THE IMPLICATIONS OF INNOVATION PROCESS
ON THE MARKETING OF HIGH-TECHNOLOGY PRODUCTS

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Rezumat
This paper highlights the role and importance of the Open Innovation Model on the marketing activity
developed by the companies from the high-technology industry. In this area, the technology is advancing
continuously and new products are appearing rapidly. Competition on high-tech market is very tough and not all
companies have the resources to cope with change. For these companies, the ideal solution is to apply the Open
Innovation Model. The paper includes some results of a qualitative marketing research which had as main
objective finding the opinions of managers from high-tech industry regarding the need for innovation process
and the choice of the most effective innovation strategies.

Cuvinte cheie: open innovation, high-technology products, marketing, qualitative research.

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1. Introduction

By introducing innovations in practice, the organizations can obtain products with improved features,
high quality services, new production processes which are more efficient and greener, improved models of
business management system, modern methods of labour management, etc.

Generally, the organizations make decisions to innovate for different reasons: to increase market share,
to conquer new markets, to improve products quality, to expand the range of products, to replace obsolete
products, to reduce the environmental impact, etc. The innovation works as a system, including all activities of
an organization. In fact, all business functions are under the impact of innovation and its development is different
depending on the nature of activity.

The innovation processes have a high degree of uncertainty regarding the final results for various
reasons. The success on the market becomes less transparent and more uncertain and launching a new product is
risky. For a new product, the quality criteria is no longer decisive for the commercial success and the innovation
degree of risk increases even more.

When a company decides to innovate, it has to take into account all the available resources (human,
financial, material, know-how) and to analyze objectively if it is able or not to deal with such changes. The
decision to innovate will change the entire business and therefore will change the company's marketing vision.
Causing the changes in product mix, the innovation process change the potential customer segments, the market
strategies and the marketing mix strategies.

The Open Innovation model can help companies with limited resources to keep up with changes
occurring on the high tech market. It is known that this market is dynamic and risky and the competition is
fierce. Open innovation provides companies the opportunity to cooperate, to join forces to create effective
products that bring them profits and provides to the consumers the satisfaction they want.
2. The characteristics of high-technology products

The Ordinance no. 21/1992 on consumer protection states that the high-technology product is “essentially a durable product, basically a product relatively complex, consisting of parts and subassemblies, designed and built to be used on an average duration of use and which can carry out repairs or maintenance”.

The high-technology products can be defined by five main features they have simultaneously [10]:

- Short product life cycle - such products cross the life cycle phases more quickly than ordinary products. The advanced technology evolution happens very quickly and this leads to a much shorter product life cycle and to the necessity of making decisions on the moment [2].
- High level of risk in the changes of users’ behaviour - using high technology products can generate radical changes in consumption behaviour of users; sometimes, such changes can be destructive meaning the failure of product adoption by consumers.
- Indispensability of infrastructure - a high technology product cannot exist in isolation; the organization should create a real services network to support the product and become an important component of its marketing mix. The infrastructure includes complementary products required for the high-tech product functionality, installation services, repairs and proper maintenance.
- Lack of clearly defined industry standards - a key feature of high technology products is the fact that they are constantly evolving. As a result of this constant evolution, the products which satisfy the same needs align to specific but different standards.
- Uncertainty on product functionality - sometimes consumers find difficult to align their needs to the benefits that high technology products can offer.

Many manufacturers consider that the main advantage of a high-technology product is precisely the sophisticated technology included but they neglect the consumers perception on this matter.

The consumer’s perspective is different from the manufacturer’s perspective. Their interests seem to be somewhat opposite [9]. The producers are interested into the product creation. Some of them are based on the misconception that consumers are not able to describe exactly what they want and aren’t aware of the products they seek. Because of this approach, the consumers could consider hostile some of the products.

Because technology tends to worry the consumers and some of them are intimidated by the idea of learning to use a new product involving advanced technology, the marketing of high-technology products has the task to explain the new technology to the consumers, to educate them regarding new trends and to help them make an informed choice.

In fact, analysing more deeply, the marketing of high-technology products consists of those integrated activities, processes and decisions of the organization, based on innovation and on the direct relationship with end users, offering them a superior value through products and services capable to satisfy new needs and specific requirements for advanced technology, enabling new feelings and experiences, in profitable conditions for the organization and protecting the natural and social environment.

3. The necessity of innovation in high-tech industry

Innovation is the driving force of competitiveness, growth, profitability and creation of a sustainable value. Innovation, as defined by the OECD, is the global process of technological and commercial creativity, the transfer of a new idea or a new concept to the final stage of a new product, process or service accepted by the market [14].

Innovation is essential for a business interested in development. Ultimately, innovation has been brought into attention by the way in which some of the world companies have used a fast rhythm of developing new products as a very powerful weapon against competition.

The innovation process has some defining features [5]:

- Disturbing element – through innovation the conventions are defied and the weaknesses must be modified or eliminated;
- Factor of development – if innovation is properly managed as a process and as a strategic risk and benefit, it leads to product development and creation of new markets;
- Business model - innovation lead to reconsideration of how to run the business, how to create value for customers and business partners;
- Creative force – innovation involves radical exploring of all the possibilities;
- High degree of applicability - innovation must have maximum impact on consumers;
- Innovation determines market shaping - innovation leads to reconsideration of the functionality of markets, customers, partners, distribution channels etc.
An innovative organization must simultaneously fulfill the following conditions [7]: have a high degree of responsiveness to demand fluctuations, demonstrate flexibility and capacity to adapt rapidly to changes of the nature of materials and their processing conditions, be able to manufacture a wide range of quality products at small costs and in a short period of time, have the ability to successfully integrate new technologies into the existing system in terms of minimum cost.

Also, an innovative organization must have strategic skills, resulting in long-term vision, ability to identify and even anticipate market trends, availability and ability to collect, process and assimilate technological and economic information; organizational skills, such as risk propensity and its control, cooperation between various intern departments, cooperation with public research, external consultants, customers and suppliers, investment in human resources.

Innovative companies must face three types of risks [1]:

- Market risk - is closely related to the “cost of change”, the cost paid by consumer for the transition from an existing solution to a completely new one; the originality and complexity level of the product will determine the amount of cost change for potential client; a lower cost of change means a lower market risk.

- Technological risk - new technology might be ineffective or could be quickly overtaken by another technology. An efficient and original technology means a lower risk.

- Strategic risk – is related to the degree of company’s familiarity with the market and technology. A higher degree of familiarity means a lower risk. As the high technology product cross the life cycle stages, the consumer becomes more familiar with it.

Organizations in high tech industries have a very developed innovative capacity. They occupy the first place worldwide in terms of number of patents approved every year. The most innovative company in the world in 2010 was considered IBM with 5,866 patents per year, followed by Canon with 2,551 patents, General Electric and Hitachi. On the places 5, 6 and 7 are Toshiba, Samsung and Sony, companies producing high technology goods for individual consumption.

Patent activity has always been an indicator of innovation. However, innovation comprises much more than mere patent filing volume. In 2011, Thomson Reuters, the world’s leading source of intelligent information for businesses and professionals, developed a range of metrics based on various facets of innovation that relate to patenting and science. The Thomson Reuters 2011 Top 100 Global Innovators includes companies that invent on a significant scale, that are working on developments which are acknowledged as innovative by patent offices across the world, and by their peers; and, whose inventions are so important that they seek global protection for them.

The most prevalent industry within the Top 100 list is Semiconductor & Electronic Component Manufacturing; 14 of the 100 companies are from this sector. Fifty per cent of these innovation leaders are from North America and 43% are from Asia. The remaining company is from Europe. For Europe, the top two industries are Machinery Manufacturing at 17% and Chemical Manufacturing at 13%. Europe leads the world in Machinery Manufacturing; 63% of the Top 100 Global Innovators in Machinery Manufacturing are in Europe, with more than half of them in Sweden.

4. The Open Innovation Model

The current environment of the organization from high technology industry has a big influence on how the marketing activity is developed. The traditional approach is no longer effective because of the transition from analogue era of marketing to digital era of marketing. This idea arose from the references to the modern economy as being a digital economy. In this new context markets are more fragmented and so are the communication tools for companies addressing to customers. But more alarming is the accelerated speed of change. Pressing need for speed and efficiency forces manufacturers and retailers to consider more innovative and effective ways to build relationships not only with consumers but also with partners or direct competitors. As a consequence they are currently developing new forms of partnership.

The innovative organizations from high technology industry increasingly use open innovation strategy. The concept of open innovation is based on the idea that organizations cannot lead all R&D activities alone, so they must capitalize the external knowledge that can be purchased.

The organizations from high technology industry simultaneously fulfill two conditions:
- The percentage of R&D department spending in product value added exceeds 10%;
- The percentage of scientists and engineers from technical department in all company positions exceeds 10% of the average of employment in the industry.

By applying the open innovation strategy, the ideas and internal knowledge can reach the market through external channels, outside the current business of the company to generate additional value [6].
The organization applying open innovation develops research projects inside it, but it has access to external projects from whose ideas it can benefit. But in turn, the organization provides results and ideas of research and development projects to the external environment (other organizations or institutions).

The elements that led to the creation of Open Innovation Model are among others: the existence of competent employees who have important knowledge and availability for geographical and functional mobility, a more important role of providers in the development of innovation, an increased number of alliances and partnerships to develop new ideas and technologies [13].

The principle of Open Innovation differs fundamentally from the traditional model of closed innovation and the following table presents the principles of both models.

Table 1. Closed Innovation Model vs. Open Innovation Model

<table>
<thead>
<tr>
<th>Closed Innovation Principles</th>
<th>Open Innovation Principles</th>
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<tbody>
<tr>
<td>Inside the organization are the most talented employees from the industry.</td>
<td>Organization must cooperate with capable employees from outside.</td>
</tr>
<tr>
<td>R&amp;D activity is developed only inside the organization.</td>
<td>R&amp;D activity from outside the organization can also create value for it.</td>
</tr>
<tr>
<td>The organization’s discoveries get first on the market.</td>
<td>It is not necessary for the organization to conduct its own researches. It can use others’ researches.</td>
</tr>
<tr>
<td>The winning organization is that who launch first an innovation on the market.</td>
<td>For the organization is more important to build an efficient business model, rather than getting the first on the market.</td>
</tr>
<tr>
<td>Creating the best ideas in the industry lead the organization to success.</td>
<td>Effective using of internal and external ideas lead the organization to success.</td>
</tr>
<tr>
<td>Intellectual property rights must be protected so other organizations can’t use them.</td>
<td>Organization should buy and use intellectual property rights from others if they are better.</td>
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For years, the logic of closed innovation was considered the “right way” to bring new ideas to market and successful companies all played by certain implicit rules. They invested more heavily in internal R&D than their competitors and they hired the best employees. Thanks to such investments, they were able to discover the greatest ideas which allowed them to get to market first. This, in turn, enabled them to reap most of the profits, which they protected by aggressively controlling their intellectual property to prevent competitors from exploiting it. They could then reinvest the profits in conducting more R&D, which then led to additional breakthrough discoveries, creating a virtuous cycle of innovation [4].

Any organization, no matter its size, can adopt the Open Innovation model. There are many advantages. All the partners benefit from participation in this process in terms of knowledge, technology or financial resources.

Panasonic decided to use Open Innovation Model for Blu Ray 3D product development, working in partnership with Hollywood studios and with prestigious research institutions in Belgium (IMEC laboratory). Being a member of the Patent Cooperation Treaty, in 2007 Matsushita Electric Industrial (the future Panasonic) occupied first place in the world, holding 2,100 patents registered. The following year the number of patents decreases sharply, Panasonic reaching the second place, being overtaken by Huawei Technologies Co. from China.

In 2009 Matsushita becomes Panasonic and take again the world leadership in terms of number of patents: 1891. This was followed by Huawei Technologies (1847) and Robert Bosch (1586), as shown in Table 2.
In 2008, Matushita Electric Industrial Co. became Panasonic Co. 

In 2010, Panasonic had globally, 91,539 patents of which 45% were developed in Japan, 22% in U.S.A. and 14% in Europe. Their number was smaller in 2010 compared to 2009, when the total was 94,139 patents.

Companies applying Open Innovation Model may face some problems that occur during interaction with other organizations. Thus, there may be some conflicts of interest which could affect all partners involved if are not handled properly.

The most common problems encountered in the case of open innovation are those related to coordination [8]. They occur in the relations between organizations involved in open innovation. Also, coordination problems can occur in the process of searching and selection of ideas, knowledge and partners involved into the innovation. For example, building a very complex high-tech product which combines multiple technologies from several companies situated in different locations means a huge amount of work in terms of coordination to achieve their full potential. In strategic terms, this product's competitive advantage doesn’t come from the contribution of technical knowledge of multiple technologies, but from how to coordinate and link partner companies in the project [11].

5. Some results from a qualitative marketing research on innovation

Given the importance of innovation in high tech industry, it was considered appropriate to conduct a qualitative marketing research on "Opinions of managers on the particularities of marketing in the area of innovation and high technology product development ."

The research was based on depth interview method. The sample used consisted of seven managers of international companies which produce and sell high technology products, and they develop their activity in Romania. Depth interviews were conducted in 2011, based on a list of themes and subthemes.

The general assumptions for the research were:
- More and more companies from high-technology industry use the principles of open innovation model.
- Many high technology companies choose to cooperate with other bodies and institutions in R&D activity in order to create high-tech products and innovative services.
- According to managers from high technology industry, the decision to purchase a high-technology product has a high degree of complexity.
- Many companies in high technology industry have the intention to involve consumers in creating and developing innovative products.

The main objectives for this qualitative research were:
- Determination of the types of existing innovations inside the companies.
- Identification of innovation strategies applied by the companies.
- Evaluation of the role of research and development activity inside the company.
- Determination of particularities of assimilation and launch new high-tech products on the market.
- Identification of the main factors affecting the adoption of innovation proposed by the company.
- Establish specific aspects for the marketing mix of high technology products.

The interviews were structured on four themes, such as: innovation process inside the company, the development of new high-technology products, the behaviour of high-technology products consumers, particularities of the market and marketing mix for high-technology products.

The respondents’ answers were processed according to the principles of the content analysis.

Regarding the process of innovation into the company, the interviewed managers considered that the adoption of innovation within a company from high technology industry gives it some major advantages. Innovation can increase sales and profit and "make the difference between markets". Innovation provides competitive advantage and improve company performance, contribute to accelerating change and create new values within, supports the company to be flexible and globally competitive, to conquer new markets and then to become a leader on them etc. One manager believes that innovation leads to transformation and restructuring of the company, offering new business opportunities. Another manager believes that innovation contributes to the creation of new values and it is a source of new experiences for consumers.

Less than half of the managers recognized that the innovation process has some difficulties for company: the risks of change are high and can lead to failure that must be accepted, innovation requires new technologies and processes that are difficult to control by a single company. One of the managers said that "the failure is part of the innovation process".
Related to the types of innovations adopted by the company, 5 of the 7 managers say they have adopted the concept of "open innovation". The main types of innovation used by the high-tech companies are: product innovation, process innovation and technological innovation. One of the managers says that within the company the innovation is done differently by type of consumer or business solutions. Another manager said his company innovated in the promotion activity. The sources of innovation used by companies are numerous and varied. They are found both within the company (employees) and outside it (customers, business partners, universities, research institutes and laboratories, virtual environment).

The innovation strategies applied by the companies are tailored to customer segments, depending on geographical areas where the activity is developed or the types of new products that will be developed. The strategies used are: the creative platform strategy, the creative solutions strategy, the continuous innovation strategy, the accelerated innovation strategy, the miniaturization product strategy, the innovation strategy according to the environmental protection, the partially innovation strategy and the total innovation strategy. The last strategy refers to eco-systems consisting of products, services and relationships with partners.

When a company decides to innovate, it gives a greater importance to R&D activity. Regarding the second theme, the development of new high technology products, according to all seven managers, R&D is essential for the success of high technology companies. Each company has, in global strategic areas, research centres for the behaviour of individual and organizational consumers and customer satisfaction, concept development labs and product design labs. Depending on financial resources, companies are investing billions of dollars in R&D annually. These efforts are aimed to create new values based on combining the concepts of "inspiration" and "shared experience".

For the assimilation of new products companies make partnerships and strategic alliances to obtain know-how, technology, procedures, infrastructure, etc. These partnerships are growing because companies often apply the open innovation model. There is concern for creating flexible platforms and products that do not affect the environment (either during their production or their use). A very important element in the competitive environment is the speed and frequency of which new products are launched on the market, without being ignored the aspects of quality. One manager mentioned a solution for avoiding that the assimilation of new products and launching become a failure: "new products must be compatible with their predecessors and those to come".

When a company decides to innovate and create new products, it is forced to change its product policy. Company becomes more flexible, more open to new, more willing to take risks. It must also change the product strategies, adapting them to the new situation imposed by the process of innovation. High-tech product strategies used mainly by companies are: new global product strategy, integrated solutions strategy, high customized solutions strategy, the strategy of unique products with exceptional performance, "green" products strategy, the strategy for selection and focus on certain categories of products, product and services packages strategy.

Managers must not forget that innovations have a strong impact on consumers and this impact is not always positive. Therefore, sometimes products are not received by consumers as companies expect. The factors affecting the adoption of innovation results by consumers are typically: demographic characteristics (age, gender, education level), how the products meet customer expectations, the degree to which the products make their lives easier, the extent to which consumers are involved in creating products, the extent to which is guaranteed the person’s safety during use, aspects of product complexity, compatibility with existing products, product testing opportunity, the products’ capacity of saving energy and being environmentally friendly, and not the least, the early adopters’ opinions about the experiences using high-tech products.

The decision of innovation and adoption of new technologies within the company is reflected into the pricing policy and strategies. Pricing decisions are made based on costs, competition and economic situation and the strategies usually used are: skimming strategy, strategy of high prices (for repositioned products), the strategy of aligned prices (by retailers pricing level), market penetration strategy or discounts strategy.

Regarding the high-tech products promotion, the companies rely on PR activities, sponsorships (especially in sport), the organization of events and presentations, participation in exhibitions in the field. Being innovative companies, they must make their presence felt in any context related to innovation. Also, the Internet is a powerful marketing communication tool that all companies consider very effectively.

5. Conclusions

Companies must still perform the difficult work necessary to convert promising research results into products and services that satisfy customers’ needs. Innovators must integrate their ideas, expertise and skills with those of others outside the organization to deliver the result to the marketplace, using the most effective means possible.

For young companies, innovation comes naturally. It is the rationale for their existence. The challenge is to create products and services consumers actually want and to do it in a way that allows for survival in the
marketplace. For mature corporations, innovation is more of a balancing act. In these situations, the objective is to maintain and enhance the value of existing lines while investing in.

Faced with thousands of potential projects, high tech companies confront significant challenges in identifying those projects with the highest potential and allocating their best resources against them. When major capital investments are required, resource allocation decisions must be made well in advance of market or customer data. Product introductions must also be timed appropriately to meet rapidly changing market needs, particularly when product introduction windows are narrow.

The companies that want to stay competitive must innovate constantly because high-tech products cross the life cycle stages more quickly than ordinary products, which are determined mainly by the rapid pace of evolution of technology. Innovation can be understood as a creative openness to exceptional ideas, as an activity of creating new products or improved products, and not ultimately as a business strategy. Innovation is presented in various forms and manifestations and each organization is aware that only through innovation can better meet the market and the environment.

Innovations don’t influence only the organization, but they can shape the entire market - customer needs, participants’ structure, the channels that link them, the rules by which they act. Innovation is not just about creativity but also about the profitability of activities. Ideas can be quickly imitated, but what really makes the difference is applying them in an unusual way. The companies must be aware that the pace of competition will only accelerate and their success depends on identifying the right opportunities at the right time.

6. References

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