

# USAGE OF MATRIX METHODS FOR DEVELOPING THE STRATEGY OF AGRICULTURAL ENTERPRISE

Olena Shumkova<sup>1</sup>, Viktoriia Shumkova<sup>2</sup>

<sup>1</sup>Sumy National Agrarian University, Sumy, Ukraine, lena\_shumkova@ukr.net

<sup>2</sup>Sumy National Agrarian University, Sumy, Ukraine, vikshumkova@gmail.com

## Abstract

In a rapidly changing environment, fierce competition requires businesses not only to focus on their internal environment, but also to develop a long-term strategy that enables businesses to adapt to changes in their environment. Therefore, the issues of improving the marketing planning system are of particular importance. Especially when it is an agricultural enterprise. Essence and differences of the strategic planning are exposed in the article. The basic matrix methods of the strategic planning and possibility of their application for development of strategies of activity of agricultural enterprises are analyzed. Such as: matrix of marketing mix; matrix of ABC-analysis; matrix of PEST analysis; matrix of SWOT analysis; matrix of BCG. The purpose of the article is to analyze the usage of matrix methods for developing the strategy of agricultural enterprise. Complex methodological aspects of enterprise marketing planning were studied by well-known foreign scientists, including I. Ansoff, G. Assel, B. Karloff, F. Kotler, M. Porter, A. Thompson. The works of L. Balabanov, O. Vyhansky, A. Voychak, S. Garkavenko, V. Nemtsov, S. Pokropivny, K. Redchenko N. Kudenko, A. Mohylova, Razina O. and others are well-known among Ukrainian scientists. The study used methods for theoretical generalization and comparison, analysis and synthesis, matrix method (for the formation of matrix for marketing strategy). Matrix methods play a very important role in marketing. The matrix method is very convenient – this explains its prevalence. However, the only use of matrix methods is not sufficient, since matrices allow you to explore marketing from separate parties and do not show a complete picture, but in combination with other methods, the matrix approach allows you to clearly see the patterns in the processes occurring in the enterprise and make the right conclusions.

**Keywords:** marketing, marketing strategy, agricultural marketing, matrix method, agricultural enterprise.

## INTRODUCTION

Changes in the external conditions of business in Ukraine, European integration vector of the country development, and possibilities of import and export operations facilitate foreign trade and open of the new markets.

Strategic management and strategic marketing are important parts of the overall management system in agricultural enterprises. They include strategic analysis, planning, directly elaboration of the development strategy, its implementation, realization and monitoring.

## RESEARCH RESULTS AND DISCUSSION

The main instrument of strategic marketing is using matrix methods in strategic planning. The matrix methods in strategic planning can help entrepreneurs and analysts scan possible solutions to the constraints they face. It is crucial to note that successful inclusive business models typically combine several strategies to address several constraints. Different methods are using for the analysis and planning, such as:

- matrix of marketing mix;
- matrix of ABC-analysis;
- matrix of PEST analysis;
- matrix of SWOT analysis;
- matrix of BCG [4, p. 19].

Before considering the above matrix methods, it should be noted that the data was taken of State Enterprise “Experimental farm of the Institute of Agriculture of the North East of the National Academy of Agrarian Sciences of Ukraine”.

State Enterprise “Experimental farm of the Institute of Agriculture of the North East of the National Academy of Agrarian Sciences of Ukraine” is a state agricultural statutory entity that carries out experimental, economic and commercial activities for obtaining corresponding profits, subordinated to the Institute of Agriculture of the North East of the National Academy of Agrarian Sciences of Ukraine.

Main directions of activity of the economy:

- active assistance to scientists of the Institute, as well as other scientific institutions in the work on conducting scientific research, production verification and implementation of scientific and technical developments;
- promote, on a mutually beneficial basis, the scientific institutions in their activities for the dissemination of scientific achievements among state, collective, as well as other agricultural organizations and peasant (farmer) farms;
- production of original, elite and reproductive seeds of agricultural crops, breeding of breeding young animals;
- effective self-management as an example of applying the results of organizational and scientific achievements;
- develops subsidiary production, industry, in particular for the processing of agricultural products [5].

The dynamics and structure of net income from the sale of products (goods, works, services) of the State Enterprise is represented in Table 1.

Table 1. Dynamics and structure of net income from the sale of products (goods, works, services) of the State Enterprise

| Product                     | Years           |               |                 |               |                 |               | In average for last 3 years |               |
|-----------------------------|-----------------|---------------|-----------------|---------------|-----------------|---------------|-----------------------------|---------------|
|                             | 2016            |               | 2017            |               | 2018            |               | Sum, thous. UAH             | Share,%       |
|                             | Sum, thous. UAH | Share,%       | Sum, thous. UAH | Share,%       | Sum, thous. UAH | Share,%       |                             |               |
| Wheat                       | 509.00          | 17.33         | 732.00          | 17.87         | 1234.00         | 26.19         | 825.00                      | 21.07         |
| Corn                        | 9.00            | 0.31          | 955.00          | 23.32         | 965.00          | 20.48         | 643.00                      | 16.42         |
| Buckwheat                   | 73.00           | 2.49          | 92.00           | 2.25          | 10.00           | 0.21          | 58.33                       | 1.49          |
| Legumes                     | 246.00          | 8.38          | 108.00          | 2.64          | 0.00            | 0.00          | 118.00                      | 3.01          |
| Soybean                     | 707.00          | 24.07         | 773.00          | 18.87         | 951.00          | 20.18         | 810.33                      | 20.70         |
| Sunflower seeds             | 1393.00         | 47.43         | 1436.00         | 35.06         | 1552.00         | 32.94         | 1460.33                     | 37.30         |
| <b>Crop production</b>      | <b>2937.00</b>  | <b>21.07</b>  | <b>4096.00</b>  | <b>24.51</b>  | <b>4712.00</b>  | <b>23.44</b>  | <b>3915.00</b>              | <b>23.14</b>  |
| Cattle                      | 2251.00         | 20.46         | 2175.00         | 17.24         | 2055.00         | 13.36         | 2160.33                     | 16.62         |
| Pigs                        | 3503.00         | 31.84         | 2263.00         | 17.94         | 3338.00         | 21.69         | 3034.67                     | 23.34         |
| Milk                        | 5247.00         | 47.70         | 8176.00         | 64.82         | 9994.00         | 64.95         | 7805.67                     | 60.04         |
| <b>Livestock production</b> | <b>11001.00</b> | <b>78.93</b>  | <b>12614.00</b> | <b>75.49</b>  | <b>15387.00</b> | <b>76.56</b>  | <b>13000.67</b>             | <b>76.86</b>  |
| <b>Total</b>                | <b>13938.00</b> | <b>100.00</b> | <b>16710.00</b> | <b>100.00</b> | <b>20099.00</b> | <b>100.00</b> | <b>16915.67</b>             | <b>100.00</b> |

It can be seen from the Table 1 that wheat, corn and other products have increased in the last three years, and the rest of the products have also shown a small rise. This proves that the management of enterprises and other aspects of outstanding performance. Wheat's share rose from 17.33 percent in 2016 to 26.19 percent in 2018, and the average in the last three years was 21.07 percent, with wheat products performing well as a whole. Milk's share rose from 47.70 percent in 2016 to 64.95 percent in 2018. Total production rose nearly 31% from 13938 in 2016 to 20099 in 2018, a testament to good management.

**1. Matrix of marketing mix.** McCarthy classified various marketing activities into marketing-mix tools of four broad kinds, which he called the four P's of marketing: product, price, place, and promotion.[6, p. 292]. The marketing mix of the State Enterprise is represented in Table 2.

Table 2. Marketing mix of the State Enterprise

| Product           | Price (UAH/center) | Place          | Promotion                   |
|-------------------|--------------------|----------------|-----------------------------|
| • Wheat           | • 537.67           | • Sumy         | • Strong supplying channels |
| • Corn            | • 357.74           | • Poltava      | • Free delivery             |
| • Buckwheat       | • 885.71           | • Kyiv         | • Special packing           |
| • Soybean         | • 886.02           | • Kharkiv      | • E-promotion               |
| • Sunflower seeds | • 817.01           | • Bila Tserkva |                             |
| • Cattle          | • 1818.30          |                |                             |
| • Pigs            | • 3576.13          |                |                             |
| • Milk            | • 747.27           |                |                             |

While analyzing the matrix of marketing mix it is important to build specific strategies for every element of this matrix.

As far as product strategy is concerned, it is a need to:

1. Breeding excellent varieties, controlling core quality.
2. Make full use of Ukraine's local fertile land, develop regional brand advantages, and actively introduce more advanced cultivation methods.
3. On the basis of the regional brand to expand the company's advantages of wheat and corn features.
4. Packaging innovation and subdivision, out of the quagmire.
5. Strictly control product quality and do green and high-quality products; optimize after-sales service to improve customer satisfaction.

As far as pricing strategies are concerned, the following should be done:

1. Expectations: to attract consumers with product leadership, to attract mid- and high-end markets through high-end products and excellent taste of quality, so as to gain recognition from major customer groups and enhance the brand visibility of wheat and corn. While ensuring the quality of the product, expand on the basis of maintaining the customer group, so as to obtain a good profit.
2. Consider the market and demand: high prices can reflect high-quality; high-end food crops are naturally much higher than the price of ordinary products on the market. The high income characteristics of the target customers determine that they attach more importance to the quality of the food and are not sensitive to the price.

The purchase for the purpose of giving gifts does not care about the price. Although the customer is not sensitive to the price, but the mentality of taking advantage is very common, this can be used to attract customers to farm leisure and picking, such as personally harvested products to give 20% discount to meet the customer's mentality of taking advantage of the advantage.

With the development of modern agriculture and modern agricultural circulation system in the world, the marketing channel mode of agricultural products in Ukraine has changed dramatically. That is why our enterprise should change the system of placing and presenting. They can choose:

1. Through the official website or corporate customer service direct marketing channels.
2. E-commerce channels.
3. Commercial Super Channel.
4. Expand major customer group purchase channels.

Grain is one of the products most in need of promotion, which is determined by its characteristics. Free samples testing to distribute to target consumers through offline stores, or invite guests to taste on the spot, to attract consumers' attention to products and brands. And affect the user's late purchase of the product. Send small samples, try to eat must be the appropriate practices of the product. You can also use the pre-sale mode. When crops are still growing in the fields, they can take the form of land-to-people. At the early stage of self-love planting, the product will be pre-sold, waiting for maturity to give a certain discount according to the market price to consumers, and even can invite contractors directly to the field to collect.

**2. Matrix of ABC-analysis.** Activity Based Classification, The full name should be ABC classified inventory control method. Also known as Pareto analysis or Barretto analysis. This rule identifies a few of the more controversial by ranking the same type of problem or item. Through long-term observations, Pareto found that 80 percent of Americans own only 20 percent of their wealth, while another 20 percent own 80 percent of the country's property, and many things follow this rule. So he applied the law to production. His main point is that by reasonably allocating time and power to a small fraction of the total, you will get better results. Of course, ignoring Class B and Class C is also dangerous. In Pareto's rule, they receive much less attention than Class A.

The accumulative frequency of class A factor was 0% and 80%, which was the main influencing factor. B factor, the cumulative frequency of 80% to 90%, is the secondary factor. C factor, the cumulative frequency of 90% to 100%, is a general influencing factor [2, p. 126].

The matrix of ABC-analysis of the State Enterprise is represented at the table 3.

From the above analysis, we can see that there is only one product in Class A, so we should focus on milk. Take positive attitude and measures to respond to market changes and needs. At the same time, cattle and pigs is also a product that cannot be ignored. They both belong to Class B products. Although not the main, but also can provide no small market profit. In the face of most class C products, enterprises can reduce the production and operation of the products by reducing the product line, so as to better serve class A products.

Table 3. The matrix of ABC-analysis of the State Enterprise

| Product         | Volume of sales, thous. UAH | Specific weight, % | Cumulative share, % | Group of priority |
|-----------------|-----------------------------|--------------------|---------------------|-------------------|
| Wheat           | 1234.00                     | 6.14               | 90.41               | C                 |
| Corn            | 965.00                      | 4.80               | 95.21               | C                 |
| Buckwheat       | 10.00                       | 0.06               | 100.00              | C                 |
| Soybean         | 951.00                      | 4.73               | 99.94               | C                 |
| Sunflower seeds | 1552.00                     | 7.72               | 84.27               | C                 |
| Cattle          | 2055.00                     | 10.22              | 76.55               | B                 |
| Pigs            | 3338.00                     | 16.61              | 66.33               | B                 |
| Milk            | 9994.00                     | 49.72              | 49.72               | A                 |
| Total           | 20099.00                    | 100.00             | -                   | -                 |

The graphic representation of matrix of ABC-analysis you can see in Figure 1.

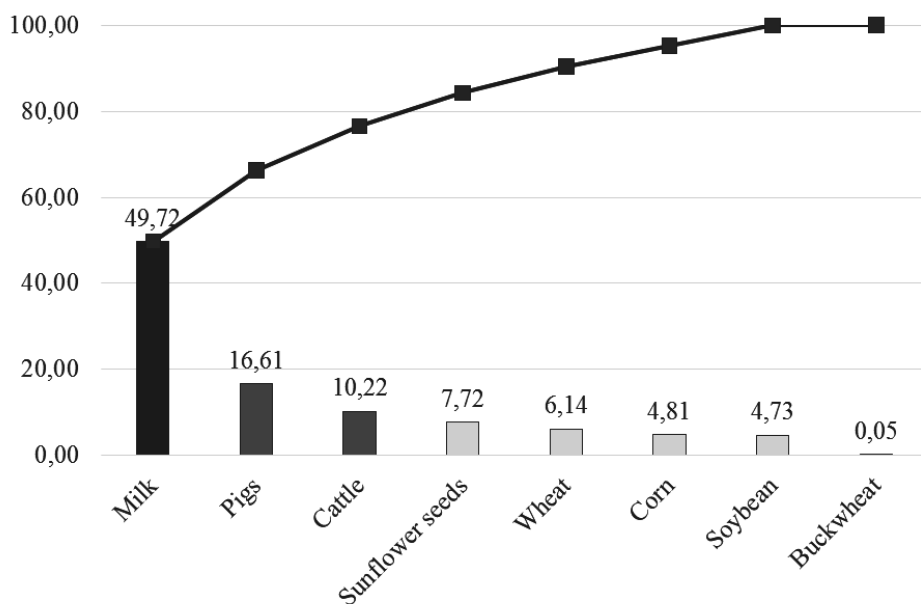


Figure 1. Pareto chart

**3. Matrix of PEST analysis.** PEST analysis is the analysis of macro environment, P is politics, E is economy, S is society, T is technology.

PEST analysis needs to master a large number of relevant research data, and has a deep understanding of the enterprises analyzed, otherwise, this analysis is very difficult to carry on. The main contents of the economy are economic development level, scale, growth rate, government revenue and expenditure, inflation rate and so on. There are political systems, government policies, national industrial policies, relevant laws and regulations, etc. There are population, values, moral standards and so on in society. There are breakthroughs in high and new technology, process technology and basic research in technology [3, p. 36].

Matrix of PEST analysis is presented in Table 4 and Table 5.

Table 4. The PEST matrix of the State Enterprise

| Factors                  | Opportunities   | Threats   |
|--------------------------|---|---|
| <b>Political / Legal</b> | 1) competition regulation;<br>2) government attitude;<br>3) employment regulation and protection  | 1) consumer protection;<br>2) international trade regulation  |
| <b>Economic</b>          | 1) economic growth;<br>2) government spending;<br>3) stage of the business cycle  | 1) monetary policy;<br>2) policy towards unemployment;<br>3) taxation;<br>4) exchange rates;<br>5) inflation;<br>6) economic “mood” |
| <b>Social</b>            | 1) income distribution;<br>2) demographics;<br>3) attitudes to work and leisure;<br>3) education;<br>4) fashions and fads;<br>5) health and welfare                           | 1) social mobility;<br>2) lifestyle changes;<br>3) living conditions  |
| <b>Technological</b>     | 1) government spending on research;<br>2) government and industry focus on technology;<br>3) new discoveries and development;<br>4) impact of changes in Intellect technology | 1) speed of technology transfer;<br>2) energy use and costs;<br>3) changes in material sciences                                     |

Table 5. Analysis of the significance of the factors

| Factors                        | Weight | Score | Weighted score |
|--------------------------------|--------|-------|----------------|
| <b>Threats</b>                 |        |       |                |
| Consumer protection            | 0.1    | 4     | 0.4            |
| International trade regulation | 0.15   | 3     | 0.45           |
| Monetary policy                | 0.25   | 5     | 1.25           |
| Policy towards unemployment    | 0.1    | 3     | 0.3            |
| Inflation                      | 0.15   | 5     | 0.75           |
| Economic “mood”                | 0.15   | 5     | 0.75           |
| Taxation                       | 0.15   | 3     | 0.3            |
| Total                          | 1      | -     | 4.2            |
| <b>Opportunities</b>           |        |       |                |
| Competition regulation         | 0.3    | 5     | 1.5            |
| Government attitude            | 0.1    | 3     | 0.3            |
| Employment law                 | 0.25   | 5     | 1.25           |
| Regulation and protection      | 0.15   | 4     | 0.6            |
| Economic growth                | 0.15   | 4     | 0.6            |
| Government spending            | 0.1    | 5     | 0.5            |
| Stage of the business cycle    | 0.01   | 3     | 0.03           |
| Demographics                   | 0.04   | 4     | 0.16           |
| Total                          | 1      | -     | 4.94           |

PEST analysis of agricultural products industry refers to the analysis of political, economic, social and technological factors to determine the influence of these factors on the strategic management process of agricultural products industry development in such ways:

1. From the political and legal point of view, the change of government departments has also brought about new changes in the agricultural industry.
2. From the economic point of view, market competition is increasingly fierce, and transnational corporations have become industry leaders.
3. From the social point of view, green agricultural products market ups and downs, but the momentum of development is good 4.5%.
4. From a technical point of view, new changes have taken place in the R & D, production and marketing of the agricultural industry.

**4. Matrix of SWOT analysis.** SWOT analysis, based on the internal and external competitive environment and the situation analysis under competitive conditions, is to enumerate the main internal strengths, weaknesses and opportunities and threats that are closely related to the subject of the study through investigation. And according to the matrix form arrangement, then with the systematic analysis thought, the various factors match each other to analyze, from which obtains a series of corresponding conclusion, and the conclusion usually has the certain decision-making character. Using this method, we can make a comprehensive, systematic and accurate study of the situation in which the research object is located, so as to draw up corresponding development strategies, plans and countermeasures according to the results of the research [1, p. 147].

The matrix of SWOT analysis is presented in Table 6 and Table 7.

Table 6. The SWOT matrix for the State Enterprise

| <b>Strengths</b>                     |    | <b>Opportunities</b>             |    |
|--------------------------------------|----|----------------------------------|----|
| 1. State enterprise                  | +5 | 1. Not very big accountment      | -3 |
| 2. High quality                      | +4 | 2. Poor technology               | -5 |
| 3. Good price                        | +4 | 3. Poor management               | -4 |
| 4. Not very far from Sumy            | +4 | 4. Poor salary                   | -3 |
| <i>Total: +17</i>                    |    | <i>Total: +15</i>                |    |
| <b>Weaknesses</b>                    |    | <b>Threats</b>                   |    |
| 1. To go to the international market | +4 | 1. High taxes                    | -5 |
| 2. Government support                | +4 | 2. High cost                     | -5 |
| 3. Investment                        | +4 | 3. Exchange rate                 | -3 |
| 4. Inurement of new technology       | +4 | 4. High level of the competition | -4 |
| <i>Total: -16</i>                    |    | <i>Total: -17</i>                |    |

After having performed the SWOT analysis, the company will use these findings to define the main issues that must be addressed in the strategic marketing plan. Decisions of these issues will lead to the subsequent setting of objectives, strategies and tactics.

**5. Matrix of BCG.** Boston matrix is also called market growth rate-relative market share matrix, Boston consulting group method, four quadrant analysis method, product series structure management method and so on.

Table 7. Enhanced SWOT analysis

| <b>Strengths-Opportunities</b>  | <b>Strengths-Threats</b>   |
|---|--|
| 1. State enterprise can go to international<br>2. Good quality and price make good investment<br>3. Good quality require                                  | 1. State enterprise done have light taxes<br>2. High quality and good price can obtain competitiveness<br>3. Not very far away can save cost             |
| <b>Weaknesses-Opportunities</b>   | <b>Weaknesses-Threats</b>  |
| 1. Not very big associated require government<br>2. Poor salary and management need government<br>3. Poor technology require the new technology invention | 1. High taxes make salary lower<br>2. The poor technology and management make high cost<br>3. Not very big assortment make high level of the competition |

Boston Matrix was pioneered by Boston Consulting Group, a large business consulting firm in the United States, as a way to plan an enterprise's portfolio. The key to the problem is to solve the problem of how to adapt the product variety and the structure of the enterprise to the change of the market demand. Only in this way can the production of the enterprise be meaningful [3, p. 69].

At the article the authors use the data from table 8 to build the matrix of BCG which is represented in Figure 2.

Table 8. Data for the BCG matrix

| <b>Product</b>  | <b>Volume of sales (million UAH)</b> | <b>Specific Weight, %</b> | <b>Market Share of the Strongest Competitor, %</b> | <b>Market Share of Enterprise, %</b> | <b>Relative Position (market share), %</b> |
|-----------------|--------------------------------------|---------------------------|--|--------------------------------------|--|
| Wheat           | 1234.00                              | 6.14                      | 79.20  | 75.20                                | 94.95                                      |
| Corn            | 965.00                               | 4.80                      | 72.40  | 45.41                                | 62.72                                      |
| Buckwheat       | 10.00                                | 0.05                      | 10.50  | 1.70                                 | 16.19                                      |
| Soybean         | 951.00                               | 4.73                      | 70.70  | 69.56                                | 98.39                                      |
| Sunflower seeds | 1552.00                              | 7.72                      | 72.00  | 67.65                                | 93.96                                      |
| Cattle          | 2055.00                              | 10.22                     | 92.30  | 89.30                                | 97.40                                      |
| Pigs            | 3338.00                              | 16.61                     | 98.00  | 97.60                                | 99.59                                      |
| Milk            | 9994.00                              | 49.72                     | 95.00  | 92.26                                | 97.12                                      |
| <b>Total</b>    | <b>20099.00</b>                      | <b>100.00</b>             | -  | -                                    | -  |

Through the interaction of the above two factors, there will be four kinds of product types with different properties, forming different product development prospects:

- 1) the product group with “double high” sales growth rate and market share (star products);
- 2) the product group with “double low” sales growth rate and market share (lean dog products);
- 3) the product group with high sales growth rate and low market share (question mark products);



4) low sales growth rate, high market share of the product group (cash cow products).

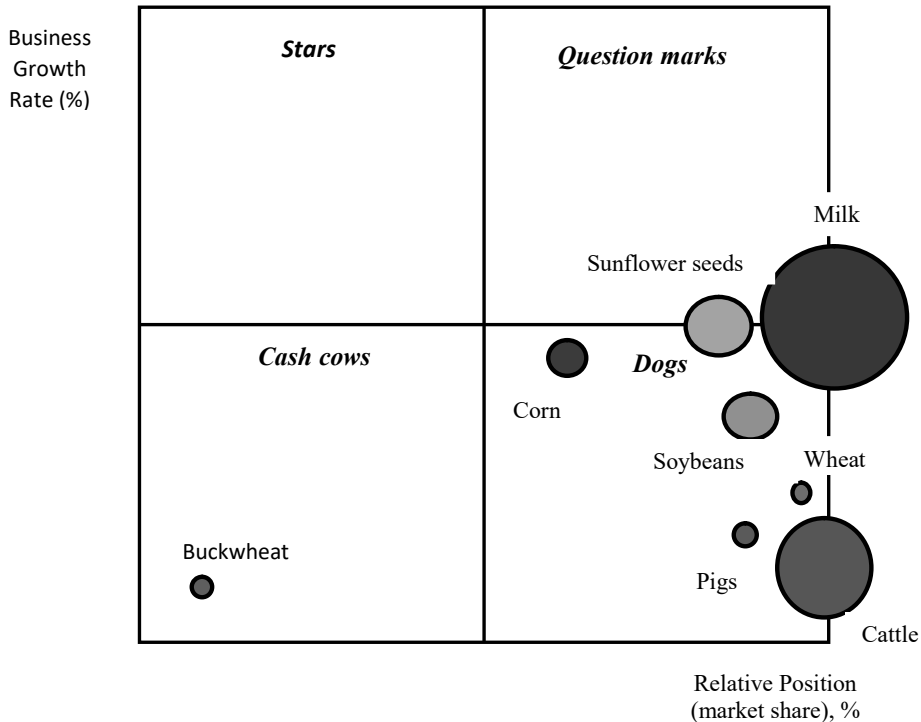


Figure 2. BCG Matrix

When choosing ways of matrix analysis it is important to notice the main steps:

- 1) simultaneous use of several methods of matrix strategic analysis to ensure versatile monitoring;
- 2) organization of regular monitoring of the strategic objectives achievement using the methods of matrix assessment;
- 3) strategic plan of the agricultural enterprise should be prepared for 5 years based on the phased algorithm with a systematic review of the objectives relevance;
- 4) organization (systematically) of comprehensive strategic analysis at the micro-, meso- and macro- level.

## CONCLUSION

Matrix methods play a very important role in marketing. The matrix method is very convenient – this explains its prevalence. However, the only use of matrix methods is not sufficient, since matrices allow you to explore marketing from separate parties and do not show a complete picture, but in combination with other methods, the matrix approach allows you to clearly see the patterns in the processes occurring in the enterprise and make the right conclusions.

## REFERENCE

1. Kindratska H. I. (2006). *Strategic management*. Kyiv: Znannia, 366 p.
2. Kudenko N.V. (2012). *Strategic marketing: manual*. Kyiv: KNEU, 523 p.
3. Mohylova A. Y. (2011). *Strategic marketing: The manual*. Dnipropetrovsk: Makovestkiy, 308 p.
4. Moutinho L., Brownlie D. (1994). The stratlogic approach to the analysis of competitive position, *Marketing Intelligence and Planning*, 12(4), pp. 15-21.
5. Official site of the SS of the ISG SE of the North-East of NAAS of Ukraine [Online]. – Available at: <http://dpdg-sad.com.ua> (accessed 11 September 2019)
6. Razina O. (2012). Marketing strategy as one of the important functional strategies. *Collection of Scientific Works of Podilsk State Agrarian Technical University*. Vol. 16, No. 3, pp. 291-294.