1381,6 | 460,5 | 1796,1 | 506,6 | 460,5 | 460,5 |
| Including zones: | | | | | | |
| Steppe | 601,1 | 200,4 | 781,4 | 220,4 | 200,4 | 200,4 |
| Forest-Steppe | 487,5 | 162,5 | 633,7 | 178,7 | 162,5 | 162,5 |
| Polissya | 214,3 | 71,4 | 278,6 | 78,6 | 71,4 | 71,4 |
| Carpathians | 78,7 | 26,2 | 102,4 | 28,9 | 26,2 | 26,2 |

As variables volumes of vegetable sales for the main consumption are defined:

- X_{SS} – realization in the Steppe zone of the products produced in the zone of the Steppe;
- X_{SF} – realization in the Steppe zone of products produced in the Forest-Steppe zone;
- X_{SP} – realization in the Steppe zone of products produced in the Polissya zone;
- X_{SC} – realization in the Steppe zone of products produced in the Carpathian zone;
- X_{FS} – realization in the Forest-Steppe zone of products, produced in the Steppe zone;
- X_{FF} – realization in the Forest-Steppe zone of products produced in the Forest-Steppe zone;
- X_{FP} – realization in the Forest-Steppe zone of products, made in the Polissya zone;
- X_{FC} – realization in the Forest-Steppe zone of products, made in the Carpathian zone;
- X_{PS} – realization in the Polissya zone of products, produced in the Steppe zone;
- X_{PF} – realization in the Polissya zone of products, produced in the Forest-Steppe zone;
- X_{PP} – realization in the Polissya zone of products, produced in the Polissya zone;
- X_{PC} – realization in the Polissya zone of products, produced in the Carpathian zone;
- X_{CS} – realization in the Carpathian zone of products, produced in the Steppe zone;
- X_{CF} – realization in the Carpathian zone of products, produced in the Forest-Steppe zone;
- X_{CP} – realization in the Carpathian zone of products, produced in the Polissya zone;
- X_{CC} – realization in the Carpathian zone of products, produced in the Carpathian zone.

Thus, it's a cabbage - 175,2; cucumbers - 131,4; table beets - 73,9; carrots - 45,4; onions - 97,0 Kt. Therefore, we consider it expedient to satisfy the lack of tomatoes for the subsequent periods at the expense of imports, and for future periods to plan (predict) higher production volumes.

Table 2. The matrix of redistribution of vegetable production by natural and climatic zones of Ukraine, (on average for 2010 - 2019): Kt

| Index | Cabbage | Cucumbers | Tomatoes | Table beets | Carrots | Onions |
|-------------------------------|---------|-----------|----------|-------------|---------|--------|
| Steppe - Steppe | 558,1 | 90,8 | 781,4 | 168,4 | 135,6 | 200,4 |
| Steppe - Forest Steppe | – | – | 27,9 | – | – | – |
| Steppe - Polissya | – | – | – | – | – | – |
| Steppe - Carpathians | – | – | – | – | – | – |
| Forest-Steppe - Steppe | 14,8 | 77,1 | | 42,5 | 48,3 | |
| Forest-Steppe – Forest-Steppe | 487,5 | 162,5 | 214,8 | 178,7 | 162,5 | 162,5 |

| Index | Cabbage | Cucumbers | Tomatoes | Table | Carrots | Onions |
|--|---------|-----------|----------|--------|---------|--------|
| Forest-Steppe - Polissya | – | – | – | – | – | – |
| Forest-Steppe - Carpathians | – | – | – | – | – | 2,5 |
| Polissya - Steppe | – | 32,5 | – | – | 16,5 | – |
| Polissya - Forest-Steppe | – | – | – | – | – | – |
| Polissya - Polissya | 214,3 | 71,4 | 46,5 | 78,6 | 71,4 | 71,4 |
| Polissya - Carpathians | – | – | – | – | – | – |
| Carpathians - Steppe | 28,2 | – | – | 9,5 | – | – |
| Carpathians - Forest-Steppe | – | – | – | – | – | – |
| Carpathians - Polissya | – | – | – | – | – | – |
| Carpathians - Carpathians | 78,7 | 26,2 | 40,3 | 28,9 | 26,2 | 23,7 |
| Surplus | 175,2 | 131,4 | | 73,9 | 45,4 | 97,0 |
| Lack | – | – | 658,2 | – | – | – |
| Cost of redistributed production, ths. UAH | 84288 | 688290 | 179955 | 119534 | 215748 | 5750 |
| Economic effect, ths. UAH | 46999 | 283584 | 527 | 58625 | 119856 | 1815 |

Predicted volumes of vegetables production and consumption in the nature and climatic zones of Ukraine, taking into account the dynamics of population and average consumption of vegetable products, are given in Table. 3.

Table 3. The size of the territory, population density and vegetable production zones (segments) in Ukraine (average forecast for 2015 - 2030)

| Nature and climatic zone | Territory, ths. km ² | Population, ths. persons (on the average) | | Production fund | | | | Consumption fund | |
|--------------------------|---------------------------------|---|--------|-----------------|--------|----------------|------|------------------|--------|
| | | | | Total, Kt | | Per capita, kg | | Total, Kt | |
| | | 2020 | 2030 | 2020 | 2030 | 2020 | 2030 | 2020 | 2030 |
| Cabbage | | | | | | | | | |
| Steppe | 250,2 | 19732,8 | 19454 | 568,3 | 589,5 | 28,8 | 30,3 | 647,2 | 669,2 |
| Forest-Steppe | 202,9 | 15421,8 | 15204 | 505,8 | 524,5 | 32,8 | 34,5 | 505,8 | 523 |
| Polissya | 123,8 | 6844,2 | 6747,5 | 348,4 | 361 | 50,9 | 53,5 | 224,5 | 232,1 |
| Carpathians | 26,7 | 2444,3 | 2409,8 | 145,7 | 151,1 | 59,6 | 62,7 | 80,2 | 82,9 |
| Total | 603,8 | 44443,4 | 43815 | 1568,9 | 1629,9 | 35,3 | 37,2 | 1457,7 | 1507,2 |
| Cucumbers | | | | | | | | | |
| Steppe | 250,2 | 19732,8 | 19454 | 248,6 | 256,8 | 12,6 | 13,2 | 217,1 | 223,7 |
| Forest-Steppe | 202,9 | 15421,8 | 15204 | 237,5 | 246,3 | 15,4 | 16,2 | 169,6 | 174,8 |
| Polissya | 123,8 | 6844,2 | 6747,5 | 78,7 | 79,6 | 11,5 | 11,8 | 75,3 | 77,6 |
| Carpathians | 26,7 | 2444,3 | 2409,8 | 32 | 33,3 | 13,1 | 13,8 | 26,9 | 27,7 |
| Total | 603,8 | 44443,4 | 43815 | 582,2 | 600,3 | 13,1 | 13,7 | 488,9 | 503,9 |
| Tomatoes | | | | | | | | | |
| Steppe | 250,2 | 19732,8 | 19454 | 818,9 | 846,2 | 41,5 | 43,5 | 818,9 | 832,6 |
| Forest-Steppe | 202,9 | 15421,8 | 15204 | 239 | 247,8 | 15,5 | 16,3 | 640 | 650,7 |
| Polissya | 123,8 | 6844,2 | 6747,5 | 41,7 | 43,2 | 6,1 | 6,4 | 284 | 288,8 |
| Carpathians | 26,7 | 2444,3 | 2409,8 | 37,6 | 39 | 15,4 | 16,2 | 101,4 | 103,1 |
| Total | 603,8 | 44443,4 | 43815 | 1137,8 | 1178,6 | 25,6 | 26,9 | 1844,4 | 1875,3 |
| Onions | | | | | | | | | |
| Steppe | 250,2 | 19732,8 | 19454 | 270,3 | 280,1 | 13,7 | 14,4 | 217,1 | 223,7 |
| Forest-Steppe | 202,9 | 15421,8 | 15204 | 195,9 | 202,2 | 12,7 | 13,3 | 169,6 | 174,8 |
| Polissya | 123,8 | 6844,2 | 6747,5 | 69,1 | 71,5 | 10,1 | 10,6 | 75,3 | 77,6 |
| Carpathians | 26,7 | 2444,3 | 2409,8 | 18,8 | 19,5 | 7,7 | 8,1 | 26,9 | 27,7 |

| Nature and climatic zone | Territory, ths. km ² | Population, ths persons (on the average) | | Production fund | | | | Consumption fund | |
|--------------------------|---------------------------------|--|--------|-----------------|-------|----------------|------|------------------|-------|
| | | | | Total, Kt | | Per capita, kg | | Total, Kt | |
| | | 2020 | 2030 | 2020 | 2030 | 2020 | 2030 | 2020 | 2030 |
| Total | 603,8 | 44443,4 | 43815 | 546,7 | 574 | 12,3 | 13,1 | 488,9 | 503,9 |
| Table beets | | | | | | | | | |
| Steppe | 250,2 | 19732,8 | 19454 | 163,8 | 169,2 | 8,3 | 8,7 | 236,8 | 243,2 |
| Forest-Steppe | 202,9 | 15421,8 | 15204 | 220,5 | 229,6 | 14,3 | 15,1 | 185,1 | 190 |
| Polissya | 123,8 | 6844,2 | 6747,5 | 147,2 | 152,5 | 21,5 | 22,6 | 82,1 | 84,3 |
| Carpathians | 26,7 | 2444,3 | 2409,8 | 37,2 | 38,8 | 15,2 | 16,1 | 29,3 | 30,1 |
| Total | 603,8 | 44443,4 | 43815 | 586,7 | 604,6 | 13,2 | 13,8 | 533,3 | 547,7 |
| Carrots | | | | | | | | | |
| Steppe | 250,2 | 19732,8 | 19454 | 130,2 | 138,1 | 6,6 | 7,1 | 213,1 | 221,8 |
| Forest-Steppe | 202,9 | 15421,8 | 15204 | 211,3 | 215,9 | 13,7 | 14,2 | 166,6 | 173,3 |
| Polissya | 123,8 | 6844,2 | 6747,5 | 130,7 | 135,6 | 19,1 | 20,1 | 73,9 | 76,9 |
| Carpathians | 26,7 | 2444,3 | 2409,8 | 22,2 | 22,9 | 9,1 | 9,5 | 26,4 | 27,5 |
| Total | 603,8 | 44443,4 | 43815 | 493,3 | 512,6 | 11,1 | 11,7 | 480 | 499,5 |

Using the optimal distribution of vegetable production in the natural and climatic zones of Ukraine, taking into account the production volumes of the main types of vegetables (cabbage, cucumbers, tomatoes, table beets, carrots and onions): and the minimum amount of their consumption, the sizes of optimum sales volumes of the main types of vegetable crops are prognosed according to natural and climatic zones of Ukraine for 2020 - 2030, taking into account the volumes of their production and the minimum-necessary consumption volumes (Table 4).

Table 4. The matrix of redistribution of vegetable products according to the natural and climatic zones of Ukraine (forecast for 2020- 2030): Kt

| Index | Cabbage | Cucumbers | Tomatoes | Table beets | Carrots | Onions |
|---------------------------------|---------|-----------|----------|-------------|---------|--------|
| 2020 | | | | | | |
| Production, total | 1568,2 | 596,8 | 1137,2 | 568,7 | 494,4 | 554,1 |
| Need, total | 1457,7 | 488,9 | 1844,3 | 533,3 | 480 | 488,9 |
| Realization according to zones | | | | | | |
| Steppe - Steppe | 568,3 | 75,3 | 41,7 | 163,8 | 130,2 | 18,8 |
| Steppe-Forest-Steppe | – | – | – | – | – | – |
| Forest-Steppe - Steppe | – | – | – | 35,4 | 22,2 | – |
| Forest-Steppe - Forest-Steppe | 505,8 | 217,1 | 37,6 | 185,1 | – | 69,1 |
| Forest-Steppe -Polissya | – | – | – | – | – | – |
| Forest-Steppe -Carpathians | – | – | – | – | – | – |
| Polissya - Steppe | 78,9 | – | – | – | 44,7 | – |
| Polissya - Forest-Steppe | – | – | – | – | – | – |
| Polissya - Polissya | 224,5 | 26,9 | 239 | 29,3 | 166,6 | 169,6 |
| Carpathians - Steppe | – | – | – | – | 16 | – |
| Carpathians - Forest-Steppe | – | – | – | – | 26,4 | 6,2 |
| Carpathians -Polissya | – | – | – | – | – | – |
| Carpathians -Carpathians | 80,2 | 169,6 | 818,9 | 82,1 | 73,9 | 217,1 |
| Surplus | 110,5 | 107,9 | – | 35,4 | 14,4 | 65,2 |
| Lack | – | – | 707,1 | – | – | – |
| Cost of sold products, ths. UAH | 1497,15 | 488,9 | 1137,2 | 560,95 | 522,5 | 494,5 |

| Index | Cabbage | Cucumbers | Tomatoes | Table | Carrots | Onions |
|------------------------------------|---------|-----------|----------|-------|---------|--------|
| 2030 | | | | | | |
| Production, total | 1626,1 | 616 | 1176,2 | 590,1 | 512,5 | 573,3 |
| Need, total | 1507,2 | 503,8 | 1875,2 | 547,6 | 499,5 | 503,8 |
| Realization according to zones | | | | | | |
| Steppe - Steppe | 589,5 | 77,6 | 43,2 | 169,2 | 138,1 | 19,5 |
| Steppe-Forest-Steppe | – | – | – | – | – | – |
| Steppe-Polissya | – | – | – | – | – | – |
| Steppe-Carpathians | – | – | – | – | – | – |
| Forest-Steppe - Steppe | 1,5 | – | – | 74 | 22,9 | 8,2 |
| Forest-Steppe - Forest-Steppe | 523 | 223,7 | 39 | 155,6 | | 63,3 |
| Forest-Steppe -Polissya | – | – | – | – | – | – |
| Forest-Steppe -Carpathians | – | – | – | – | – | – |
| Polissya - Steppe | – | – | – | – | 42,6 | – |
| Polissya - Forest-Steppe | – | – | – | 8,7 | | 14,3 |
| Polissya - Polissya | 232,1 | 27,7 | 247,8 | 30,1 | 173,3 | 174,8 |
| Polissya -Carpathians | – | – | – | – | – | – |
| Carpathians - Steppe | – | – | – | – | 18,2 | – |
| Carpathians - Forest-Steppe | – | – | – | 25,7 | 27,5 | – |
| Carpathians -Polissya | – | – | 13,6 | – | – | – |
| Carpathians -Carpathians | 82,9 | 174,8 | 832,6 | 84,3 | 76,9 | 223,7 |
| Surplus | 118,9 | 112,2 | – | 42,5 | 13 | 69,5 |
| Lack | – | – | 699 | – | – | – |
| Cost of sold products, ths. UAH | 1546,67 | 503,8 | 1179,6 | 574,7 | 542,5 | 509,43 |

Taking into account the research data, the sizes of optimum volumes of realization of the main kinds of vegetable crops according to the natural and climatic zones are prognosed. As a result of the calculations, there was a shortage in the production of tomatoes, which in 2020 will be 707,1 Kt, and in 2030 - 699 Kt, which does not allow to adequately satisfy the needs of the country population. However, in the production of other types of products, their surplus is observed in 2020-2030 relative to the needs of the population. Therefore, we consider it expedient to satisfy the lack of tomatoes for the subsequent periods at the expense of imports and to plan larger production volumes. The surplus of vegetable products can be rationally exported to countries where their shortage is observed and, therefore, the realization at favorable prices, for example, to the northern regions of the EU or The Baltic countries is possible.

At the same time, the share of large enterprises in the total production volume is decreasing. There was also a decrease in the crop area by 40 ths. ha, gross yield - by 2 Mt, yields - by 22 %. Reduced yields are decreasing both for large and small farms¹.

The supply of vegetables in Ukraine is formed, mainly due to production, which is concentrated in households (Fig. 1).

In 2018, there continues to be a positive tendency of increase in production volumes, which is likely to continue in the near future (Fig.2). The reason for this is the dynamic development of the vegetable market in Ukraine in recent years, which is still not saturated. The high profitability of this industry for the correct approach to growing and marketing, even in the overproduction season, in contrast to other segments of agro-industrial complex can be indicated as a distinctive feature.

In reference to the forecast of the vegetable subcomplex development, structural changes in production are expected: the share of specialized agricultural enterprises and peasant farming will

¹ Kobylynska T. (2018): Statistical evaluation of plant-growing branch. The journal of Zhytomyr State technological university Series: Economics 83(1):66-70

increase, and households will decrease.

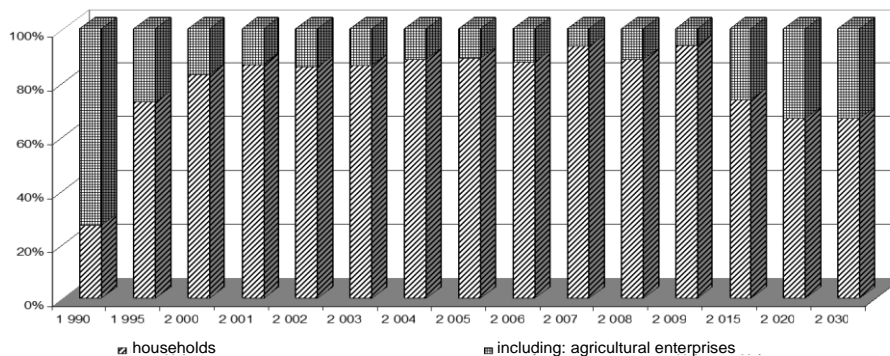


Fig. 1. The share of agricultural enterprises and households in the vegetables production, 1990 – 2030

There was a tendency towards a decrease in the purchase of vegetable products by stock organizations and increased sales of vegetables on the market, to commercial structures, as well as on payroll. The prices for vegetable products did not contribute to the expanded reproduction of production and did not compensate for production costs.

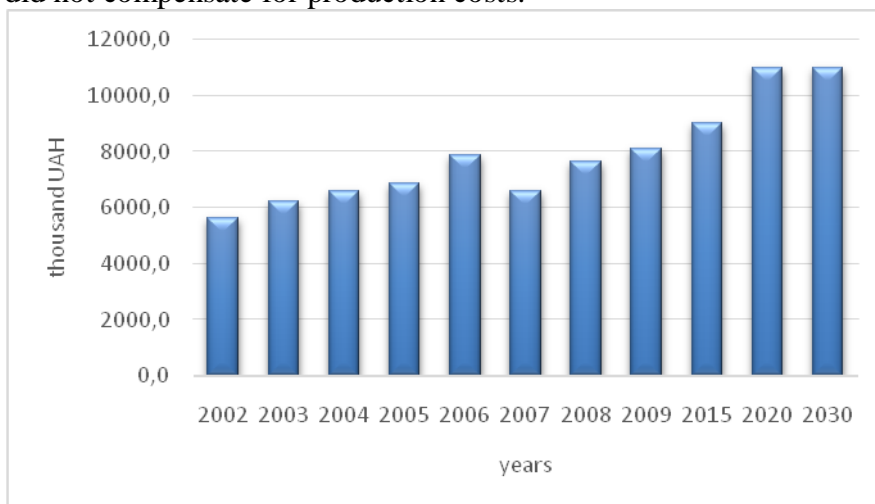


Fig. 2. The dynamics of vegetable production, 1990 – 2030

The economic crisis has led to a violation of the interaction of vegetable subcomplex individual spheres: production, processing, storage and marketing of vegetable products, the processes of self-regulation and self-survival of its spheres began. In these conditions, the share of households in the vegetables' production has increased and their production in agricultural enterprises has decreased. In recent years, there has been a tendency to increase the production of vegetables in households (up to 90%) and decrease in agricultural enterprises (Table 5). At the same time, vegetable farming in farms has not yet become a high-value industry. One of the directions in its development may be the creation of specialized farms with fluctuations in the area of vegetables from 20 to 100 hectares. A specialized farm must be integrated with similar or processing ones.

Table 5. Production of vegetables and melons in Ukraine by categories of farms, Kt, 1990 – 2030

| Year | All categories of farms | Including: agricultural enterprises | Among them | | The share of households in all categories of farms |
|------|-------------------------|-------------------------------------|------------|------------|--|
| | | | farms | households | |
| 1990 | 6666,0 | 4872,0 | 0,0 | 1794,0 | 26,9 |
| 1995 | 5880,0 | 1607,0 | 27,4 | 4272,7 | 72,7 |
| 2000 | 5821,3 | 986,3 | 82,6 | 4835,0 | 83,1 |
| 2001 | 5906,8 | 772,5 | 90,7 | 5134,3 | 86,9 |
| 2002 | 5827,1 | 706,7 | 109,0 | 5120,4 | 87,9 |
| 2003 | 6538,2 | 827,6 | 131,7 | 5710,6 | 87,3 |
| 2004 | 6963,9 | 768,6 | 142,5 | 6195,3 | 89,0 |

| Year | All categories of farms | Including: agricultural enterprises | Among them | | The share of households in all categories of farms |
|------|-------------------------|-------------------------------------|------------|------------|--|
| | | | farms | households | |
| 2005 | 7295,0 | 780,7 | 156,1 | 6514,3 | 89,3 |
| 2006 | 8058,0 | 974,2 | 223,9 | 7083,8 | 87,9 |
| 2007 | 6835,2 | 713,4 | 168,2 | 6121,8 | 89,6 |
| 2008 | 7965,1 | 1108,6 | 275,9 | 6856,5 | 86,1 |
| 2009 | 8341,0 | 1120,1 | 223,7 | 7221,0 | 86,6 |
| 2015 | 10000 | 1436 | 337 | 8564 | 85,6 |
| 2020 | 12000 | 2069 | 387 | 9931 | 82,8 |
| 2030 | 13000 | 2430 | 406 | 10570 | 81,3 |

Depending on the area of arable land on the household and the availability of sales market, the level of energy efficiency and direction of specialization, the total area under the vegetables and the structure of their planting are determined. For farms, different options for the development of vegetable production are acceptable, taking into account the specific conditions of production and the availability of market niches. As the foreign experience of farms activity shows, growing of 3 to 4 main vegetable crops or specializing in monoculture growing is common and effective.

The largest production volumes of vegetables in the period 2000-2018 were recorded in Dnipropetrovska (506.9 Kt) and Khersonska (488.3 Kt) oblast (Fig. 4).

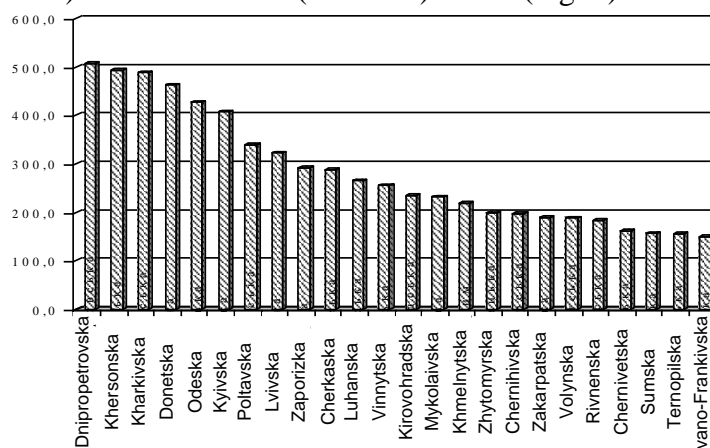


Fig. 3. Production volumes of vegetables in 2000 – 2018 in the regions, Kt

In the demand pattern for vegetable products, the main share falls on food - 72.1% and feed - 14.3%. In the long term, by 2020, the share of volumes used for feed (up to 18%) is likely to increase, and losses will significantly decrease (from 6% in 2008 to 2% in 2020) (Fig. 5). At the same time, the physiological need for vegetable consumption will gradually be reached.

In recent years there has been a tendency towards a decrease in the consumption of vegetables. So, in 1990, the production of vegetables per capita amounted to 141 kg, in 2000 - 91.9 kg, in 2010 - only 101.7 kg. Reducing consumption is due to lower productivity, transformation of ownership in the state. Consumption of vegetables since 2000 increases, but the recommended rate - 158 kg per person per year - should be achieved in 2020.

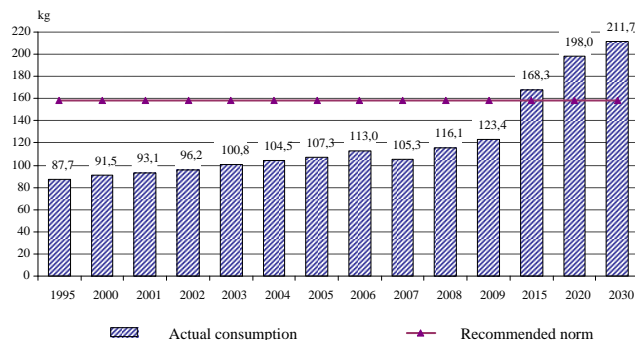


Fig. 4. Provision of population needs in vegetables per one person, kg / year, 1990 – 2030

In recent years, there has been a positive trend towards increase in the vegetable production in Ukraine (Table 6).

Table 6. Vegetable production in Ukraine in 2000 – 2018

| Index | Year | | | | | | | | |
|-----------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 2000 | 2001 | 2002 | 2004 | 2013 | 2015 | 2016 | 2017 | 2018 |
| Gross yield, Kt | | | | | | | | | |
| Vegetables, total | 6666,4 | 5879,8 | 5821,3 | 6963,9 | 7295 | 8058 | 6835,2 | 7965,1 | 8341 |
| open-ground vegetables | 6416,1 | 5607,4 | 5584,5 | 6697,7 | 7018,5 | 7755,3 | 6547,5 | 7669,8 | 7967 |
| closed-ground vegetables | 250,3 | 272,4 | 236,8 | 266,2 | 276,5 | 302,7 | 287,7 | 295,3 | 374 |
| Yield, c / ha | | | | | | | | | |
| Vegetables, total | 149 | 120,2 | 112,3 | 148,7 | 157,1 | 171,4 | 152,3 | 173,9 | 182,8 |
| open-ground vegetables | 144,2 | 115,4 | 108,2 | 143,8 | 152 | 165,9 | 146,8 | 168,5 | 175,7 |
| closed-ground vegetables | 4,8 | 4,8 | 4,1 | 4,9 | 5,1 | 5,5 | 5,5 | 5,4 | 7,1 |
| Gathered area, ths.m ² | | | | | | | | | |
| Vegetables, total | 447,2 | 489,3 | 518,6 | 468,2 | 464,4 | 470,3 | 448,8 | 457,9 | 456,36 |
| open-ground vegetables | 445,0 | 485,7 | 516 | 465,7 | 461,8 | 467,6 | 446,1 | 455,3 | 453,46 |
| closed-ground vegetables | 2,2 | 3,6 | 2,6 | 2,5 | 2,6 | 2,7 | 2,7 | 2,6 | 2,9 |

The production of vegetables in all categories of Ukrainian farms has stabilized in recent years and is about 8 million tons per year. In 2018, the production of open-ground vegetables increased by 36.8% compared with 2000, the production of green peas increased 3 times, tomatoes - by 33.0, cabbage - by 55.1, beets - by 31.9, onions - by 86.3, carrots - by 49.2%. In 2018, the production of almost all vegetable crops increased both in agricultural enterprises and in households¹.

Fluctuations in production and consumption of vegetables are correlated with changes in the balance of vegetables (Table 7).

Table 7. Balance of vegetables (including canned and dried products in fresh weight): Kt

| Index | Year | | | | | | | |
|--|--------|--------|--------|--------|--------|--------|---------|---------|
| | 2000 | 2002 | 2005 | 2007 | 2017 | 2018 | 2020 | 2030 |
| Production | 5575,5 | 5607,9 | 6845,4 | 6585,3 | 7640,1 | 8341,0 | 12000,0 | 13000,0 |
| Change in stock at the end of the year | 180,9 | -154,8 | 176,4 | -76,5 | 620,1 | 534,0 | 590,0 | 630,0 |
| Import | 26,1 | 70,2 | 90,0 | 142,2 | 320,4 | 209,0 | 118,0 | 126,0 |
| Export | 27,0 | 31,5 | 135,0 | 268,2 | 225,9 | 312,3 | 814,0 | 1102,0 |
| Spent on feed | 655,2 | 912,6 | 1092,6 | 1025,1 | 1094,4 | 1200,0 | 1400,0 | 1600,0 |
| Spent on planting | 77,4 | 78,3 | 81,0 | 89,1 | 91,8 | 108,0 | 95,0 | 100,0 |
| Losses | 159,3 | 123,3 | 353,7 | 463,5 | 550,8 | 600,0 | 420,0 | 450,0 |
| Consumption Fund | 4501,8 | 4687,2 | 5096,7 | 4958,1 | 5377,5 | 5796,0 | 8799,0 | 9244,0 |
| Calculated per person, kg | 91,5 | 96,2 | 107,3 | 105,3 | 116,1 | 125,9 | 198,0 | 211,0 |
| Number of population | 49,2 | 48,7 | 47,5 | 47,1 | 46,3 | 46,0 | 44,4 | 43,8 |

In recent years, an increase in the consumption of vegetables has been observed, primarily due to the increase in their production, mainly in the private sector, and not at the expense of production

¹ Kernasyuk Yu. (2018): Vegetable market of open ground and greenhouse. <http://agro-business.com.ua/agro/ekonomichniy-hektar/item/10912-rynok-ovochiv-vidkrytoho-gruntu-ta-teplychnykh.html>. Accessed 02 Apr 2019

in large agricultural enterprises, as the main source of income of vegetable products to the trading network. Consumption of vegetables per capita has grown. To a certain extent, this is the result of a reduction in the population. A higher level of production is responsible for a higher level of consumption of vegetable products per capita. Of course, there is a surplus of consumption over production.

As a result of processing data from¹, the deficit of production and supply of vegetable products by regions of Ukraine was projected. Calculations are presented in Table 8.

Table 8. Determination of volumes of vegetables supplies by regions of Ukraine, 2018

| Consumers | Deficit, Kt | Suppliers | Surplus, Kt | Volume share | Supply volumes, Kt | Economic effect, ths. UAH |
|------------------------|-------------|---------------------|-------------|--------------|--------------------|---------------------------|
| Kyiv region | -130,5 | Zhytomyr region | 52,4 | 0,12 | 15,6 | 3029,3 |
| | | Vinnitsa region | 66,8 | 0,15 | 19,6 | 22285,2 |
| | | Cherkasy region | 130,6 | 0,29 | 37,8 | 34665,2 |
| | | Poltava region | 175,3 | 0,39 | 50,9 | 20744,3 |
| | | Chernihiv region | 23,4 | 0,05 | 6,5 | 3292,1 |
| Total | | - | 448,5 | 1 | 130,5 | 84016,1 |
| Ivano-Frankivsk region | -9,5 | Zakarpatskyi region | 92,2 | 0,28 | 2,6 | 1596,5 |
| | | Lviv region | 100,9 | 0,31 | 3,0 | 1610,4 |
| | | Ternopil region | 55,4 | 0,16 | 1,5 | 779,0 |
| | | Chernivtsi region | 83,5 | 0,25 | 2,4 | 748,0 |
| Total | | - | 332,0 | 1 | 9,5 | 4733,8 |
| All | -140 | - | 780,5 | | 140 | 88749,9 |

The deficit of vegetables production by regional farms of Kyiv and Ivano-Frankivsk regions, 130.5 Kt and 9.5 Kt respectively was revealed. This necessitates the redistribution of products at the expense of interregional supply of vegetables. At the same time it is necessary to consider additionally the solution of the problem of optimization of transport flows.

The national food market of Ukraine is heterogeneous in its structure, so each region has its own conditions for the vegetables production in particular and the functioning of the vegetable market in general.

In recent years, an increase in the consumption of vegetables has been observed, primarily due to the increase in their production, mainly in the private sector, rather than at the expense of production in large agricultural enterprises as the main source of vegetable supply to the trading network. Consumption of vegetables per capita also increased. To a certain extent, this is the result of a reduction in the population. A higher level of production is responsible for a higher level of consumption of vegetable products per capita. Of course, there is a surplus of consumption over production.

There is a positive tendency to increase production volumes, which is likely to continue in the near future. The reason for this is the dynamic development of the vegetable market in Ukraine in recent years, which, however, remains not saturated. Produced for consumption in fresh and processed form products will be delivered to the wholesale and retail trade, as well as the public catering network.

References:

1. Kolomiets, K. (2017): Improvement of the system of state regulation for providing the food security of the state. *Market Infrastructure* 12, p.49-54.
2. Allen, T., Prospero, P. (2016): Modeling Sustainable Food Systems. *Environmental Management* 57, p.956-975.

¹ Squares, gross collections and yields of crops, fruits, berries and grapes (2018) State Statistics Committee of Ukraine. Statistical bulletin. <http://agroua.net/statistics>. Accessed 02 Apr 2019

3. Li X. (2014): Operations Management of Logistics and Supply Chain: Issues and Directions. *Discrete Dynamics in Nature and Society* 2014, p.1-7.
4. On the production and circulation of organic agricultural products and raw materials (2014) Legislation of Ukraine. <http://www.zakon.rada.gov.ua/go/425-18>. Accessed 02 Apr 2019
5. Agbo, M., Rousselière, D., Salanié, J. (2015): Agricultural marketing cooperatives with direct selling: A cooperative–non-cooperative game. *Journal of Economic Behavior & Organization* 109, p.56-71.
6. Pysarenko, V. (2018): Marketing of vegetable products (methodical and practical aspects): Market of vegetable products: market conditions, subjects. https://agromage.com/stat_id.php?id=324. Accessed 02 Apr 2019
7. Pysarenko, V. (2018): Marketing of vegetable products (methodical and practical aspects): Marketing research of consumers, the retail and wholesale segment of the vegetable market. https://agromage.com/stat_id.php?id=325. Accessed 02 Apr 2019
8. The future of food and agriculture (2017): Food and Agriculture Organization of the United Nations, Rome. <http://www.fao.org/3/a-i6583e.pdf>. Accessed 02 Apr 2019
9. Squares, gross collections and yields of crops, fruits, berries and grapes (2018): State Statistics Committee of Ukraine. Statistical bulletin. <http://agroua.net/statistics>. Accessed 02 Apr 2019
10. Kobylinska, T. (2018): Statistical evaluation of plant-growing branch. *The journal of Zhytomyr State technological university Series: Economics* 83(1): p.66-70.
11. Kernasyuk, Yu. (2018): Vegetable market of open ground and greenhouse. <http://agro-business.com.ua/agro/ekonomichnyi-hektar/item/10912-rynok-ovochiv-vidkrytoho-gruntu-ta-teplychnykh.html>. Accessed 02 Apr 2019
12. Rodashchuk, H., Solskyi, O., Kutkovetska, T. (2018): Use of informational technologies in the logistics activities of agricultural enterprises. *Scientific bulletin of Polissia* 2, p.175-182.