



## **The Mechanisms of Formation of Demand in the High-Tech Products Market**

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### **ABSTRACT**

Currently, high technologies are a key factor and catalyst for technological modernization of the Russian economy. Effective management and development of high technologies market is the key to the transition from commodity to high-tech development. The article considers the factors influencing the dynamics of the demand for high technologies in the light of scientific and technical progress. The indicators of competitiveness of high technologies on Russian and foreign markets is studied, developed approaches to generate demand for high technologies and conceptual model of sales management of innovation technology products. Scorecard to build a matrix of decision making in marketing is justified and generated sales management mechanisms of high technologies on the market high-tech products and presents practical advice on creating demand for high technologies in the B2B market.

**Keywords:** High Technology, High-Tech Product, Marketing of High Technologies, Innovation, Consumer Behavior, Formation of Demand, Economic Growth

**JEL Classifications:** O, O3, Q55

### **1. INTRODUCTION**

For the successful functioning of innovative-technological business needs a well-developed infrastructure, investments, security of intellectual and scientific-technical potential and the presence of development institutions.

The competitiveness of the Russian high technology depends on the level of production costs (Derunova and Semenov, 2013). However, in the absence of consumer demand, the decrease or increase in the price level will not lead to market success (Carlin et al., 2011). The classic model of supply and demand demonstrates the contradictory interests of the producer and the buyer: The demand for products with higher price decreases and supply increases. Competitive advantages of the products depend on the quality factor of consumer preferences, cost and level of service. Aghion and Howitt reported that an important factor in ensuring competitive advantage of high-tech products and innovation technology refers to the time spent on their implementation from the beginning of the execution of R&D to manufacturing prototypes (Aghion and Howitt, 1998). Gamayunov et al., Kable

considered the separate issues of innovative activity (Gamayunov et al., 2014; Kable, 2011).

According to great variety of terms, competitive advantages of high-tech innovative products seen in the comparison of its counterparts from other manufacturers (Chelnokova and Gritsak, 2013; Chvetkov, 2011; Demin, 2011; Derunova et al., 2014; Kuzyk and Yakovets, 2005; Moreck and Yeung, 2000; Polterovich and Tonis, 2003). In case of stable properties that distinguish the product from its competitors competitiveness will be confirmed and in the presence of consumer choice among products analogues will be implemented (Arnett et al., 2003). Thus, the competitive advantage of high-tech innovative products and high technologies consist of a number of private technical, economic, quality parameters, the value of total consumption affects the market mechanism of supply and demand.

### **2. METHODOLOGY**

On the basis of the analysis of dependence of quality parameters of high-tech innovative products and technology from consumer

preferences, the level of novelty and other characteristics should follow to the concept of modelling the competitive advantages of specific products in selected product market on the basis of the following principles:

- The application of quantitative methods of evaluation;
- Using a well-known scientific methods and indicators for measuring competitiveness;
- Relative competitiveness.

Practice of this mechanism allows to minimize the uncertainty of the external environment in terms of competitiveness. By modelling the competitive advantage and determine market share, we can:

- Forecast potential sales volumes and revenues;
- To take decisions on accelerating the development process due to the simultaneous production of new vehicles for mass production at an unfinished stage of development;
- To develop proposals for inclusion in the plan of commodity production item, a sample of new technology for maximum competitive advantage.

The market for high-tech innovative products can be presented as clear, however, dynamically developing and constantly improving the system of economic, financial, exchange-trading and legal relations between producers of this product and its consumers, designed on the principles of competitiveness and competition to ensure a balanced supply and demand on it by creating and all-round development of the innovation intermediary sector and the establishment of special pricing on high-tech products and implementation and consulting services, taxation, financing and crediting of the enterprises of science and innovation sphere, as well as create specialized market structures.

Accordingly, the interaction of enterprises and organizations in the implementation of high-tech innovative products is a complex mechanism that operates on a number of principles and approaches. Currently none of the existing approaches to managing the implementation of high-tech innovative products does not take into account the factors influencing these processes.

Solution the development of a methodological framework and mechanism for the formation of a stable demand for high-tech innovative products based on the study of consumer behaviour will create conditions to stimulate innovation.

Mainly, the application of the principles of system analysis provides an opportunity to identify new concepts in the study of consumer behaviour (Derunova and Semenov, 2013; Kostina, 2013; Kostina and Moses, 2010; Naumov, 2009). In many studies there is used the notion of “behaviour” in those cases when an unknown pattern of transitions of the system from one state to another (Asemoglu et al., 2002; Baker, 2009; Bikchantaeva and Bikchantaeva, 2005).

Proceeding from the above, the study of the basic beliefs and principles of a scientific theory of systems allow you to make qualitative systematic studies of consumer behaviour (Figure 1).

Modeling pricing repelled from assumptions about the variety of factors that affect the final cost of high-tech products. These factors include:

- Psychology of consumers acting on cost;
- Pricing of companies;
- The use of natural resources;
- Consideration of geography and transportation costs;
- Range of products;
- Prestige products, etc.

Detailing these factors, the use of them as endogenous variables, gives the opportunity to build differentiated for each market and each product model.

Pricing mechanism plays a major role in the market economy. Thus, the process of market pricing of high-tech innovative products is controlled by supply and demand, which, under the influence of equalizing competition, gives rise to the equilibrium market prices (Hofstede et al., 1998; Soloviev, 2006; Sondergaard, 2005). These prices stimulate growth as the deficit offers products and allow rid of excess holding offer relevant products.

For example, “spider” models assume that the demand for high-tech products in direct proportion to the cost, though the demand and cost are considered at specified time intervals. Offer is due to the cost of the previous period. Today distinguish analytical and simulation version of “spider” model (Smith et al., 2006).

Analytical model assumes that the market is a unique production, supply and demand which is characterized by the values of aggregate demand and aggregate supply (Plassmann et al., 2010; Tretyak and Sloev, 2013; Krajbich et al., 2010).

Simulation (or scholastic) model involves consideration of the following models. These are:

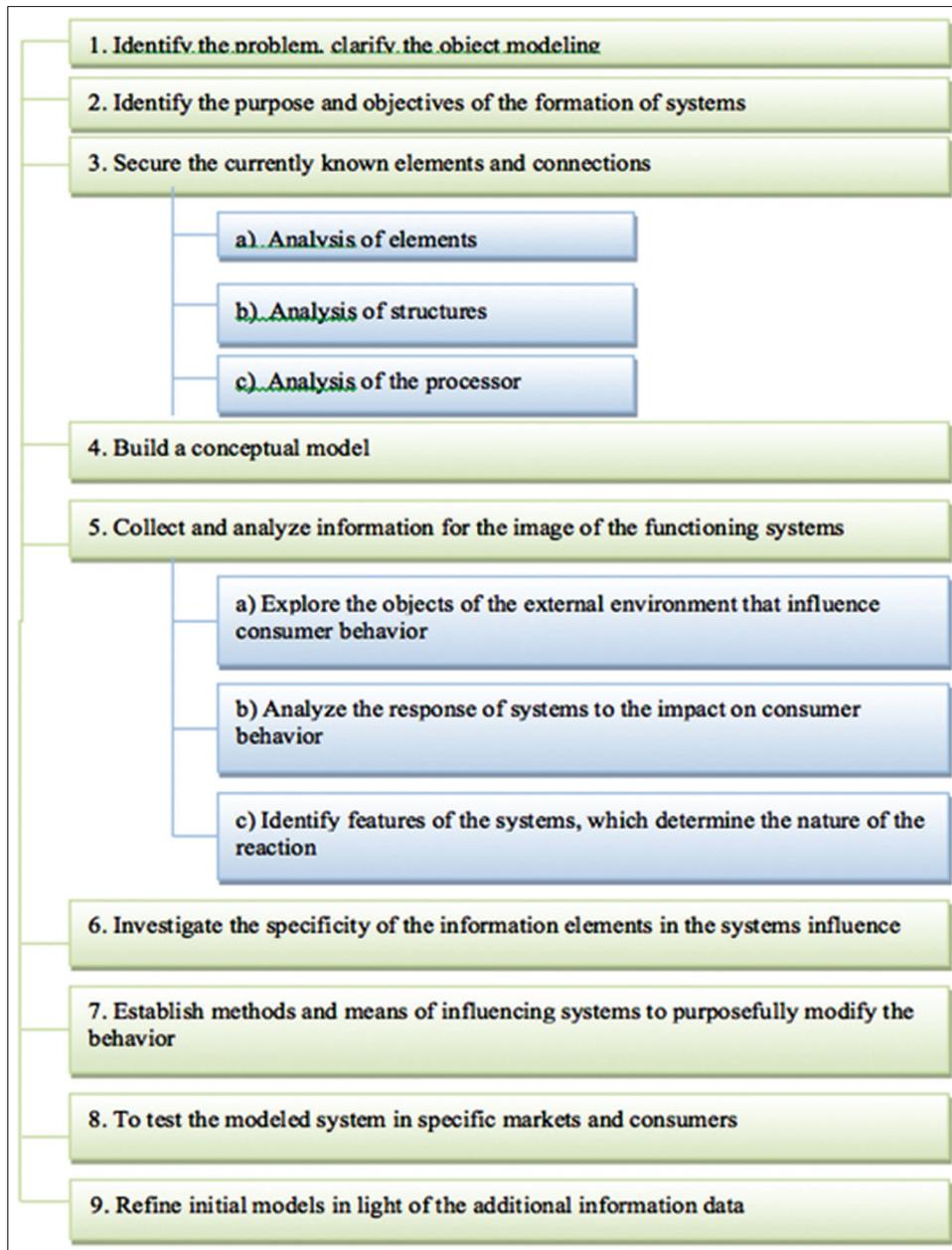
- Probabilistic model;
- A model of learning.

Probabilistic model includes three random variables. Each of the three units has its own set of distribution laws, zero expectations and given variance.

The first affects the demand (for example, sudden fluctuations in income and preferences), and the second affects the proposal (for agricultural products such accident can be a change in weather conditions, changes in technology and the efficiency of production processes) and the third value determines the conditions of local equilibrium of the market, and also establishes accuracy of this equilibrium (Nickell et al., 1997).

The model takes into account all learning gained experience in the preceding period, i.e. all changes in the cost of production. In this case, pricing modeling allows predicting the cost of different periods of time, thereby establishing pricing policy of the company.

Use of standard marketing strategies for high-tech products has serious limitations. Blackwell et al. described that these limitations are due to the fact that the product has a specific purpose and

**Figure 1:** Scheme qualitative systematic study of consumer behavior

extremely high level of risk associated with its purchase (Blackwell et al., 2007). All this affects the marketing tool and makes a number of characteristics that are associated with implementing marketing strategies such products. Consider the basic conditions of formation of the marketing strategy of selling high-tech products.

The first condition: The importance of individual work is every potential consumer high-tech products (usually the number of consumers of high-tech products, is limited).

The second condition: Adequate risk to consumers when making purchases of high-tech products. Success depends on the marketing policies of perceived consumer risk.

Major components of this condition:

- Political risks;
- Functional risks;

- Financial risks;
- Risks losing time;
- Psychological risks.

Of these risks depends on consumer's decision to change, postpone or reject the package. The stronger the risks, the longer decisions about purchasing high-tech products.

The third condition: In preparing the contract for the supply of high-tech products requires the participation of a wide range of specialists (we are talking about extensive, multi-stage negotiations).

The fourth condition: Should take into account the emotional components of marketing high-tech products. However, this condition does not have a strong impact on the managers who make the decisions.

The fifth condition: Program marketing high-tech products, usually implemented at the level of specific products, a single company, as well as business intermediaries (Sonn et al., 1998).

The sixth condition: Marketing policy of high-tech products, perhaps, could be a means of preventing and mitigating the effects of economic crises (marketing directly associated with a specific phase of the economy, but its potential impact is not significant as the economic nature is determined by other, more powerful factors) (Peshkov, 2008; Tonis, 2003).

### 3. DATA

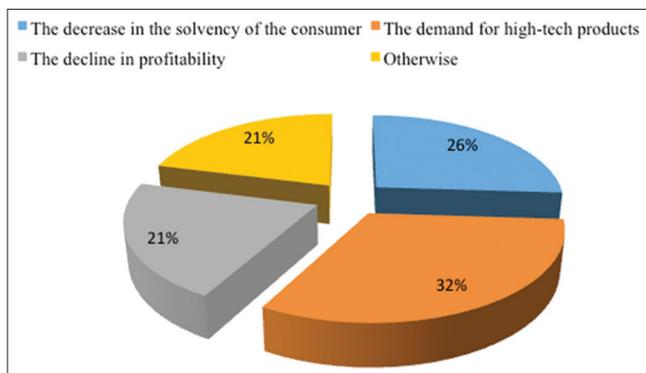
A study of problems faced by the companies that sell high-tech products, detects insufficient attention to marketing issues, issues of competitiveness and competitive advantages. Scientific and technological potential is realized only when the condition for the formation of marketing mechanisms, which allow not only to create high-tech products, but also to promote it on the market (Figure 2).

Results of the research of indicators of competitiveness of high-tech products, which have been obtained in accordance with these approaches should be the foundation of the process of its growth through marketing innovations.

The formation mechanisms to ensure a competitive advantage of high-tech products, must be based on the use of the entire arsenal of marketing innovations. All the latest theoretical approaches and innovative marketing principles should be used to create and form such a mechanism. The results of the study shows the necessity of complex innovative approaches to high-tech business by restructuring based on the latest marketing concepts.

The study of the role and purpose of marketing in the strategy of selling high-tech products showed that today the market of high-tech products, in spite of great scientific potential, developed very poorly. The reason is the lack of competitiveness, product promotion on the market of high technologies. In this case, the basis for the formation of such mechanisms may be the concept of innovative marketing, which is based on modern information technology and the latest marketing communications.

Figure 2: The main problems for companies selling high-tech products



The calculation of competitiveness of high-tech products made by major manufacturer parameters. It does not always take into account the interests of the consumer.

Integral indicators of the competitiveness of high-tech products (K), providing the advantage for consumers is determined by the formula:

$$K_{comp.} = I_{reg.} \times \frac{I_{tech.} \{P_{1,2,3,4,5,8}\}}{I_{econ.} \{C_{2,3,4}\}}$$

where,

$K_{comp}$  – is the level of competitiveness for consumers;  
 $I_{norm}$ ,  $I_{tech} \{P_{1,2,3,4,5,8}\}$ ,  $I_{econ} \{C_{2,3,4}\}$  – is the index of regulatory, technical and economic parameters, which take into account the interests of the consumer.

With this method of calculation of integral indicators priority is on the side of the consumers’ opinion regarding the operational and useful qualities of the products. While consumers are not interested in industrial problems, which are essential for the manufacturer.

The results of the research competitiveness of high-tech products, which were obtained in accordance with these approaches, should be taken as the basis of its growth through marketing innovations.

The formation mechanisms capable of ensuring competitive advantage of high-tech products should be based on the use of the whole arsenal of marketing innovations. All the latest theoretical approaches and principles of innovative marketing should be used to create and form of such a mechanism (Borisov and Fadeev, 2007; Carlin and Seabright, 2003; Morck and Yeung, 2000).

Despite the novelty of many methods that can facilitate the introduction of some marketing innovation in the formation of high-tech products, analyzed approaches are not quite adequate for the purpose of increasing the competitiveness of high-tech products. The main drawback is the violation of the principle of consistency, synergy and lack of specificity of high-tech products, while ensuring its competitiveness.

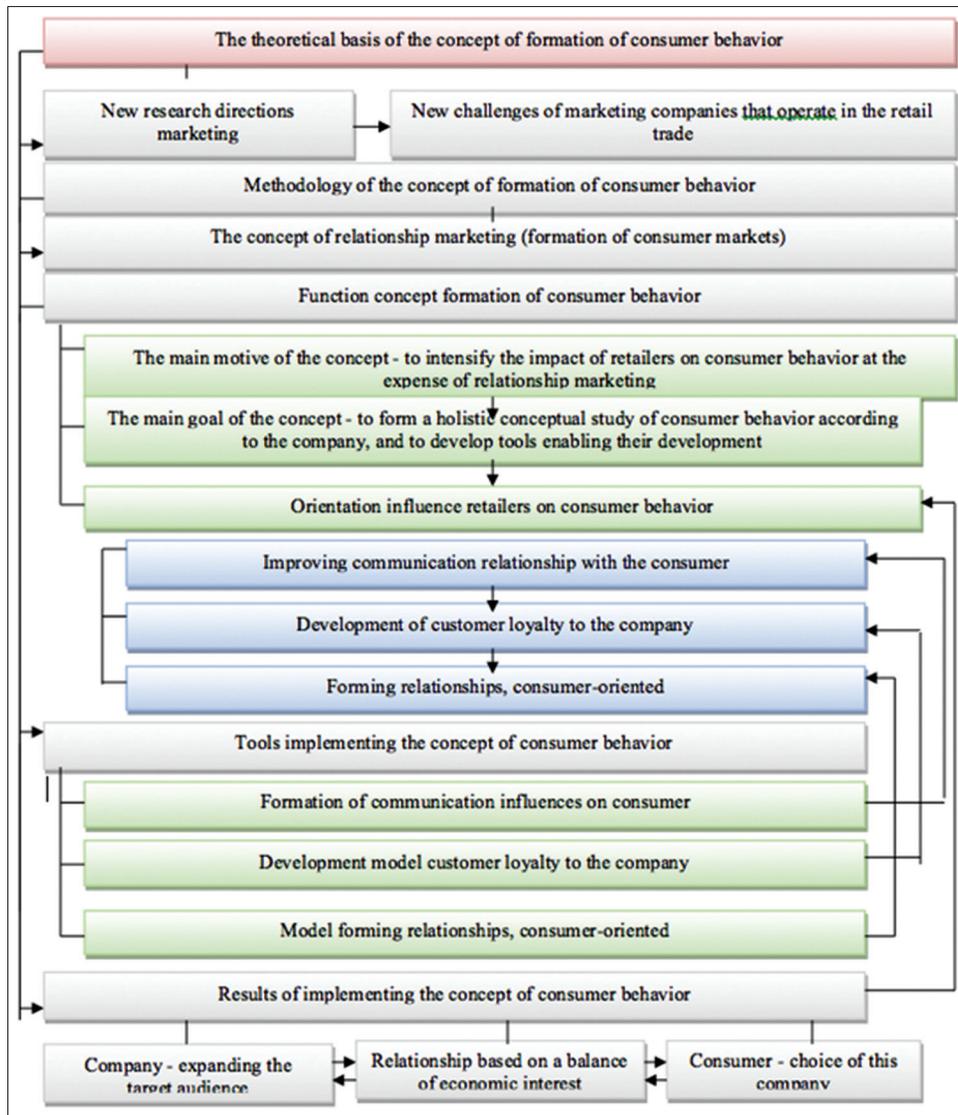
The practical application tools of realization the concept of sales management allows to provide positive feedback at once for both sides: For retailers - extend the target audience; for the consumer - identify the company and ensure its preference in comparison with competitors (Figure 3).

### 4. RESULTS

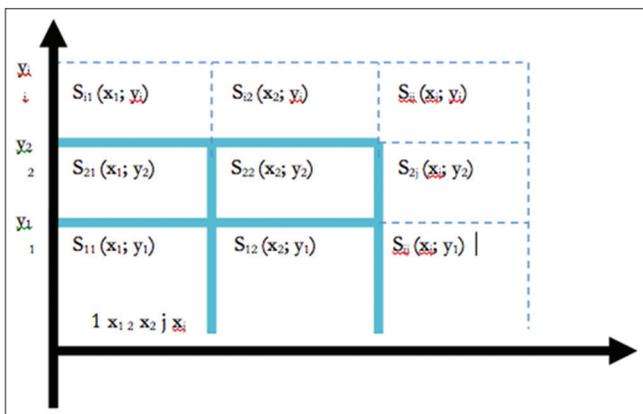
Proceeding from foregoing, the proposed comprehensive model for constructing a matrix of factors benefits of inner segments and factors the prospect of external segments. In this matrix as a basis for constructing is not taken a separate factor, and taken the complexes of factors (Figure 4).

where  $x$ ,  $y$  - it figures, which are characterized by complex factors;  $x_1, x_2, \dots, x_j$  - is adjacent quadrants values 1,2,...,  $j$  index  $x$ ;  $y_1, y_2, \dots, y_j$  - is adjacent the squares of 1, 2,...,  $i$  the index  $y$ ;

**Figure 3:** The conceptual model of sales management of high technology products



**Figure 4:** The model for constructing a matrix of marketing solutions



$S_{11}, S_{ij}$  - are strategies that are recommended at the value index, shown in the inequality:

$$\begin{cases} x_{j-1} \leq x \leq x_j \\ y_{j-1} \leq y \leq y_j \end{cases}$$

In reviewing recommended to use well-known 5-point system. Assessment depends on associations with the following characteristics: A high level - 4-5 points, Medium - 2-4 points, low level - 1-2 points. Based on this the matrix size is  $3 \times 3$ , i.e., for each segment of the market will fit one of the fields matrix.

To make an assessment of all factors and calculate outcome indicators it is possible on condition gathering the necessary information for each factor. When making a decision is necessary to evaluate factors on a scale and to note the weight, which will reflect the relative importance of factors.

## 5. CONCLUSIONS

Features of high technology products as a marketing object is applied to management its sales strategy some limitations. In order to increase the effectiveness of management strategy sales of high technology products, in this paper we proposed the concept of management consumer demand based on the interaction of consumers and producers, which in turn focuses on building sales strategy.

The proposed concept allows systematizing the process of selling products based on consumer relations. It allows carrying out valuations using parameters in investment inflows, profit for the period, as well as the dynamics of change in the number of consumers of high-tech products.

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