Development strategy of agricultural enterprises in the production of high-tech products

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Abstract. The aim of the study is to develop an approach to increasing the profitability of agricultural enterprises. To achieve this goal, the concept of product life cycle and the possibility of its transformation into a more complex model, which provides for the release of several generations of high-tech products, is used. In this regard, the article deals with the issues of ensuring the competitiveness of agricultural enterprises under the conditions of rapid development of technologies, including information technologies. It is shown that agricultural enterprises producing high-tech products have significantly lower material costs and higher costs for research and development work, as well as significantly higher profits than traditional enterprises of the agricultural industry. Due to the fact that the release of innovative high-tech products is associated with high risks, the management of high-tech enterprises need to plan the life cycles of their products. An important resource for supporting the competitiveness of products is the scientific information used to develop new types of products and their production technologies. This approach allows for the timely introduction of new types of products with higher competitiveness in the market. This allows achieving sustainable growth of product competitiveness and growth of income of agricultural enterprises. Creating a software model for implementing this algorithm will create the possibility of automatically planning new types of products and increasing profitability. This will help increase the efficiency of the enterprises of the Russian agricultural sector.

1. Introduction

The high speed of the transfer and application of scientific, financial and industrial information, as well as the introduction of new technologies and the release of previously unknown types of products significantly affect the work of agricultural enterprises using high technologies. This paper is devoted to considering the most obvious relationship between these issues, and their in-depth study and practical application of the research results will be the subject of a separate development.

The relevance of the study is due to:
- activation of acceleration, transfer and use of scientific and other information in demand in various sectors of the economy;
- the rapid development of companies, accelerating the change of technology of products of various generations, which is rapidly reflected in the price level in all sectors of the economy [1];
- the need for early formation of a pricing strategy for new types of products.

The novelty of the topic lies in the lack of developed mechanisms for pricing products of various generations, which are produced using new technologies in the agricultural sector.
The purpose of the study is to study the features of the application of scientific information, high technology and labor resources to develop an enterprise pricing strategy.

2. Materials and Methods
Scientific information is a production resource that increases from use with a pronounced synergistic effect. High technologies have so quickly rushed in and continue to change our lives, that we do not have time to notice. They allow creating most of the products of mass demand, and such developments have already been implemented in almost all areas of the economy. They are used in agriculture, industry and medicine, in the field of transport, law, trade and other industries. At the same time, the demand for scientific and high-tech products in the world is constantly growing. [2]

It is important to note that firms engaged in the production of high-tech products are required to invest in research and development. This provides the opportunity to produce goods and services with characteristics that will provide growing demand. This circumstance is associated with the improvement and development of existing industries, as well as with the release of new types of competitive products.

A quantitative indicator for measuring scientific and informational resources is research intensity calculated as the ratio of the cost of research and development to sales volume:

\[ C_{\text{res.in}} = \frac{E_{\text{rd}}}{SV} \]

where: \( C_{\text{res.in}} \) - research intensity of products, rel. units; \( E_{\text{rd}} \) - R&D expenses of the company (enterprise), rub.; \( SV \) - sales volume of the company, rub.

Sustainable success is achieved by technologies and products with a high level research intensity, although such investments are always fraught with risk. Nevertheless, the R&D expenses in the development of products with new consumer properties often can simultaneously and significantly reduce the share of material resources in the cost and receive a higher income.

High-tech products are most often called products created using scientific and information resources. However, such products may also be the technologies of their production. And since the technology and equipment that is necessary for their implementation is a method and means of producing high-tech products, the dominant part of scientific research is connected with the development of high technologies.

The pricing and technological strategy of the company in the production of high-tech products is associated with the well-known concept of the product life cycle. [3]

The product life cycle concept is one of the most controversial pricing concepts. However, its essence is as follows. [4]

Any product (with the exception of that which is necessary for people to live constantly, and is in constant demand) goes through several stages of life. There are stages of development and entry into the market, growth, maturity, decay and withdrawal from the market. Thus, product has its own life cycle, which has its own total duration, various durations of the individual stages within the cycle, and features of its cycle development. For each stage of the product life cycle at each stage, new consumer segments with different price sensitivity appear on the market, which is taken into account in pricing practice.

So, at the stage of development and entry of goods into the market, price does not play a significant role. However, if for consumers the price is an indicator of a certain quality, and at this stage of the product’s existence they still cannot compare it with alternative products, then their behavior is relatively insensitive to the price of the innovative product. Therefore, even before the product enters the market, manufacturers are trying to present at least in the form of advertising information about the new consumer properties of the product. Since information about the quality of the product is most often distributed through potential buyers, the future long-term demand for the product largely depends on the number of initial buyers and their positive reviews about the product.
On the other hand, the price at this stage should primarily compensate for the initial costs of research, development of new production and the promotion of goods on the market. Therefore, prices for first-to-market products are high.

The stage of product development is undoubtedly the most difficult, since the duration of the product’s life cycle, its cost to the manufacturer, and demand is determined for a long time depending on the content of the materials, technologies, and information used.

At the stage of “growth”, the product encounters its competitors for the first time. This creates a great opportunity for the consumer to choose. At the same time, consumer awareness of the product increases, which increases its sensitivity to price. The price at this stage is high, but lower than at the previous stage. It must exactly match the quality and consumer value that the buyer expects.

At the growth stage, the company usually receives high profits, part of which is directed to the development of a new product.

A feature of the stage of “maturity” is the appearance on the market of the most price-sensitive consumer group. The market situation is as follows: 1) the market is saturated with the product; 2) competition is weakening due to the elimination of companies that have not survived it; 3) part of the companies moves to the creation and sale of new products.

The price level at this stage is already lower.

Often, as a separate stage of the life cycle, the stage of “saturation” is singled out as part of the stage of “maturity”. During this period, the market is saturated, demand requires new products. So that competitors do not seize the initiative, it is necessary to introduce new products with a high level of competitiveness to the market. The nature of advertising is also changing.

At this stage, the market is expanding, firstly, by attracting new consumers, and secondly, due to the geographical expansion of the market. It is at this stage that a certain general market price appears, to which both producers and consumers are striving to a greater or lesser extent. Often it is called equilibrium. [5]

The maturity stage is followed by the stage of decay and withdrawal of goods from the market, which ends the product’s life cycle. It is characterized by the lowest volumes of product sales and a low price level.

It is very important not to impede this stage, not trying to sell the product at low prices for as long as possible, but to withdraw it from the market in time, concentrating the main efforts on the production and sale of a new product, the development stage of which should begin when the first generation product is still at the stage of growth and maturity.

Of great importance in the formation of the technological and assortment development strategy of agricultural enterprises is the choice of priorities in determining target groups of consumers, as well as the choice of pricing policy.

The formation of the pricing policy of an enterprise is directly related to setting goals that it wants to achieve through the sale of groups of specific products. Different enterprises may have one goal or several goals, but, as a rule, this is a combination of several. Among them, the main ones can be distinguished:

1. Further existence of the company. In this case, the enterprise may have excess capacity, intense competition in the market is observed, demand and preferences of consumers have changed. In such cases, in order to maintain production or simply release production, to eliminate stocks, often lower prices. At the same time, profit simply loses its significance. As long as the enterprise covers at least variable and part of fixed costs, production can continue for some time. However, the question of the company’s survival is already seen as a short-term goal.

2. Short-term profit maximization. Many companies want to set prices on their products or a range of products that would maximize profits over a short period of time. To achieve this goal, it is necessary to determine the preliminary demand or preliminary costs for each type of product. From several options for the ratio of net costs or prices, one is selected that can bring maximum profit. It is assumed that expectations of demand and costs are known quite accurately, although this is very rare in reality. This goal is often set by enterprises operating in a poorly formed market for a certain type of goods.
This method does not contribute to the civilization of the market, since it is oriented in advance to the increased demand of any goods and low consumer awareness of the consumer properties of such goods.

3. Short-term maximization of turnover. Prices that stimulate the maximization of turnover are chosen when the goods are produced by several companies. In this case, it is difficult to determine the share of each company in total costs, so it is considered sufficient only to accurately determine demand. Short-term maximization of turnover may in the long term ensure equity participation in the market, which usually leads to a steady increase in profit.

4. The maximum increase in sales. Companies using this goal believe that increasing sales will lead to lower costs per unit of output and, on its basis, to increase profits. Assuming that the market is very sensitive to the price level, the company reduces the price of its products to the minimum acceptable level. This approach is called the offensive pricing policy on the market. Such a policy can be successful only if a number of conditions are met:
   - if the market sensitivity to prices is very high (i.e. a decrease in prices necessarily leads to an increase in demand);
   - if it is possible to reduce costs by increasing the volume of production;
   - if the market does not offer a significant number of substitute products;
   - if the increase in production does not face the problem of trend and seasonality.

5. The policy of “skimming cream” from the market by setting high prices. It can take place when a company produces new products and sets prices for them that significantly exceed production costs and normal profit. However, this simplicity is deceptive: a significant part of the profit is forced to go into new research and development (R&D) projects to create the next new product, or simply the next generation product. These costs are included in the cost of new products, so the profit margin is actually not high. However, enterprises receive certain advantages: working in the conditions of creating high-tech products, you can always be the winner before companies that do not invest in research and development. This happens because, due to the outstripping novelty of the product, production is reprofiled, new goods are created, and new goods markets are developed by these companies.

For agricultural enterprises associated with the seasonal nature of the work, the choice of short-term sales maximization policy is quite often. However, other types of pricing policies can be applied quite successfully.

Along with the choice of pricing policy, it is necessary to implement a certain pricing strategy. This allows optimizing the volume of sales, the level of production costs and prices set for different periods of the life cycle. In a mixed and market economy, the pricing strategy comes down to choosing the methods that enterprises use when setting free prices for specific types of products.

Pricing strategy is a set of methods that enterprises use when setting free prices for specific types of products. It should be noted that in the process of selling products with a certain life cycle, along with the choice of pricing policy, it is necessary to implement a certain pricing strategy. This allows optimizing the volume of sales, the level of production costs and prices set for different periods of the life cycle. At the same time, companies can use the following main types of pricing strategies:

1) High price strategies are applicable:
   - to new products first appearing on the market that have no analogues, i.e. to goods that are at the initial stage of the life cycle;
   - for goods oriented to wealthy customers who are interested in quality, uniqueness of the goods, i.e. to that part of the market where demand does not depend on the dynamics of the price level;
   - to new products for which the company has no prospects and long-term mass demand.

2) The average price strategy can be used at all stages of the life cycle, except for decay or recession, and is most typical for most companies that see profit as a long-term prospect. Many companies rightly consider such a strategy to be optimal, since it eliminates the so-called “war” of prices, does not lead to intense competition, and makes it possible to receive normal returns on invested capital for a sufficiently long time.
3) The strategy of low prices can be applied at any stage of the product life cycle. It is mostly in demand in the following cases:
- with the aim of penetrating the market, increasing the market share of their goods;
- in order to increase the load of excess production capacity;
- to avoid bankruptcy.
4) The target price strategy is most often used by large corporations that produce many types of products. It is difficult for them to keep track of the dynamics of prices for each type of product, so they set for themselves a minimum income limit for a certain period. In this case, the goal is to constantly obtain a certain profit, regardless of changes in the level of prices and sales.
5) The purpose of the strategy of preferential prices is to increase sales. It is used at the end of the product life cycle and manifests itself in the application of various discounts.
6) The strategy of “related pricing”, the choice of which is guided by the sum of the price of the goods and the costs of its operation.
7) The strategy of following the leader is guided by the price level of leading companies in the market or in a particular sector of the market, and strict compliance with any cost limit is not expected.

However, with the intensive use of scientific information and the development of a strategy for the development of agricultural enterprises for a long period, the application of disparate strategies in each section of the product life is inappropriate. This is due to the fact that the enterprise is often obliged to change production technologies and types of products. In these conditions, it is necessary to develop an approach to the technological and pricing strategy when releasing several generations of high-tech products.

Each company is obliged to ensure that it can make a profit in the future: for the realization of high-demand products and for generating income, work is needed to create it, and it must begin long before the decay in the product life cycle [6]. And if the product life cycle (and the size of income) allows saving money to start a new production, then this must be done in the first three stages.

Thus, the most important task of agricultural companies that produce several generations of high-tech products is the planning of types, their consumer properties and life cycle. [7] If we do not solve this problem constantly, the organization will invariably face periods of decay in revenue and a decrease in demand. The task of life-cycle planning is especially relevant for companies involved in agricultural services, information, new technologies and other promising areas.

In an era of accelerated product change in all high technology sectors of the economy, the life cycle of each type of product is accelerated and shortened. Each company has the opportunity, in anticipating demand, to produce products with consumer properties expected by the market. [8] Due to this, it becomes possible to establish a price for new products, which will allow receiving high income. The scheme of the product life cycle with the release of several generations of high-tech products becomes a chain of interconnected, spaced in time life cycles of various types of products. However, the presence of several types of new products (analogues or more advanced) on the market obliges us to build a company policy regarding:
- forecasting demand for products with certain consumer characteristics;
- assessment of technologies for its production and possible level of costs;
- the need to develop new technologies, taking into account their cost, the ability to reduce the cost of a unit of production, as well as increase sales;
- investments of part of the income received from the sale of products of previous generations in these areas.

The life cycle of each type of product includes all stages inherent in it - development and entry into the market, growth, maturity, decay and withdrawal from the market. However, it is important to note the following: at the most significant stages in terms of profitability, the company is obliged to direct part of the profit (income) to the development and production of a new type of product (in some cases, two or more types). These are stages of growth and maturity. This approach allows creating in advance and at the right time producing and starting the sale of competitive and highly profitable products with fundamentally new consumer properties.
3. Results
Thus, there is a periodic change in the types of products developed and sold, each type of which is highly competitive and can bring additional profit for the development of new types of products. As before, the forecasting of the moments when one or several types of products must be withdrawn from the market and the new ones sent for sale remains important. These stages are quite significant, since a competitive war between types of own products leads to lower sales volumes, less profit and costs that can be avoided through proper marketing and planning.

However, financial resources allocated from profit are not enough: the scientific information used in the development of new generations of products and the effectiveness of its use become the determining factor for success. [9] The problem of rational use of financial resources is relevant not only for industrial enterprises of the agricultural sector, but also for institutions of higher professional education, forming a new generation of specialists who will soon be engaged in the field of high-tech industries. So, at the Moscow State University of Technology and Management named after K.G. Razumovsky, one of the research areas is associated with the activation of students' creative abilities by stimulating them with an increased academic scholarship accrued for achieving high results in scientific student research [10]. The achievements of students in scientific activities have a positive effect on the image of the university and contribute to its occupation of higher position in university ratings. In turn, a worthy place in authoritative ratings allows the university to be more competitive in the educational services market [11]. Thus, the information (in the case under consideration - university ranking data) determines the price of educational services. In the production sphere, it is information that forms not only the consumer properties of new products, but the demand for it, costs, sales, and other performance indicators. Therefore, this category is the most important factor in the successful construction of the pricing strategy of a company that produces several generations of high-tech products.

4. Discussion
The above mentioned allow drawing the following conclusion. The development of a comprehensive strategy for an agricultural enterprise that produces several generations of high-tech products should include monitoring of scientific information, its development and intensive use. This can be done to achieve many goals, such as forecasting consumer properties and calculating the competitiveness of products. Such an approach will allow achieving sustainable growth in the competitiveness of products and growth in the income of agricultural enterprises.

It should be noted that the most important factor of the work effectiveness is also the professional training of specialists who are able to accurately and in advance plan and determine the needs of customers, create a new type of product and correctly set a price for it.

5. Conclusion
The study of prices requires a detailed examination of the process of its formation. This is due to the rapid change in technology for the production of diverse products and the relationship of this process with the price level in all sectors of the national economy. In this regard, the concept of the product life cycle was studied in detail. Further, in the context of the continuous release of new competitive products with the goal of constant income generation, this concept was transformed into a pricing strategy.

This pricing strategy, which can be implemented with the release of several generations of high-tech products, requires detailed refinement, but it can already be applied in practice. It is relevant for companies with the rapid development and the release of new types of products of various generations, in which the consumer properties of products, their types and the level of costs and prices must be formed in advance.

The formation of this scientific idea was the impetus for the start of new research by the authors in the field of pricing and technological strategies of enterprises operating in the agricultural sector.

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