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TRANSFORMATION OF BIG PHARMA BUSINESS MODELS

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Abstract. The article explores the main directions and drivers of transformation of Big Pharma business models over the last quarter century. Key features of the traditional blockbuster model are revealed in the context of the main trends in pharma business environment that might have an adverse impact on this model effectiveness, in particular skyrocketing R&D costs, massive patent cliffs and tightening regulatory pressure on drug prices. The author analyzes various adaptive strategies used by Big Pharma firms, including mega mergers and acquisitions, intensive globalization and expansion into emerging markets, and makes the conclusion that these strategic moves had a limited effect in bringing about lasting change. The key solution to industry challenges had been found on the way of reconsidering the dominant players' business model. The author relates the emergence of the new specialty pharma model to the serious changes in the basic architecture of customer value creation, delivery and capture mechanisms. The rapid growth of specialty care drugs in the portfolios of Big Pharma companies led to dramatic shifts not only in the target customer audience but also in the fundamental approach that these firms had to take regarding customer interaction, promotion and distribution systems, as well as the way of making profit. Even more significant changes could be observed in R&D sphere where Big Pharma companies have been intensively developing symbiotic relationships with innovative biotechnological firms. Given their effective and flexible R&D mechanism, the dynamic biotech firms have already become the most attractive participants of Big Pharma emerging innovation ecosystems. The author concludes that most of today's Big Pharma companies represent a hybrid business model meaning parallel development of the traditional blockbuster and the new specialty pharma models. This combination allows pharmaceutical giants to retain effective control over the rapidly changing global industry marketplace.

Keywords: global pharmaceutical corporations, blockbuster business model, specialty pharma model, biotech sector, innovation ecosystems.

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The COVID-19 pandemic forces us to take a closer look at the logic of the development of the global pharmaceutical industry. The combination of high science intensity and social significance of its products gives obvious relevance to the study of the main trends and drivers of change in the business models of the largest pharmaceutical corporations over the last quarter of a century.

CHALLENGES FOR THE TRADITIONAL BLOCKBUSTER MODEL

The concept of a business model describes a system of the basic characteristics of an enterprise (firm) that determine the fundamental scheme of construction and interaction of mechanisms for customer value creation, distribution and capture [1, 2, 3]. In practice, this means highlighting a number of the backbone elements inherent to the firm, including the mechanism for creating customer value and distributing it among target customer groups, the mechanism for generating profit (monetization of the value created), as well as the way of using available resources and processes to ensure sustainable interaction between the two mechanisms.

The so-called blockbuster model has been typical for the leaders of the global pharmaceutical industry. It has evolved as a solution to the triple challenge, that is characteristic of any knowledge-intensive business: 1) management of long-term risks and their rewarding; 2) integration of knowledge across diverse research areas; 3) cumulative accumulation of knowledge [4, p. 473].

Large pharmaceutical companies have to perform extremely expensive research and development (R&D) on a wide range of areas of medicine therapy in order to find the most promising drugs in terms of potential sales. To do this, they start from identifying the large segments of the target customer audience who need certain medicines. Then, significant investments are made in the development and market promotion of the perspective drugs, their patent protection is ensured, and large-scale advertising campaigns are carried out. The expectation is that some of the new medicines will become blockbusters, meaning that their sales will exceed $1 billion per year.

There are two factors critical for the functioning of the blockbuster model: the size of the market and fairly long period of the developer's monopoly position in relation to the sales of relevant pharmaceuticals. After all, most attempts to develop medicines end in failure. The costs and risks associated with these processes become justified only when huge revenues are earned due to the outstanding market success of a particular medicine.

The boom of the blockbuster model occurred in the last two decades of the 20th century. According to expert estimates, just over one decade, from the early 1990s to the early 2000s, it created more than $1 trillion of shareholder value for Big Pharma firms. [5]. For example, Lipitor (from the group of statins – cholesterol lowering drugs) during the patent period (14.5 years) brought US-based Pfizer about $125 billion in sales and about $80 billion in operating profits before taxes. There are many other blockbuster drugs whose sales revenue exceeded the costs of their creation and promotion by 40–50 times (!) [6].

However, since the beginning of the 21st century, one could notice a trend of declining performance of the blockbuster model. Researchers are increasingly predicting scaling down or even final collapse of this business model, and such forecasts have become a kind of mainstream in the analysis of the global pharmaceutical industry [5, 7, 8, 9]. Experts see the main problem in the rapid and poorly controlled rising costs of pharmaceutical R&D, especially related to clinical trials of medicines and their market promotion [10]. Indeed, according to a special study for the period from 1997 to 2008, the average cost of developing and promoting a single medicine (before obtaining approval for sale) in the United States increased by almost 2.5 times (from $1.04 billion to $2.56 billion), meaning an average growth rate of about 8.5% per year [11].

Since the second half of the 2000s, regular waves of so-called patent cliffs have been adversely affecting the performance of the blockbuster model. It was at this time that the drug bestsellers created in the late 1980s – early 1990s began to lose patent protection one by one. As a result, in 2007–2012, in the US market alone pharmaceutical giants lost about $60 billion of their overall sales [12]. For the period of 2015–2020 such losses have been estimated at $215 billion [13].

While in the past leaders of the pharmaceutical market could slow down the process of their blockbusters' sales decrease even after the loss of patent monopoly (mainly due to their heavily advertised brand names), now the possibilities of this "soft landing" began to narrow sharply. The main reason was the spread of firms specializing in the production of generics (drug analogs containing the same quantity and quality of the active substance as in the original medicines). By the mid-2000s, the rate of filling the market with competing generics had become so high that blockbuster medicines began to loose up to 90% of their multibillion-dollar sales and profits just a few weeks after the expiration of their patent protection [14].

Another trend adversely affecting the viability of the blockbuster model was related to the strengthening of state controls over pharmaceutical prices, which had a serious impact on the pricing mechanism in the industry. Instruments of direct or indirect price control are now actively used in most countries with developed pharmaceutical markets to limit the growth of prices for medicines. Moreover, industry experts expect tightening of state controls over pharmaceutical prices, as well as other measures to limit their further increase.

All these processes undermine the performance of the traditional business model. However, if the blockbuster model loses its viability, then the importance of blockbuster drugs in the key pharmaceutical markets should decline. The same downward trend should have been observed in the dynamics of the share of blockbusters in the sales of global pharmaceutical corporations. However, nothing like this happens. In 2001–2019, blockbusters clearly strengthened their dominant position in the sales of almost all major therapeutic areas [15]. As for the importance of blockbusters in the total sales of Big Pharma, it is also growing. In 2019, in the group of the 10 world's largest pharmaceutical corporations, the share of blockbusters averaged 65.2% of total sales, or 4.8 percent increase compared to 2018 [16, p. 15]. The leaders of the global pharmaceutical industry (as well as the industry as a whole) retain leading positions in profitability compared to most other industries [17, p. 4].

In other words, predictions about the decline of blockbusters in the global pharmaceutical markets turned out to be clearly premature, although the pro-

Table. The world's largest pharmaceutical firms in terms of annual sales of medicines, 1990, 2011, and 2019

1999		2011		2019	
Firms	Sales, USD billion	Firms	Sales, USD billion	Firms	Sales, USD billion
Merck & Co	5.2	*Pfizer*	56.4	*Roche*	48.2
Bristol Myers Squibb	4.7	*Novartis*	51.6	*Novartis*	46.0
Glaxo	4.5	*Merck & Co*	40.1	*Pfizer*	43.9
SmithKline Beecham	4.0	*Sanofi*	39.5	*Merck & Co*	40.9
Ciba-Geigy	3.8	*AstraZeneka*	37.0	*Johnson & Johnson*	40.0
American Home Products	3.5	*Roche*	34.9	*Sanofi*	35.0
Hoechst	3.5	*GlaxoSmithKline*	34.5	*Abbvie*	32.4
Johnson & Johnson	3.3	*Johnson & Johnson*	27.7	*GlaxoSmithKline*	31.3
Eli Lilly	3.0	*Abbott*	25.9	*Takeda*	29.1
Bayer	3.0	*Teva*	23.9	*Bristol Myers Squibb*	25.2
Roche	2.9	*Eli Lilly*	23.7	*AstraZeneka*	23.2
Sandoz	2.9	*Takeda*	17.8	*Amgen*	22.2
Rhone Poulenc	2.9	*Bristol Myers Squibb*	16.4	*Gilead Sciences*	21.7
Pfizer	2.8	*Bayer*	16.4	*Eli Lilly*	20.1
Schering-Plough	2.2	*Amgen*	16.3	*Bayer*	18.6

Compiled by the author from: [19, 20].

cesses noted above do have a negative impact on the performance of the traditional business model of Big Pharma. In order to explain this seeming contradiction, it is important to analyze the efforts of global pharmaceutical corporations aimed at adapting to changes in the business environment.

EMERGING SPECIALTY PHARMA MODEL

One of the initial directions of strategic adaptation of the leading pharmaceutical corporations was the expansion of the product portfolio and R&D and production base through mergers and acquisitions. Since the second half of the 1990s, the global pharmaceutical industry has seen the wave of mega mergers and acquisitions, which had significantly changed its competitive landscape. A number of new pharmaceutical giants emerged including Novartis (a result of merger between Swiss Ciba-Geigy and Sandoz, 1996), AstraZeneca (a result of merger between Swedish Astra AB and British Zeneca Group, 1999), Aventis (a result of merger between German Hoechst AG and French Rhone Poulenc S.A., 1999), GlaxoSmithKline (a result of merger between British GlaxoWellcome and SmithKline Beecham, 2000). The continuation of these integration processes can be also seen in the accession of the Franco-German Aventis to the French Sanofi (2004), the takeover by Pfizer of another US-based pharmaceutical giant – Warner-Lambert (2000), and the merger between Merck & Co. and Schering-Plough (2009).

The largest pharmaceutical corporations considered mega M&A deals as a response to threats for the viability of their traditional business model focused on the regular release of blockbuster drugs to the market. The accelerated growth of the size of their businesses and globalization were supposed to ensure cost reduction due to economies of scale, as well as risk reduction by diversifying corporate business portfolios in the face of declining efficiency of R&D and expiration of exclusive patent rights on the most profitable medicines.

One of the most important consequences of the wave of mega M&As was the formation of the top group of the world's largest pharmaceutical corporations, which became known as Big Pharma. This elite of the global pharmaceutical business stands out from other industry players not only in size but also in the global scope of business operations[1] (see the table).

It is important to note that, despite the significantly increased competitive pressure and constant shifts in the hierarchy of the leadership group, its composition is rather stable. If one compares the rankings of the largest pharmaceutical companies in 1990 and 2019 (in terms of drug sales), one can see that all of

[1] It would be worth noting that the share of the foreign component in total assets of the 11 largest pharmaceutical firms in 2019 averaged 69.6%, in sales it reached 79.3%, and in the number of employees – 71%. The combination of these indicators placed Big Pharma to the group of leaders in terms of average transnationalization index (73.3%) in comparison with the largest multinational firms from other industrial sectors (author's calculation based on: [18]).

the 15 participants in the 1990 ranking managed to remain in the 2019 list in one or another way (see the table). Seven of them even retained their former names having significantly increased the size of their business through acquisitions. The rest acquired new names (Novartis, Sanofi, GlaxoSmithKline, and AstraZeneca) as a result of mergers (sometimes performed as multi-stage deals and in most cases by mutual consent of shareholders).

The consolidation of assets enabled global pharmaceutical corporations to take the way of the active expansion in emerging markets (primarily in China, India, as well as in the largest countries of the Middle East and South America), which were considered a new promising field of operations. In 2010, the volume of the pharmaceutical segment of emerging markets was estimated at approximately $150 billion, and by 2015, it has grown to $245 billion [21].

However, despite the relatively high growth dynamics of emerging markets, attempts of the direct transplantation of the traditional business model to the new environment have encountered a number of specific barriers. The causes for "rejection effect" include the chronic underfunding of the healthcare sector in these countries and the low income level of most consumers, which significantly limited their ability to buy new expensive medicines. Under the conditions of scarce national health budgets, the governments of many developing countries are forced to reserve the bulk of available funds for the purchase of basic or so-called priority medicines, only in exceptional cases providing market access to truly innovative drugs. A serious barrier to the use of the traditional business model of Big Pharma was also the weakness of patent protection of medicines in many emerging markets, which was often encouraged by the national governments striving to develop local production of generics.

In general, the ability of the largest pharmaceutical corporations to adapt to adverse changes in the business environment by means of extensive development, especially through attempts to simply extend the blockbuster model to emerging markets, has proved to be very limited. Under such circumstances, Big Pharma firms began an active search for a new business model.

First of all, the changes were reflected in the restructuring of the product portfolio by shifting the focus to new categories of the target audience of end users (patients). While in the boom period of the blockbuster model (1995–2005), primary care medicines generated up to 80% of the revenue of Big Pharma companies, in the following decade, the share of specialty medicines[2], including biological ones, aimed at treating previously incurable diseases, began to grow rapidly in their product portfolios. For example, in 2010–2014, the average growth rates of sales of specialty drugs amounted to 9.7% for Novartis, 10.6% for Johnson & Johnson, 11.4% for Bayer and 11.7% for Pfizer, and in the case of Bristol Myers Squibb, they even reached 41.7% [22, p. 382].

This shift in focus reflects the overall restructuring of the global pharmaceutical market, in which specialty medicines are playing an increasingly prominent role. While in 2010, their share in the total sales of prescription medicines was about 18%, in 2019 it increased to 29%, and by 2026, it is estimated to reach 35% [23, 24].

Why does the accelerated growth of the share of specialty medicines in the product portfolios of the largest pharmaceutical corporations imply the emergence of a new business model? The thing is that the new orientation towards the development and production of such medicines means a number of shifts that largely change the approach to creating customer value and its capturing. Significant shifts are taking place in almost all key areas of firms' activities, including their interaction with customers, approaches to the development of new products (medicines), methods of their market promotion and profit generation (monetization).

Specialty drugs, by definition, are developed for a very limited customer audience. Unlike primary care medicines, which are aimed at the global markets and hundreds of millions of potential customers, they are initially developed with an eye to relatively small market niches of medicines prescribed by specialty doctors. The number of patients for whom such medicines are developed is usually much less than 100 million people, and most often only a few tens of millions of patients worldwide.

The main therapeutic areas of application of specialty medicines include oncology, severe neurological diseases (such as Alzheimer's and Parkinson's diseases), autoimmune disorders (including multiple sclerosis, type I diabetes, and rheumatoid arthritis),

[2] One of the most important classifications of prescription medications developed by pharmaceutical companies is their division into two large groups: primary care medicines and specialty care drugs. The former are usually aimed at the prevention and treatment of general or chronic diseases and prescribed by general practitioners, family doctors, internists, and pediatricians. Among the main therapeutic areas for which such drugs are used, in particular, are hypertension, dyslipidemia (metabolic disorders of cholesterol and other lipids), type II diabetes, asthma, chronic obstructive pulmonary disease. The latter are prescribed by specialty doctors and are aimed at treating more severe and rare diseases.

as well as rare diseases and difficult-to-treat severe forms of some common diseases, such as asthma or migraine. Despite widely recognized danger of these diseases (especially in developed countries), the development of medicines for their treatment for a long time remained largely outside the interests of the global pharmaceutical corporations, primarily due to the fact that such drugs with their relatively narrow audience did not fit into the traditional blockbuster business model.

By the mid-2000s, the situation in this area began to change. Big Pharma firms have started to realize that increased investments and increased risks associated with the development and promotion of innovative and often pioneering (never used before) drugs for categories of patients previously considered incurable can be compensated by a significant increase in prices of such medicines.

Despite the general tightening of price control measures, such price increases have usually not met with serious opposition in developed countries, most of which have adopted legislative acts aimed at stimulating the development of medicines for the treatment of rare (orphan) diseases. It is no coincidence, that the share of specialty drugs in the total number of blockbusters has increased dramatically over the past two decades. While in 2003, 70% of all blockbusters accounted for primary care medicines, by 2019, 77% of them were in the group of specialty drugs [25, 26].

Entering the markets of specialty medicines required global pharmaceutical corporations to make significant changes in their customer interaction approaches, and to restructure their systems of distribution and market promotion. The differences from the traditional business model focused on the mass sales of blockbuster products are even visible at the stage of determining the target audience of end consumers (patients). In the case of specialty medicines, this audience is divided into numerous segments that often require very different methods of work. At the same time, although prescribing doctors are still the priority targets of marketing efforts taken by pharmaceutical firms, in this case the requests of specialty doctors are much more complicated and diverse compared to what can be observed when working with general practitioners. In particular, taking into account significantly higher prices for specialty medicines (especially for rare diseases), sales representatives of pharmaceutical corporations often have to prove to specialty doctors not only their therapeutic effectiveness but also competitive advantages in terms of the therapeutic effect/price ratio. In many cases, sales personnel has to help specialty doctors in developing complicated schemes to finance the purchase of expensive medicines (when neither insurance companies nor patients themselves are ready to pay the required sums on their own). They are also supposed to provide doctors with regular information about price fluctuations for the desired medicines (in comparison with competitors).

Very significant changes are also taking place in distribution systems. While medicines prescribed by general practitioners can be purchased in ordinary pharmacies, specialty drugs are either distributed through specialty pharmacy chains or come to patients only during their stay in specialty clinics (due to the required storage conditions or specifics of taking such medicines).

SYMBIOSIS WITH BIOTECH

One of the most important factors behind the changes in Big Pharma strategies was not only the growing market potential of specialty medicines but also the rapid rise of relatively modest in size, but very dynamic biotech firms that are distinguished by fundamentally different approach to drug development. While the drugs developed by traditional pharmaceutical companies have chemical basis (so-called small molecules), the creation of biological medicines is based on processes that reproduce the functions of cells of a living organism (in biotechnological production processes microorganisms and enzymes are used to make medicines based on the so-called large molecules).

Innovative biologic medicines have proven to be an effective therapeutic response to many rare diseases. In addition, compared with traditional drugs, the development of analogs of biologics is much more complicated task and its results are more difficult to predict. Unlike chemical generics, biosimilars may differ significantly from the original in their effect on the human body, which necessitates additional clinical trials. Therefore, even after the expiration of patents, the market positions of biotech companies developing successful medicines are protected quite well.

While the first stages of biotech development in the 1980s and almost until the end of the 1990s passed almost unnoticed by global corporations, from the beginning of 2000s the interest of Big Pharma in this segment began to grow very rapidly. The pharmaceutical giants paid particular attention to the ability of biotech firms to create effective R&D mechanisms that ensure the development of new medicines with enviable regularity. From the point of view of the innovation mechanism, biotech firms evidently stand

out with a number of critical advantages compared to traditional leaders of the pharmaceutical industry.

First, the small size gives them considerable flexibility. Having only a few people with decision-making power at the top of the management pyramid, their organizational structures are much less bureaucratic, which makes it much faster to make key decisions regarding financing of promising projects (or killing unsuccessful ones) at the early stages of drug development. In large companies, on the contrary, the presence of numerous divisions (often competing with each other) significantly lengthens the decision-making process. Besides, these decisions often turn out to be suboptimal due to the conflicts of interest of top managers.

Second, biotech firms differ from Big Pharma companies by a significantly higher "risk appetite", which is largely due to different sources of R&D financing. Big Pharma firms traditionally used mainly their own funds for these purposes. All of them are public corporations, whose shareholders expect steady growth in capitalization and return on invested capital, giving priority to short-term financial results (based on quarterly reports). Therefore, many key decisions in such companies are taken based on the opportunities to increase revenues or to limit rising costs. In many cases, this implies a desire to reduce risks by any means without going beyond the existing competencies, which automatically leads to the curtailment of risky innovative projects. As for biotech firms, the main sources of financing for them have traditionally been venture funds and private equity funds, which are more focused on risky investments and tolerant to long payback periods.

Third, in comparison with the Big Pharma, biotech firms have closer ties with specialized research centers and universities that conduct fundamental research. Many biotech firms were not only founded by people from academia but also have well-known scientists in the relevant R&D areas among their owners or chief executives. It is no coincidence that, according to HBM Partners, the share of new medicines launched to the US market (registered in the US), that were originally developed in the laboratories of small biotech firms, increased from 31% to 63% over the period of 2009–2018 [27].

The R&D potential of biotech has become especially attractive for pharmaceutical giants striving to retain their leadership in a rapidly changing landscape of the industry where innovations have always been the main key to success. The fastest way for Big Pharma companies to penetrate in biotech segment was taking over the most successful biotech firms. During 2010–2020, the total value of such acquisition deals increased from $27.9 billion to $118 billion (i.e. by 4.2 times) [28, 29].

It is very characteristic, that in many cases one of the main motives for these acquisitions was the desire of Big Pharma companies to introduce the unique creative biotech culture, which has long been lacking in their overly bureaucratized research units. Practice has shown, however, that embedding even some elements of the innovative culture of biotech firms after their acquisitions into the rigid management structures and processes of global pharmaceutical giants would face serious difficulties. Therefore, Big Pharma companies began to focus more and more on the involvement of biotech firms in their innovation ecosystems where participants can maintain almost complete independence.

The development of such ecosystems has already become one of the most important trends significantly changing the entire innovation landscape of the pharmaceutical industry. What is meant here is the emergence of a whole network of external innovation partnerships around Big Pharma, based on the so-called open innovation mechanisms. Some idea of the scale of R&D and technological cooperation activities of pharmaceutical giants within such ecosystems is given by special studies assessing the contribution of external organizations to the development of new medicines.

According to German experts, by 2015, the drug development pipelines of global pharmaceutical corporations on average were about 50% made up of medicines developed in collaboration with external partners. At the same time, for a number of Big Pharma companies, this share was even higher, for example, 56% for Merck, 57% for AstraZeneca, 59% for Bristol Myers Squibb, and 72% for Sanofi [30, p. 407]. Like in many other modern industrial sectors, the innovation ecosystems formed around pharmaceutical giants involved technology firms of various sizes, specialized research centers and universities. But in the case of Big Pharma, biotech firms quickly moved to the forefront of the most attractive partners, as cooperation with them ensured strong synergetic effect, especially in terms of minimizing costs and risks of pharmaceutical giants at the most difficult initial stages of their R&D activities.

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The expansion of global pharmaceutical corporations into the specialty drug markets has inevitably led them to the need of mastering a new business model. In contrast to the traditional approach designed for

the development and sale of blockbuster medicines for the treatment of mass diseases, the specialty pharma model focuses on smaller market segments covering patients with severe chronic or rare diseases. Such market reorientation entailed a significant change in the entire architecture of the industry, most vividly reflected in the emerging symbiosis between the largest pharmaceutical corporations and innovative biotech firms.

Certainly, the active development of the new business model by Big Pharma firms does not mean that blockbuster medicines are completely fading into the past. On the contrary, statistics show that they continue to bring pharmaceutical giants a significant share of total sales and profits. This is due to a number of reasons. On the one hand, a considerable part of Big Pharma business continues to focus on the development of traditional blockbuster drugs aimed at primary care. On the other hand, more and more specialty medicines themselves are becoming next-generation blockbusters reflecting dominant trends in the structure of demand in the main pharmaceutical markets. Moreover, the global COVID-19 pandemic created additional opportunities for successful sales of entire series of new blockbusters, especially in the field of antivirals and anti-COVID vaccines. In other words, the majority of Big Pharma companies are nowadays characterized by a hybrid business model implying parallel development of the traditional blockbuster model and the model of specialty pharma that ensures the growing production of the next-generation blockbusters. This hybrid approach allows pharmaceutical giants to cover a much larger share of the rapidly changing global market.

The prospects for further evolution of Big Pharma business models are determined by a number of new trends that also define the future of the global healthcare sector as a whole. These trends include personalization of treatment based on digital technologies (particularly big data analytics and artificial intelligence), the development of preventive medicine (aimed at preventing the development of diseases and pathologies through early diagnosis and the introduction of lifestyle changes). It is also necessary to mention the spread of so-called curative therapy, which can ensure the recovery of the patient with one-time or very time-limited corrective intervention that eliminates the very cause of disease (for example, through the use of gene or cell therapy methods). All these largely disruptive trends for the industry will inevitably force global pharmaceutical corporations to embark on a new round of fundamental restructuring of their business models that obviously will be formed on the basis of new-generation digital technologies and much closer interaction with various high-tech partners.

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ТРАНСФОРМАЦИЯ БИЗНЕС-МОДЕЛЕЙ "БОЛЬШОЙ ФАРМЫ"

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Аннотация. Анализируются основные направления и факторы изменений типичных бизнес-моделей глобальных фармацевтических корпораций на протяжении последней четверти века. Особое внимание уделено динамично развивающимся процессам научно-технического взаимодействия фармацевтических гигантов с малыми и средними биотехнологическими фирмами, ставшего основой формирования инновационных экосистем. Перспективы дальнейшей эволюции бизнес-моделей "Большой фармы" автор связывает с новейшими трендами персонализации терапии на основе цифровых технологий и развития превентивной медицины.

Ключевые слова: глобальные фармацевтические корпорации, бизнес-модель блокбастеров, модель специализированной фармы, сфера биотеха, инновационные экосистемы.

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