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ANALYSIS OF CHARACTERISTICS OF TECHNOLOGY MARKETING IN HIGH-TECH INDUSTRY (CASE OF SPACE INDUSTRY)

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Introduction

At the beginning of the XXI century the development high-tech and their penetration into all industries, services and everyday life was defined as the main direction of development of scientific and technical progress. No one country, which is focused on building national capital, manufacturing, defense capabilities, tending to promote economic growth and social benefits, can't solve these problems without focusing on the most efficient use of scientific and technological potential. This implies the urgent need for activities which can assess research intensity and commercial prospects of high-tech products (projects) and ensure its promotion.

Domestic enterprises after incoming to the global space market faced with the problem of high competition and necessity to achieve a high level of competitiveness, sustainable development contributes to the favorable organization.

Collection of European and American studies, covering many sectors of industry, shows that approximately 60-80% of successful innovations is the origin of the market against 20-40% coming from the laboratory and innovations, based on direct analysis of needs, are generally more successful. That's why the aim of this research is to analyze the features of high-tech-marketing, especially in space industry.

1. Main characteristics of high-tech marketing

The marketing of space technology and technology transfer from space to non-space industrial sectors now are the base of development. Marketing technique used was a 'push' approach, with promotion through a catalogue of space technologies that have real potential for application in a non-space sector¹.

High-tech-marketing is a special kind of different from traditional marketing, due to the different and complex peculiarities of the high-tech. High-tech marketer can not be promising without an understanding of high-tech, he must possess strategic thinking, think ahead, and he should know more than the average marketer.

Experts point out that from 2001 to 2004 world market recruitment in high technology (particular in information technologies) has steadily expanded and increased from \$2.5 million to \$5.9 million, or more than 2.3 times. According to Comtel Personel agency, demand for specialists in the sales organization, promotion of products and technologies is increasing annually by 20%. In the selection of such personnel specialized companies (system integrators, software developers, educational and service centers etc.), and the organization of the major areas of business (large commercial and industrial structures, banks etc.) are interested.

In implementing of innovation marketing based on technology factor should be guided by following strategic principles:

- 1) only that technology have sense of further development and using, which will provide value-added growth, competitiveness, innovation and improvement in their techno – economic characteristics;
- 2) with an increase of the level of technology novelty, future sales of high-tech-product forecast became more difficult;
- 3) forecasting is the most difficult in cases where implementation of new technology leads to the changes in the nature of demand;
- 4) even the new high-tech products should be produced with regard of existing norms and standards;
- 5) providing a large amount of aftermarket services to consumers is necessary during the planning of high-tech products marketing;
- 6) creation of an entire product family based on core technology that provides significant cost savings and

¹ Willekens Ph., Peeters W.A. Space Marketing: A New Programme in Technical Education, *ESA bulletin*, 1998, 94

increase of profitability is necessary;

7) focus should be done on preparing of consumer to use of new high-tech products, given that the consumer essential qualities along with innovative products has design, packaging and project documentation quality.

Innovation marketing is a systematic actions done by management and staff of the organization to harmonize aspects of the innovation process (technology, product, market and organization) to create a new market-oriented products. Marketing innovation as an emerging variety of marketing is most often seen as:

- ideology of modern business (business ideology);
- system of marketing research (marketing research);
- practice of marketing management (marketing management);
- set of measures to promote innovation and demand generation (promotion).

High-tech marketing is very complicated and time-consuming because tough competition in the technology markets requires of scientific management, continuous analysis of volatile competitive environment and large information amount. The difficulty of technology marketing is costly various resources on all major directions of innovative marketing.

2. Comparison of marketing in traditional and high-tech

High-tech industries have some principle differences from more traditional sectors. High-tech are dynamic areas in which new developments are often ahead expressed or perceived needs of potential consumers and violate the established boundaries between the traditional industrial sectors.

High-tech and high-tech-products are characterized by the following features¹:

1. Technical aspect plays in high-tech key role because innovations have a short life cycle, in traditional technology marketing technical aspect is secondary and technology has a long life cycle.

Traditional consumer company develops and launches a new product for 2-5 years. Some businesses in the retail sector are more quickly and update their proposals for some brands every season. But innovative technology develops much faster. For example, the expansion of companies such as Yahoo!, Google or Mail.Ru, and the pace of their launch new services over the past few years is simply amazing.

2. Industry and the market: high-tech are rapidly changing, traditional technologies are more stable.

3. Clients: in high-tech clients do not have sufficient knowledge and face difficulties in evaluating the product, in traditional segments clients have the knowledge and the possibility of a rational assessment of the product.

4. Competitors in the first case are often unknown or unpredictable, there is high probability of threats from newcomers, in traditional technology marketing competitors are known and high barriers protect from entry of new strong players.

Generally the aim of strategic marketing activities is to identify are correctly oriented directions, allowing rational set achievable goals in the future and the ways of their implementation.

The boundaries of the underlying market are unclear, i.e. competitive threats may come from various technological horizons. As a result of constant comings and goings of competitors is high technological uncertainty. Border industrial sectors vary, and can be seen as a union of several new markets in the underlying market (eg, for office automation) and, conversely, the collapse of the market for highly specialized segments.

5. Partnership: in the first case can give a unique competitive advantage and set the market standard in the second – only can give some resources.

6. Marketing research: in the first case may be irrelevant, "opinion leader" plays an important role, in the second researches are highly relevant, almost always important to view the mass consumer.

7. Planning: in the first case is difficult and only possible in the short term, in the second - predictable for a long period.

8. Marketing in organization: in the first case is based on cross-functional collaboration and communication; in the second is provided by the functional department.

While in traditional companies marketing department is responsible for sales, high-tech companies develop by the other way and distribute among themselves the functions of product development, communications and profit-making. Thus, in cases where the income is generated indirectly, marketing department is not tied to sales problems as it happens in traditional companies or retail.

¹ Прокопенко О.В., Омеляненко В.А. Вплив фактору високих технологій на глобальні економічні процеси, *Вісник національного технічного університету «Харківський політехнічний інститут»*. Збірник наукових праць. Тематичний випуск: *Технічний прогрес і ефективність виробництва*. Харків: НТУ «ХПІ». 2012. nr 13.

For example, companies such as Google, product managers are the most responsible (to considered this position, you have to be at least a student of the profile institution, but not a marketer). Marketing also plays a significant role in the company rather in matters of advertising and promotion and to a lesser extent in the development of products.

9. Product: in the high-tech development is dictated by the manufacturer and marketing highlights the importance of a "friendly" design; in the second - the development is dictated by the market prevails intriguing design.

At some positions in technology marketing (engineers marketing) marketers need to work closely with the developers (internal communication) or sales staff and customers (external communication). This requires serious knowledge about the product and its production process, and without the proper education its very difficult to get such position. For those who want to be effective in such interaction, technical knowledge can be a deciding factor.

10. Price: in the first case the pricing is complex (and often a temptation dumping); in the second - costing standards are available.

11. Sales: in the first case requires close contact producer with the consumer; in the second case various options of sales mechanism are allowed.

12. Communications: a high-tech market training is required and branding is used as a tool to combat with the customers fears / doubts; in the second - emphasis is done on the benefits of the product, and branding is used as a tool to enhance of the buyers interest.

Accounting the technological component in the strategy provides the basis for setting priorities in the choice of technologies. Ideally, a competitive firm should always aspire to control their key technologies, engage in at least one emerging technology, be ready to cut, partially or completely, the use of basic technologies.

Strategic marketing of technology must be systematically realized at three levels.

At the strategic level the choice of target markets and the formation of high-level long-term plan for the release of the product ("roadmap") or a decision concerning specialization is done. Also the answers to the questions concerning working with a certain technology or the specialization in a particular subject area were given.

Tactical level marketing in companies generally solves promotion task on the previously selected target markets.

Operational level marketing in high-tech sector represents all activities directly related to the sale, implementation and maintenance of product or services to a particular customer on a particular transaction.

3. Marketing in space industry

Although space technologies often are attributed only to carrier rockets and satellites, there is a huge world industry that uses data provided by outer space vehicles and gives us ordinary services.

These markets can roughly be divided in three parts:

- production – this includes rocket components, as well as production of equipment necessary for service rendering;

- services – they include satellite navigation (e.g., GPS) services, satellite communications (e.g., satellite television and telephone communication services, internet), and Earth observation services (e.g., Earth use control, weather forecast, etc.);

- subordinated fields – further small services of three previous service fields (entertaining activities and sea crossings, specific communication types, natural disaster relief, water and air pollution measures, etc.).

Detailing these areas are shown in Figure 1.

Commercializing space technologies needs to become one of the priority areas for developing space activities, not only to provide a better return on budget investments in space developments, but also to become a key factor for the use of space technologies in the civilian sector. As the experience of other countries shows, the state should stimulate commercialization in four key ways:

1) establishing a databases and advertising materials regarding the prospects for different technologies and inventions;

2) funding work related to the adaptation of space technologies to consumer needs;

3) organizing marketing at the sector level;

4) training and retraining of necessary specialists.

The direct product derived from the space programme itself consists of the successful launch and its

associated services, data from the satellites, operational services, specific generic technology, etc.

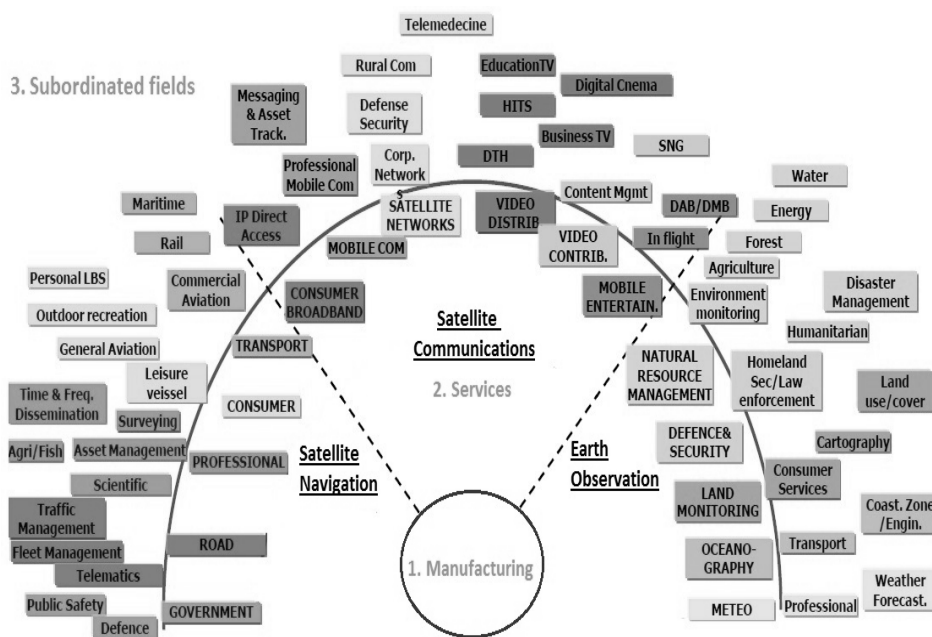


Figure 1. Space technologies markets

Source: *Space Technology Cluster*. Access mode: <http://www.vatp.lv/en/space-technology-cluster>

The indirect products are not only the spin-offs in the form of tangible products, technologies or techniques derived from space programmes and applied in non-space industrial sectors, but also include the intangible know-how and internal competence. These products are promoted with difficulty even if they touch the general public in their daily lives, e.g. surgery, automobile technology, energy and environment, etc.

E.g. Latvian Space Technologies Cluster operates with an aim to promote:

- 1) individual marketing of enterprises and organizations,
- 2) cooperation within and outside Cluster among field and interdisciplinary enterprises,
- 3) creation of national and international partnership among Cluster Cooperation partners.

Cluster activity is based on:

- measures to plan and develop new technologies, products, and services (e.g., development of technical and economical justification, concepts, and strategies);
- measures to promote marketing and commercial collaboration (export market broadening, namely, participation in international exhibitions, forums, conferences, trade missions, matchmaking events, and seminars on export questions);
- measures directed towards raising efficiency and productivity of resource use or within a value chain (e.g., product improvement and development concepts); as well as
- other measures to facilitate competitiveness of Cluster Cooperation partners.

Space research has focused on developing and perfecting technologies and processes to unprecedented levels to ensure they can cope with the harsh nature of space. Technologies and components for space are characterized by low weight, strength and durability, efficiency and reliability, compactness, temperature resistance, radiation resistance, corrosion resistance.

Also space technologies fall into many categories: materials such as composites, alloys, metals; hardware and software; automation and robotics; electronics, sensors and optics; communications; and power and energy devices.

The process for transferring these technologies involves identifying suitable space technologies and marketing their potential services and applications. This is done by analyzing the technical challenges that exist in industry and then identifying which space technologies are suitable to meet those needs.

The goal of commercializing space technologies is to ensure the effective use of technologies created at public cost. Among the problems that arise in commercializing space technologies, six stand out:

- lack of mechanisms to provide for the effective application of technologies created at public cost;
- ineffective application of technologies created at public cost;
- unresolved intellectual property issues;
- lack of financing to make space technologies marketable;
- lack of informational coverage for the implementation of technologies, such as advertising, techno-

networks, and so on;

- lack of domestic demand for such technologies.

Generally three major applications have developed to date and dominate the space sector¹: TV broadcast (satellite communications), telecommunications infrastructure (satellite communications), and satellite navigation (the ubiquitous satnav). These markets are dominated by major international companies, and while they have seen major growth in the past, future revenues are projected to stagnate as they become mature.

However, a whole range of new opportunities are opening up and the market is starting to fragment into a plethora of new, niche and bespoke applications. In consumer markets, Google has been extending services such as Google Earth, while mobile phone software developers are rapidly incorporating satnav and satellite imaging capabilities into new Apps. In May 2012, there were over 1000 Apps using satellite capabilities each on Google Play and the iPhone9 Apps Store.

A similar picture is emerging in B2B markets. Traditionally dominated by companies selling telecommunications bandwidth (e.g. Inmarsat, Eutelsat, Intelsat) or satellite navigation systems, new markets are now emerging for applications that solve pressing commercial and societal problems. Aimed at addressing issues with significant economic value, these new B2B applications are lower volume, but much higher unit value, than consumer applications.

In the B2B sector, a rapidly developing area is the emergence of mixed modality applications (combinations of satellite communications, GNSS, and Earth Observation). A good example is the IRISS project, part funded by the European Space Agency Integrated Applications Promotion program (ESA IAP), and led by Nottingham Scientific Ltd. This new capability will allow Train Operating Companies to communicate with their assets irrespective of location and status, enabling data to be uploaded and offloaded in real time to support decision making processes and to improve the management of operations and incidents. It will generate savings for the train operators through energy efficient driving, maintaining timetable performance, enhanced safety & comfort, brand promotion and improved customer satisfaction.

4. International space technologies marketing analysis

NASA has long partnered with the private sector, academia and other government agencies to repurpose space technologies for commercial use. Many of those advances are documented in the agency's annual Spinoff publication, which has featured more than 1,800 spinoffs in health and medicine, transportation, public safety, consumer goods, energy and the environment, IT and industrial productivity. The latest edition of Spinoff highlighted 44 innovations, including a search and rescue system enabled by satellite ground stations, and a robot assistant that roams hospitals and registers patients. NASA says spin-off technologies save lives and contribute to the economy.

Comparing the Chinese space program with the Soviet and USA ones, in general, show that it repeats the initial stages of space development of these states. But the pace is very different. As for the differences, here, first of all, I must say that the Chinese use it to decide not so much research as marketing goals and do not hide it.

According to strategic marketing approach China need to be first who determines the Martian theme in the international space community. Since the solution of engineering problems for human exploration of Mars will stimulate the development of almost all sectors of industry. Research will contribute to the incredible ingenuity in new technologies developing. And the benefits of such activities which in fact are still unknown at the moment, of course, will dramatically improve life and will bring new benefits to mankind in the future. And from the fact which state will become a trendsetter in this race will depend its perspective.

China use strategic marketing approach in its breakthrough projects, for example, in the automotive industry. Here, the main vector of Chinese companies making efforts directed at creating vehicles with hybrid power source that is initially acted on the field, where foreign companies are still going to come. As a result, by 2012, more than 95% of transport in China is planned with mixed sources of supply. A similar situation is happening in the field of mobile phone industry. Here Chinese manufacturers actively use their skills and combine copy seemed incompatible; for several years produced hybrid phones that work in buildings 2-4 SIM card has an analog TV receiver and much more, including stun guns.

Marketing in space sector is also important at the international level, since this industry is inherently international. So analysis must be reviewed on the basis of international competitive advantage.

We can note an examples of questions raised about the marketing of Space Station:

Product:

¹ Higgons R. *Qi3 Insight: 'Space – The New Frontier' Growth Opportunities for Non-Space Companies* 2012, p. 13.

– Can we market the Space Station emphasizing the non-tangible product, namely the ‘space frontier’ dimension? Should we emphasize the Space Station as a self-standing product or as a stepping-stone for interplanetary space exploration?

Price:

– Could we approach the general public with dedicated relative cost indicators (market survey)?

Promotion:

– Should we allow commercial sponsorship on the Space Station?

– What about creating a cartoon character to represent the COF? Such a character could be used to promote the Space Station to youngsters in the various countries?

Physical Distribution:

– How do we establish the link with the non-space industry to encourage them to propose experiments to be conducted on-board the Space Station? The RADIUS (Research Association for Industrial Use of Space) was based on access to the industrialists by scientists involved in microgravity experimentation, who already have their networking and contractual relations with the various potential customers in the various industrial sectors such as the petrochemical, environmental and pharmaceutical industries. This approach led to the successful involvement of several private companies in the ground-based research, and some have even participated in the in-flight space experiments. In May 1998, for example, experiments prepared with a consortium of oil companies will be carried aboard the Space Shuttle.

Conclusion

High-tech innovation strategy, based on the analysis of the market needs with a subsequent transition to a laboratory, is more successful than the reverse path strategy. American marketer William David stated that "good products are invented in laboratory, great products are invented in the marketing department".

Generally the main objectives of space technologies marketing are two:

- improving the effectiveness of industry enterprises, their revenues and profits through the effective application of their technologies;

- ensuring the country's socio-economic growth by increasing tax revenues from high-tech sector enterprises that apply modern technologies effectively.

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