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Information and analysis support for pharmaceutical business management

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Abstract. The present study emphasizes growing importance of information support for pharmaceutical companies. Information provides not only decision-making and its transfer between firm's departments but also increasing the company's competitiveness by obtaining and collecting some additional data on plan numbers deviations. It also ensures adding new scientific laws, inventions and novelties to the total body and capacity of knowledge and technical solutions.

1. Introduction

The topicality of the pharmaceutical market research is, first and foremost, related to its increasing social significance, which is revealed in immanent population need for recovery and a limited ability of manufactures and suppliers to meet this need. A high level of social significance in a pharmaceutical market is due to a low level of demand elasticity for the price of medicines. For example, in the mid-2000s, the Government of the Russian Federation began to pay more attention to the health care sector including development of the pharmaceutical market. In 2009 the strategy of the pharmaceutical industry development for the period up to 2020 was approved. According to this programme, some strategic actions are supposed to be done in due sequence. They will enable to come up to a totally new level of the pharmaceutical market development and to provide the population of the Russian Federation with medicines and health care products. Achieving a totally new level of the pharmaceutical market development is associated with intensification of information and analytical activity of pharmaceutical companies both in the sphere of drug design and production and in the sphere of circulation and realization of medicines by wholesale and retail suppliers.

Information analytics (hereinafter referred to as IA) of a company involves obtaining, analysing, collecting and accumulating information with further foresight to the work and development of a pharmaceutical company. Using foresight in the strategy of transnational business provides an in-depth analysis of alternatives and proves to be a foundation for understanding strategic corporation challenges and opportunities [1]. In future, new and coming into service technologies in the field of information support and analysis will objectively lead to the transformation of a labor market [2].

According to many researchers, information management and analysis can greatly increase labor efficiency of enterprises [3]. Its enhancement will give a necessary boost for the development of the economy of the whole country [4] taking into account the existing macroeconomic situation in the long run [5]. But in any case, the possibility of accelerating economic development is connected with changing the growth model [6] and also with pursuing a well-balanced monetary policy [7].

2. Results and Discussion

The need to develop and bring new medicines to a market is connected with the search for competitive advantages of pharmaceutical companies which result from cost savings. The formation of the competitive environment of a pharmaceutical market takes place under the influence of a large number of factors. They can be divided into internal factors such as: internal resources of the company, pricing policy, product policy, personnel policy, strategic and financial management, and external ones like development of the world economy, government regulation, level of technological development, level of cultural development, availability of natural resources.

Globalization of the world economy and implementation of the concept of sustainable development result in increased competition in a pharmaceutical market. Cost savings are linked not only with production activities of a pharmaceutical company but also with savings on advertising and marketing communications. Apart from that, mergers and acquisitions in a pharmaceutical market contribute much to cost savings thanks to joint research efforts. Development of health care as a sector of the economy is determined by the growth of innovation activity [8], investment attractiveness of the pharmaceutical industry [9] and a pharmaceutical market as a whole. Health care costs continue to increase in the world every year. This growth is usually associated with GDP level, and it is most noticeable in mature markets, which form the bulk of pharmaceutical industry's revenues. As a rule, the higher GDP level of a country, the greater is its cost of the health care system.

An important factor in the smooth running of a holding pharmaceutical company is transfer of reliable and timely information. The IA structure of a pharmaceutical company is given in Figure 1.
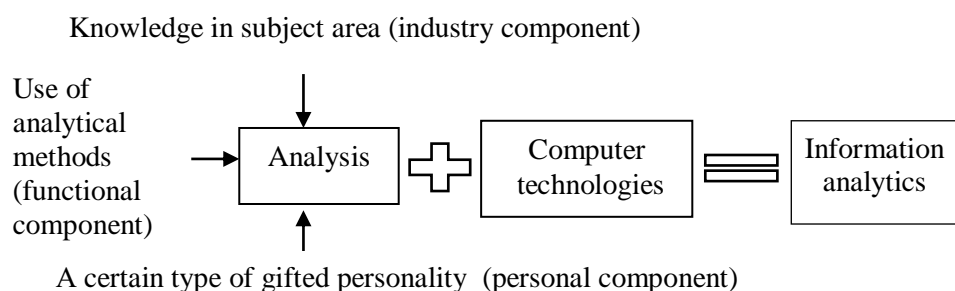

Figure 1. IA structure of a pharmaceutical company (authors').

To transfer reliable and updated information it is necessary to use various data processing systems capable of solving problems in various areas (trade and procurement, accounting, warehousing), and in the field of accounting automation, organization of the technological process of medicines production and medical products. Improving efficiency of pharmaceutical businesses is one of the priorities for the development of the Russian economy in accordance with the state programme of the development of the pharmaceutical and medical industry for 2013-2020 [10]. First of all, this refers to supplying pharmaceutical companies with commodities from external and internal warehouses via intra-company channels, because information is data that helps to reduce costs and increase efficiency of a pharmaceutical company (Table 1).

Table 1. IA tasks within a pharmaceutical company.

Task	IA types	Necessary data	Information sources
Increasing company's competitiveness	Analysis of the market situation. Defining the company's market share	Market structure and development trends data	Statistics and analytics of market conditions
	Analysis of market segments in accordance with the selected criteria	Market characteristics	Questionnaire of professionals and consumers

Task	IA types	Necessary data	Information sources
Development of goods production program	Identification of consumer preferences and the degree of their satisfaction	Main characteristics of potential customers	Data on the criteria and characteristics of market segmentation
	Process of evaluation of goods by buyers	Attitude of buyers to goods	Testing product name and packaging quality using group discussions and focus groups
	Evaluation of the program of goods production in terms of the economic goal of the company	Market prices on goods and quantity of sold products	Primary and secondary information
	Selection of promising areas of product range development	Main market trends and conditions	Primary and secondary information
Defining price policy	Selection of pricing methods in the context of actual market prices and forecast data	Data on the minimum price and competitors' prices	Statistical price level data and audit data for companies' pricing policy
	Selection of distribution channel participants and their motivation	Transportation costs and sales revenue data.	Corporate reports and surveys of intermediaries and buyers
Selection of distribution channels	Selection of stocking location, methods of storage and the inventory management system	Data on purchasing power of the area and storage costs evaluation	Social and demographic statistics
	Evaluation of efficiency of wholesale and retail companies	Data on potential sellers and buyers	Special inquiry, monitoring, survey
Advertising campaign development	Evaluation of efficiency of promotional activities	Data on the market saturation degree in terms of product life cycle	Corporate reports and advertising costs analysis
	Evaluation and selection of advertising media	Data on the availability of advertising media	Cost of standard advertising media
	Monitoring results of advertising activity	Data on economic advertising efficiency	Corporate reports and sales volumes

The pharmaceutical industry is recognized to be socially significant nowadays. That is why receiving timely information aimed at further processing and using obtained results in the process of production activities is crucial. A key step towards increase of pharmaceutical company's competitiveness and its internationalization is a fully developed management system. Mergers and acquisitions occurring in a pharmaceutical market lead to reorganization of a newly formed company [11]. There is also a need to optimize a range of products, but first of all, it is necessary to change an organizational structure. The organizational structure of a pharmaceutical company is a structure consisting of several branches that have a management company as a centralized monitoring and management body. Automation of such management system allows reducing the risk of making management mistakes.

The topicality of this study lies in the fact that leading pharmaceutical companies spend significant financial resources on information technologies which make it possible to reduce the costs of planning and managing all information flows concerning raw materials, products, services, and processing transactions. They also serve to retain and strengthen their positions in the global market in view of the internationalization of the global economy.

According to the authors, in future, business-entities that are not, for any reason, responding to the changing conjuncture of a pharmaceutical market may face the problem of reducing their competitiveness and attractiveness of their shares. Virtually, implementation of modern information technologies in pharmaceutical companies will contribute much to business development. They bring the following benefits:

1. electronic document management, which allows to automate the stages of the life cycle of documents from design to archiving. Advantages of electronic document management should be recognized as follows:

- consumables expenses decrease, such as: payment for postal and courier services, photocopying materials, minimizing labor costs;

- work of all departments and divisions of a company in one information space;

- safety and security of documents thanks to use of data encryption and electronic signatures which minimizes the risk of information leakage.

When staff members deal with document flow their productivity increases and mistakes in documents processing due to the human factor are reduced.

2. production technology management which contributes to increasing labor productivity due to automatic and semi-automatic production lines, product quality control, reduction of technological errors associated with human factors;

3. automation of accounting and planning and decision-making system. To make management more effective it is necessary for the manager to change some parameters of the visual assessment of the events happening. The introduction of automated accounting systems mediates:

- acceleration of obtaining operational statistics;

- elimination of errors in the calculations, entailing additional time and money costs;

- improving the quality of labor of accountants due to the minimization of routine work.

 In the context of this study, it should be noted, that over the past few years, the pharmaceutical industry has undergone important changes related to updating molecular approaches. In the future, these approaches will allow diagnosing diseases more accurately and proposing solutions on patient's health advocacy.

In accordance with the choice of the company's development strategy, information technologies, given below, can be an important key to this transformation:

1. computing systems with petaflop-level performance (1015 operations per second). The generation of machines with such productivity in the pharmaceutical industry will create conditions for the mass use of biomolecular simulation;

2. Grid technology which is a rapidly developing tool uniting resources of thousands (millions) of personal computers, a huge «virtual» system with powerful computational capabilities. The implementation of this technology means solving tasks in the field of screening for the coincidence of DNA sequences, conducting analytical actions on sales volumes and promotion devices in real time mode;

3. bio-simulation which is the process of creating a virtual or real model of the human body based on the information of a CT scanner, NMR scanner or ultrasound scan results. It is used for improving quality in diagnosis, modeling planned operations, producing individual prostheses or implants, analysing treatment results. Predictive bio-simulation allows pharmaceutical companies to reduce the number of laboratory tests devoted to finding out potential drugs, their health effect in terms of efficiency and safety;

4. intelligent markers and radio frequency identifiers designed to enhance product control at any production stage, as well as at the distribution stage. The main advantage of RFID is the replacement

of slow and inefficient traditional production processes and the switch of pharmaceutical manufacturers to the production of a range of complex drugs in smaller batches;

5. modern servers which are virtual networks of information storage with transparent integrated file and archiving management systems focused on storing vast amount of information;

6. Production Process Analysis (PAT) technology which continuously and automatically monitors production processes in real time mode. The introduction of PAT technology largely improves the quality of production processes, resource conservation, since it is more profitable to carry out the correction online than to reject products that are beyond the limits of tolerance from the standard.

3. Conclusion

The future development of a pharmaceutical market is associated with consumers' need to be healthy and to be satisfied with the need for medicines. Based on business competition, a pharmaceutical market being an emerging economic system of interaction between its main subjects of production and consumption meets the population needs, and namely, it provides people with socially significant products in maintaining their health.

The existence of a modern pharmaceutical market is thus predetermined by its vital priority. It is due to the fact that consumers demonstrate their inherent need for recovery but meeting this demand is associated with manufacturers' limited capacities based on some technological and legal factors which affect manufacturers. In modern economies, only healthy people, with other things being equal, will be more competitive in a labor market. Therefore, they will be able to create greater added value from the production factors at their disposal and thus improve their well-being.

This study allowed the authors of the article to draw the conclusion that pharmaceutical industry has a significant investment potential. While developing it should be supported by the permanent implementation of information technology in production and financial cycles. In this regard, the advantages of using the corporate portal of the organization, electronic document management, systems of client, supplier and partner interaction management have been updated. However, it has been found by the authors that automation of information technology processes is accompanied by many problems such as staff competence, difficulty of setting up and adapting to individual business characteristics, lack of resources and poor development of the financing mechanism of training companies' staff to information technology skills.

A pharmaceutical market is one of the markets with developed competition, associated with a large volume and variety of medicines, a large number of suppliers (including importers), significant interchangeability of drugs within groups, development of pharmacy chains. Increased market competition in the pharmaceutical industry makes companies look for new ways of development. Therefore, leadership in a pharmaceutical market will belong to those companies that will be able to recognize the emerging perspectives and opportunities for their development before their main competitors can do that.

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