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**MARKETING OF HIGH-TECH PRODUCTS
IN THE ECONOMICS OF ECOSYSTEM INTERACTIONS**

Natalia V. Beletskaya^{*}, Tatiana N. Pasechkina

Siberian Fire and Rescue Academy of the State Fire Service of the Ministry of Civil Defense,
Emergencies and Disaster Management of the Russian Federation,
Zheleznogorsk, Russian Federation

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Abstract. In the current conditions of innovation development and global digital transformation, marketing of high-tech products, which forms new opportunities for growth and competition, is of particular relevance. The economics of ecosystem interaction, in which various technology companies, startups, investors and consumers are united in a network of mutually beneficial relationships, opens a wide field for research into the mechanisms of promoting innovative products.

The purpose of this article is to analyze the key factors affecting the marketing of high-tech products in the context of the ecosystem approach, as well as to assess the effectiveness of strategies based on the mutual integration of participants in innovation communities.

The research conducted using a sociological survey and analysis of statistical data makes it possible to identify the peculiarities of customer behaviour and preferences when choosing high-tech products, to determine the growth dynamics and prospects of marketing strategies. The results show that marketing in the ecosystem interaction economy requires a comprehensive and adaptive approach, including the development of unique value propositions and the formation of sustainable communication channels with end users.

The article also discusses the risks and limitations associated with rapid changes in technological and market conditions, and suggest directions for further research to help improve the effectiveness of marketing interaction between participants in high-tech ecosystems.

Keywords: marketing of high-tech products, ecosystem interaction economics, innovation, digital transformation, strategic promotion, ecosystem approach, marketing strategies, technology startups, value proposition, and communication channels.

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**МАРКЕТИНГ ВЫСОТЕХНОЛОГИЧНЫХ ПРОДУКТОВ
В ЭКОНОМИКЕ ВЗАИМОДЕЙСТВИЯ ЭКОСИСТЕМ**

Наталья Владимировна Белецкая^{*}, Татьяна Николаевна Пасечкина

Сибирская пожарно-спасательная академия Государственной противопожарной
службы Министерства Российской Федерации по делам гражданской обороны,
чрезвычайным ситуациям и ликвидации последствий стихийных бедствий,
Железногорск, Российская Федерация

Аннотация. В современных условиях развития инноваций и глобальной цифровой трансформации особую актуальность приобретает маркетинг высокотехнологичных продуктов, который формирует новые возможности для роста и конкуренции. Экономика взаимодействия экосистем, в рамках которой различные технологические компании, стартапы, инвесторы и потребители объединяются в сеть взаимовыгодных отношений, открывает широкое поле для исследования механизмов продвижения инновационной продукции.

Цель данной статьи заключается в анализе ключевых факторов, влияющих на маркетинг высокотехнологичных продуктов в контексте экосистемного подхода, а также в оценке эффективности стратегий, основанных на взаимной интеграции участников инновационных сообществ.

Проведенное исследование с использованием социологического опроса и анализа статистических данных позволяет выявить особенности поведения и предпочтений покупателей при выборе высокотехнологичной продукции, определить динамику роста и перспективы маркетинговых стратегий. Результаты показывают, что маркетинг в экономике взаимодействия экосистем требует комплексного и адаптивного подхода, включающего в себя разработку уникальных ценностных предложений и формирование устойчивых каналов коммуникации с конечными пользователями.

В статье также рассматриваются риски и ограничения, связанные с быстрыми изменениями технологических и рыночных условий, и предлагаются направления дальнейших исследований, способствующих повышению эффективности маркетингового взаимодействия участников высокотехнологичных экосистем.

Ключевые слова: маркетинг высокотехнологичных продуктов, экономика взаимодействия экосистем, инновации, цифровая трансформация, стратегическое продвижение, экосистемный подход, маркетинговые стратегии, технологические стартапы, ценностное предложение, каналы коммуникации.

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Introduction. Rapid technological development and digital transformation create favourable conditions for the emergence and fast growth of startups operating in the high-tech sector. The key to enabling such companies to enter and stay in competitive markets is effective marketing that focuses on the features of innovative products and the dynamics of demand. The problem of marketing high-tech products is exacerbated by the fact that consumers often do not fully understand the benefits and uses of new technological solutions, while the dynamics of changes in the market are so high that promotional strategies must constantly adapt to changing conditions.

The concept of ecosystem economy is closely related to the idea of co-creation of value within a network of participants who are able to complement each other with their resources and competences. This form of organization enhances synergies and allows companies to respond more flexibly to market challenges [1]. For high-tech companies, whether they are large corporations or small startups, participation in ecosystems offers great opportunities for strategic alliances, data sharing and joint marketing promotion. However, integration into ecosystems requires a special approach to creating a value proposition, branding and building communication channels. In this situation, the role of marketing strategies that take into account the ecosystem nature of interactions and allow building long-

term relationships not only with the consumer, but also with other participants in the innovation process is increasing [2].

The problem considered in this article is related to the search and analysis of mechanisms that ensure the effectiveness of marketing of high-tech products in the context of the ecosystem interaction economy. The key hypothesis is the assumption that traditional marketing tools, initially focused on linear models of interaction between the manufacturer and the end customer, require significant adaptation that takes into account multi-vector relationships and deep integration of various market participants. Particular attention is paid to the role of partnerships, methods of promotion on platform solutions and communication channels that allow deploying flexible campaigns to attract consumers [3].

The theoretical significance of the study lies in the rethinking of classical marketing concepts taking into account the factors of network co-operation and system dynamics of high-tech ecosystems [4]. The practical importance of the work is related to the identification of recommendations for startups and large technology companies that seek to integrate into evolving ecosystems and successfully promote innovative solutions. The results of the study can be used to optimize budgets, plan marketing campaigns, and build long-term partnerships with other market participants.

The aim of the article is to present the results of a study that identified the key factors of successful marketing of high-tech products within the framework of ecosystem interaction economies.

For this purpose, the tasks of identifying the peculiarities of consumer behaviour, analyzing the promotion strategies of startups and large businesses, and assessing the effectiveness of the implementation of the ecosystem approach in marketing activities were set.

The set goal determined the choice of research methods and the structure of the work. First, the materials and methods that made it possible to collect and analyze the necessary data are discussed. Then the results obtained are presented. They are considered from the perspective of relevant scientific concepts. Conclusions are presented, and discussion questions aimed at further development of the topic are put forward for consideration.

Materials and Methods. The study was conducted over a six-month period and involved collecting and analyzing primary and secondary data to examine different aspects of marketing high-tech products and how it can be integrated in an ecosystem format. The primary source of information was a sociological survey of marketing and strategic development managers from 25 high-tech companies operating in the fintech, telecoms, biotechnology, robotics and artificial intelligence sectors. Each company was characterised by a different level of maturity: some were startups that had recently entered the market, while others were subsidiaries of large technology corporations [5].

The survey was conducted in an online format. Respondents were asked a series of questions regarding marketing tools used how they attract customers, general principles of interaction with partners and participation within ecosystems. Budget priorities, expectations of marketing programmes and potential risks associated with the introduction of new technologies were also analyzed. Secondary sources included data from open information resources, research by international consulting agencies on the development of high-tech markets, and company reports. These materials made it possible to compare the answers received with real trends, such as the growth of venture capital investments in certain industries or the dynamics of changes in consumer demands [6].

In the course of the study, a methodology was chosen for comparative analysis of the survey results and financial and statistical indicators of the companies that participated in the survey. The study took into account the factors of scale (a startup or a division of a large corporation), industry specifics and the degree of involvement in ecosystem interaction.

Content analysis of marketing campaigns launched by companies over the past year was also used: promotion formats, key communication channels and creative approaches aimed at engaging the target audiences were studied [7].

To formalize and visualize the results, we used correlation analysis between campaign success indicators (growth of the customer base, increase in conversion rates, and development of partner alliances) and factors determining the marketing approach (presence of an ecosystem strategy, degree of technological innovation, budget size). The obtained data were systematised and presented in the form of tables and graphs, which allowed us to verify the hypothesis about the importance of integration into ecosystems for the successful promotion of high-tech products [8].

The research was conducted under time constraints, which imposed certain limits on the depth of immersion in each specific industry. At the same time, the use of a wide range of analytical methods - from interviews with subject matter experts to mathematical and statistical methods of data processing - made it possible to build a holistic picture of the state and prospects of marketing high-tech products in the modern economy of ecosystem interaction.

Results. The data collected demonstrates a strong correlation between the effectiveness of marketing strategies and the degree of a company's participation in ecosystem interactions. The survey data indicate that more than 60% of respondents from marketing managers of high-tech companies consider integration into partner networks and open platforms as one of the main factors influencing the successful promotion of innovative solutions [9]. Respondents representing startups emphasized the importance of strategic cooperation with corporations and development institutions to gain access to resources, expertise and sales channels. Representatives of large corporations pointed out the benefit of interaction with startups and small development teams in accelerating the introduction of new product ideas [10].

The comparative analysis revealed that companies that actively use ecosystem marketing tools show higher growth rates in their customer base. According to the results of the survey and analysis of financial indicators, the level of growth of the client audience for a year in such companies reached 35% on average. Companies that use mainly traditional promotion channels and have little interaction with other ecosystem participants showed an average growth rate of no more than 20%. Participation in joint development, access to unified databases and the use of partner communication channels can reduce customer acquisition costs, increase product awareness and build loyalty among the target audience [11].

The following summary table, based on a sample of 25 companies, was compiled to illustrate the extent to which the ecosystem approach is influencing the growth of the customer base. The table averages two groups of companies: those that reported active participation in ecosystems (Group A) and those that operate more in isolation (Group B).

Table 1. Comparison of customer base growth dynamics and marketing budget over the year

Company groups	Average customer base growth (in %)	Average annual marketing budget (in thousands of dollars)	Share of spending on digital channels (in %)
Group A	35	450	60
Group B	20	300	40

According to the table, companies actively involved in ecosystem engagement allocate more of their annual budget to marketing activities and emphasise digital channels, which include SMM, targeted advertising and partner platforms. The share of spend on digital

channels is 20 per cent higher on average, reflecting companies' desire to expand customer touch points and respond faster to market changes.

In addition to analyzing marketing budgets, data was collected on the recognition dynamics of brands that are actively innovating and collaborating across ecosystems. Recognition was assessed based on the results of online surveys of potential and current customers, where respondents indicated the degree of awareness of brands in their field of activity [12]. The data was processed using statistical software to derive average values for two groups of companies similar to Group A and Group B from the previous table [13].

Based on the processed responses, time series were constructed to show the growth in brand awareness of both groups of companies over a six-month period. The difference between the groups is especially noticeable at the end of the observation period. To visualize this trend, a simplified line graph is presented, where the X-axis shows time (by months) and the Y-axis shows the average level of recognition in percent.

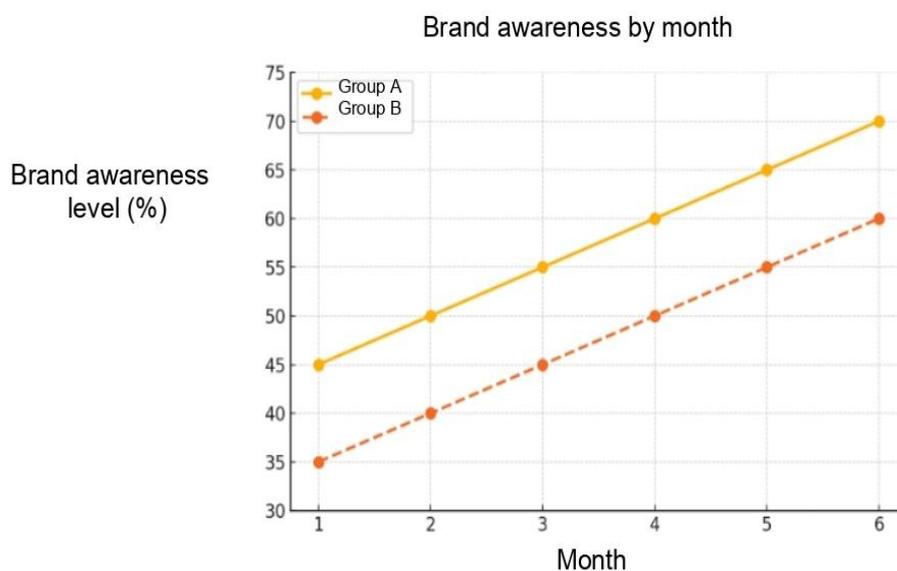


Figure 1. Brand awareness by month

The graph shows that at the beginning of the period (the first month) both groups start with approximately the same level of awareness, but by the sixth month, Group A's performance is 10-15% higher than Group B's. Such dynamics confirms the important role of ecosystem marketing in building a positive brand image and accelerating market penetration for high-tech products.

Discussion. The results obtained are consistent with the concept of the ecosystem interaction economy, according to which joint activities of market participants allow to increase the aggregate value and improve the competitiveness of each of them. Marketing in such conditions moves from classical promotion models to more integrated strategies that take into account multi-vector communication channels, partnership programmes and the creation of joint solutions on a platform basis.

The fact that companies that are actively involved in ecosystems are seeing faster growth in their customer base and brand awareness suggests that customers value the multifaceted benefits of partnerships. From the customer's point of view, product availability within a single platform, integrated service solutions and a single support system create a higher perceived value than disparate products from different companies. This explains the interest of large corporations in integrating startups, as well as the desire of young companies to interact with established players [14]. The positive effect is enhanced when partners do not

just declare cooperation, but form real mechanisms of information exchange, participates in joint research projects and in the development of cross-functional products [9].

An analysis of marketing campaigns conducted by companies that prioritize the ecosystem approach reveals a number of common features. Many of them are building a content strategy around the ideas of collaborative development, participation in global technology trends and addressing pressing social issues. This resonates with consumers, who are increasingly choosing brands that can offer not only a specific technology, but also an image of the future or values associated with it. Long-term oriented marketing communications help to establish trust with users and partners, which becomes the foundation for further innovations [15].

However, existing constraints cannot be ignored. The rapidly changing high-tech environment requires constant product portfolio renewal and flexible revision of promotion strategies. Companies that fail to react in time to changing technological trends or lack sufficient resources to maintain a high rate of innovation may face high risks [16]. Integration into an ecosystem can also lead to technological dependence on partners, and uneven distribution of resources within the network sometimes creates barriers to bringing new products to market quickly. All this emphasizes the need to find a balance between the competitive advantage that an ecosystem provides and the risk of losing some of the autonomy [13].

The results of the study show that marketing strategies based on the principles of open innovation and ecosystem approach help to increase the effectiveness of promoting high-tech products. However, companies must recognize that such an approach requires a strong corporate culture that supports partnership and knowledge sharing. Of particular importance are flexible organizational structures that allow for the rapid testing and launch of new marketing tools, as well as the existence of a transparent infrastructure of interaction within the network.

From a practical point of view, the identified trends indicate that it is advisable for startups to seek partnerships as early as possible, enter platform solutions, develop hybrid communication channels and participate in profile clusters or accelerator programmes. Large corporations, in turn, need to create open-door strategies for new players, allocate internal resources for experimentation and introduce a culture of internal entrepreneurship. This symbiotic model of cooperation becomes the most favourable environment for the emergence of breakthrough technologies and accelerated growth of their popularity in the market.

Conclusions. The results of the study confirm the importance of the ecosystem approach for marketing high-tech products and demonstrate that integration into partner networks, co-operation with large corporations and platforms, and active interaction with research institutes can accelerate the launch of innovative solutions to the market and increase their competitiveness. Systematic application of digital marketing tools and partner communications within a single ecosystem leads to higher growth of the customer base and brand awareness compared to companies that prefer to remain isolated. Statistical indicators of conversion rates, sales dynamics and return on marketing investments confirm the positive impact of ecosystems.

However, the fast-paced nature of high-tech industries and the increasing complexity of ecosystem linkages create additional challenges for planning and forecasting marketing campaigns. Companies must prepare for the fact that partnerships require constant reworking of strategies, a shift away from rigid competitive schemes in favour of flexible cooperation models, and a willingness to invest in a common platform infrastructure.

The work has generated several discussion questions that can form the basis for further research and practical implementation of ecosystem marketing. One of the key questions is

the degree of control that large corporations should retain in their interactions with startups, and which profit-sharing models incentivize the most productive collaboration.

Another area for further study could be the role of government agencies and development institutions in creating the legal framework and infrastructure for ecosystems that enable continuous innovation.

No less significant is the issue of ethics and data protection, as ecosystems often involves the exchange of large volumes of commercially sensitive or personal information. These and other challenges can be seen as promising areas for joint research by representatives of business, government, academia and non-profit organizations involved in shaping the future high-tech market.

References

1. Pyatachenko, A. M. (2024). Digital transformation of marketing activity: theoretical basis. *Vestnik of Adygeya State University. Series 5: Economics*, 4(342), 79–87.
2. Kolmykova, T. S., Kovalev, P. P. (2023). Ecosystems as a global trend of digitalisation of economic space. *Society: politics, economics, law*, 5(118), 123–128.
3. Golov, R. S., Mylnik, A. V. (2024). Analysis of the essence and main types of ecosystems in the economy and industry. *Scientific Proceedings of the Free Economic Society of Russia*, Vol. 246, No 2, 315–335.
4. Kulakov, K. Y., Verstina, N. G., Meshcheriakova, T. S. (2022). Innovation infrastructure and innovation climate: ecosystem of innovative development. *E-Management*, Vol. 5, No 1, 32–42.
5. Starikova, M. S., Voronov, A. A., Ponomarev, I. N. (2023). Territory marketing tools in solving the problems of industrial development of the region. *Practical marketing. N. Territory marketing tools in solving the problems of industrial development of the region. Practical Marketing*, 1, 10–17.
6. Babkin, A. V., Babkin, I. A. (2023). Multilevel matrix approach for management of sustainable development of industrial ecosystems. *Sustainable ESG development of intelligent ecosystems*, 203–221.
7. Krasiuk, I. A., Bragin, A. Yu. (2023). Marketing strategies of high-tech sector of the economy. *Modern science and education: achievements and prospects of development: collection of materials of the XXX-th international full-time scientific-practical conference*, in 4 vol., Vol. 1, 7 June, 2023. Moscow: Publishing House of SIC 'Empire', 184.
8. Krasiuk, I. A., Bragin, A. Yu. (2023). Marketing management of high-tech sector of the economy. *Social and economic development of Russia: problems, trends, prospects*, 330–336.
9. Bragin, A. Yu. (2023). Formation of the national ecosystem of industrial entrepreneurship. *Innovations and Investments*, 4, 361–365.
10. Keller, A. V., Okolnishnikova, I. Yu. (2022). Marketing analysis of key trends in the development of transport and logistics services market. *Vestnik of South Ural State University. Series: Economics and Management*, Vol. 16, No 4, 141–152.
11. Krasiuk, I. A., Bragin, A. Yu. (2025). Marketing contour of technological competences. *Management Consulting*, 2, 57–74.
12. Golubetskaya, N. P., Smeshko, O. G., Chirkova, T. V. (2022). Transformation of innovation activity in the modern management of organizations. *Economics and Management*, Vol. 28, No 2, 147–158.
13. Kovalchuk, Y. A., Stepnov, I. M. (2022). Management of Industrial Ecosystems in the Unified Digital Space. *Problems of Market Economy*, 3, 107–121.
14. Zhdanov, D. A., Mikirtichan, A. G. (2022). Ecosystems as a management tool for high-tech business, 345.

15. Gusakov, G. V. et al. (2023). Theoretical study of the development of the concept and tools for creating a country brand of dairy products. Actual issues of processing of meat and dairy raw materials, 16, 32–39.

16. Bragin, A. Yu. (2023). Innovative determinants of the client-centred approach in industrial business. Innovation Economics: prospects of development and improvement, 3(69), 17–22.

Сведения об авторах:

Белецкая Наталья Владимировна – аспирант, Сибирская пожарно-спасательная академия Государственной противопожарной службы Министерства Российской Федерации по делам гражданской обороны, чрезвычайным ситуациям и ликвидации последствий стихийных бедствий
e-mail: bnv.05@mail.ru

Пасечкина Татьяна Николаевна – кандидат педагогических наук, доцент кафедры гуманитарных и социально-экономических дисциплин, Сибирская пожарно-спасательная академия Государственной противопожарной службы Министерства Российской Федерации по делам гражданской обороны, чрезвычайным ситуациям и ликвидации последствий стихийных бедствий
e-mail: pasechkina@yandex.ru

Information about the authors:

Beletskaya Natalia Vladimirovna – Postgraduate, Siberian Fire and Rescue Academy of the State Fire Service of the Ministry of Civil Defense, Emergencies and Disaster Management of the Russian Federation
e-mail: bnv.05@mail.ru

Pasechkina Tatiana Nikolaevna – Candidate of Pedagogic Sciences, Associate Professor of the Department of Humanities and Socio-Economic Disciplines, Siberian Fire and Rescue Academy of the State Fire Service of the Ministry of Civil Defense, Emergencies and Disaster Management of the Russian Federation
e-mail: pasechkina@yandex.ru