Tetyana V. Shabelnik[1]

MODELLING OF BUSINESS PROCESSES CONTROL IN MARKETING-ORIENTED MANAGEMENT AT A PHARMACEUTICAL COMPANY

The paper presents a model of business process control within pharmaceutical company marketing-oriented management. The model allows minimizing the risk of failures in the implementation of pharmaceutical products and reducing the costs of pharmaceutical companies due to continuous recording, analysis and monitoring of business processes.

Keywords: *business process; marketing-oriented management; pharmaceutical company; pharmaceutical product.*

Тетяна В. Шабельник

МОДЕЛЮВАННЯ КОНТРОЛЮ БІЗНЕС-ПРОЦЕСІВ МАРКЕТИНГО-ОРІЄНТОВАНОГО УПРАВЛІННЯ ФАРМАЦЕВТИЧНИМ ПІДПРИЄМСТВОМ

У статті розроблено модель контролю бізнес-процесів маркетинго-орієнтованого управління фармацевтичним підприємством, яка сприяє мінімізації ризиків виникнення збоїв при реалізації фармацевтичних товарів та призводить до скорочення витрат фармацевтичного підприємства за рахунок безперервного обліку, аналізу й контролю реалізації бізнес-процесів.

Ключові слова: *бізнес-процес; маркетинго-орієнтоване управління; фармацевтичне підприємство; фармацевтичні товари.*
Форм. 12. Літ. 11.

Татьяна В. Шабельник

МОДЕЛИРОВАНИЕ КОНТРОЛЯ БИЗНЕС-ПРОЦЕССОВ МАРКЕТИНГ-ОРИЕНТИРОВАННОГО УПРАВЛЕНИЯ ФАРМАЦЕВТИЧЕСКИМ ПРЕДПРИЯТИЕМ

В статье разработана модель контроля бизнес-процессов маркетинг-ориентированного управления фармацевтическим предприятием. Модель позволяет минимизировать риски возникновения сбоев при реализации фармацевтических товаров и сократить затраты фармацевтического предприятия за счет беспрерывного учета, анализа и контроля бизнес-процессов.

Ключевые слова: *бизнес-процесс; маркетинг-ориентированное управление; фармацевтическое предприятие; фармацевтические товары.*

Problem statement. Permanent economic development processes and the competitive situation at the pharmaceutical market make contemporary pharmaceutical enterprises actively search for improvement reserves in managerial decision-making with the purposes of timely prevention of problems and efficiency increase.

According to the principle of optimality, the development of any dynamic system does not depend on its initial state or initial management decisions, but is completely determined by the current state of the system and the impacts that will be performed in the future (Bellman, 1960).

Thus, the aim of optimal marketing-oriented management (MOM) at pharmaceutical enterprises is to determine the configuration of critical elements in its cur-

[1] Mykhailo Tugan-Baranovskyi Donetsk National University of Economics and Trade, Ukraine.

rent functioning, enabling the performance as an organized dynamic system with feedback, and the identification of deviations in the execution of business processes from the planned schedule.

Recent publications analysis. A significant contribution to the study of business processes organization control in MOM was made by domestic and foreign experts: O.V. Arefyeva and T.V. Lutska (2009), K.K. Chuprov (2005), S.M. Kovalev (2003), V.S. Ponomarenko et al. (2013), A.V. Surzhenko (2009) and others.

But, it should be noted that monitoring of business processes in MOM at a pharmaceutical company did not get sufficient attention. Namely, there are no systemic developments, models or methods of business processes control for MOM at a pharmaceutical company.

The research objective. The aim of the study is to develop a model for pharmaceutical company's business processes marketing-oriented management control.

Key research findings. Based on the notion of a dynamical system, a mechanism for the implementation of business process within MOM of a pharmaceutical enterprise is a transitional state function of the following form (Ponomarenko et al., 2013, Rubcov, 2001):

$$f : T \times X \times \Omega \times \mathrm{B} \to \Omega, \tag{1}$$

where f – the function of the state transition of a pharmaceutical company in the process of control implementation; T – set of time points in which the state of pharmaceutical companies is studied; X – the set of input values of business processes of MOM at a pharmaceutical enterprise; Ω – the set of possible states of business process in MOM at a pharmaceutical enterprise; B – the set of management actions, which serves as a factor in the transition of the business process between its possible states.

The values of the transition function of the state of the business process of MOM at a pharmaceutical company (1) perform the following states:

$$s_i(t) = f(t_0, t, s_i, x_p, \varpi_m) \in \Omega, \tag{2}$$

where $s_i(t)$ – the i-th state of business process of MOM at a pharmaceutical company; t_o, t – respectively, the initial and the current time points in a dynamic system; x_p – the value of the p-th option of business process of MOM at a pharmaceutical company.

Business process within MOM of a pharmaceutical company passes the state $s_i(t)$ at the point of time $t \in$ T when at the initial moment of time $t_o < t$ it was in the state $s_i(t_o) \in \Omega$, and during the time interval $[t_o, t)$ was under the effects ϖ_m.

According to key provisions of the control theory, the optimal control of any complex dynamic system involves the development and implementation in its functioning of such influences that allow generating the greatest synergy effect from their implementation (Lysenko et al., 2013; Gerasimov and Gerasimov, 2011). Then, the function of business processes control with MOM is a procedure for determining the effectiveness which can be formalized in the following way (Aref'yeva and Lutska, 2009):

$$f(p_i(t), \varpi_m(t), p_i) \to extr; \tag{3}$$

$$p_i(t) - p_i < \nu \tag{4}$$

or

$$p_i(t) - p_i = 0; \tag{5}$$

$$p_i(t), p_i \in \overline{P}, \tag{6}$$

where $p_i(t)$ – the degree of achievement by a pharmaceutical company of a certain operation point in time; p_i – the purpose of operation of pharmaceutical enterprises; ν – the set value of deviation of operational characteristics of pharmaceutical enterprises; $\overline{P}$ – the area of operational goals of pharmaceutical enterprises.

To determine the effectiveness of business processes of a pharmaceutical company, to measure time based on the likely conditions and alternative scenarios, we can use the PERT method, which is a technique for estimating the time required for performance of work under a schedule for a particular project (Eddous and Stensfild, 1997; Kovalev, 2003).

Thus, the duration of business process at a pharmaceutical company (T_{BP}) and the deviation of its expected value (σT_{BP}), which is the main performance indicators for any business process at a time can be computed as the sum of the weighted average of operations estimates on the business process critical path, and the standard deviation relative to the average duration (Gerasimov, 2009):

$$\begin{cases} T_{BP} = \sum_{k=1}^{K} \left(\dfrac{t_k^{\min} + 4t_k^{\exp} + t_k^{\max}}{6} \right), \\ \sigma_{T_{BP}} = \sqrt{\sum_{k=1}^{K} \left(\dfrac{t_k^{\max} - t_k^{\min}}{6} \right)^2}, \end{cases} \tag{7}$$

where $t_k^{\min}$ – the optimistic duration of the k-th operation of business process within MOM at a pharmaceutical enterprise $k = \overline{1,K}$; $t_k^{\exp}$ – the most likely duration of the k-th operation of business process of MOM at a pharmaceutical enterprise $k = \overline{1,K}$; $t_k^{\max}$ – the pessimistic duration of the k-th operation of business process of MOM at a pharmaceutical company $k = \overline{1,K}$.

Since the key objective in management of any organization is bringing the operational business processes in line with the goals and objectives defined at a certain stage of its operation, the control should assist in keeping up business processes under any conditions to ensure the withdrawal from invalid states.

This is possible only if the coordination of procedures in the execution of all business process, their control and elimination of violations in the implementation of the operations that cause deviations from the established operational plan.

We model the runtime of business processes within MOM at a pharmaceutical company within the deadline of T_{BP}^{O}. Then, given that the timing of execution of the business process is asymptotically normal with the expectation $M(t_{S_i})$ and variance $(\sigma_{T_{BP}})^2$, the likelihood of its implementation within the deadline, that is, when the

total duration of operations is within the interval $M(t_{S_i}) \le T_{BP} \le T_{BP}^{O}$, can be calculated by using the tables of normal distribution of a random variable, where the value of the argument is computed as follows:

$$Z(t_{S_i}) = \frac{T_{BP}^{O} - M(t_{S_i})}{\sigma_{T_{BP}}}, \tag{8}$$

where $Z(t_{S_i})$ – the value of normal distribution function values of the period of business process of MOM at a pharmaceutical company.

The state of the inventory system, which directly affects the stability of the organization in the long run, is checked after each new order for pharmaceutical goods purchase. Then to the key performance indicators of business processes within MOM, enabling the control over business qualitative characteristics we include the following:

$$KPI_1 = \frac{W(D,H)}{W(D,H)+W'(D,H)} \times 100\%; \tag{9}$$

$$KPI_2 = \frac{W(D,H)}{T_{period}} \times 100\%, \tag{10}$$

where KPI_1 is the ratio of the number of orders for the purchase of the i-th cluster of pharmaceutical products, upon inclusion the inventory system, to the total number of procurement requests for the i-th cluster of pharmaceutical products; KPI_2 – the ratio of the number of orders for the purchase of the i-th cluster of pharmaceutical products, upon the inclusion to the inventory system, to the number of working days in the period under analysis; T_{period} – the number of working days in the period during which the analysis of business process at a pharmaceutical company is carried out.

The combined ratio, which describes the criticality of deviations in the parameters of business processes at a pharmaceutical enterprise, can be calculated using the following equation:

$$Risk\_Priority\_Number = \prod_{a=1}^{3} B_a^b; \tag{11}$$

$$B_1^b = \overline{1,10}, B_2^b = \overline{1,10}, B_3^b = \overline{1,10}, \tag{12}$$

where *Risk_Priority_Number* is the number of priority risk in business process at a pharmaceutical enterprise; B_1^b is the estimated probability of deviations detection in business process of MOM at a pharmaceutical company against the set values; B_2^b – evaluation of the probability of deviations in business process within MOM against the set values; B_3^b – the impact of deviations of business process at a pharmaceutical enterprise from the set values.

The greatest number of priority risk acts as a guide in developing appropriate control measures aimed at reducing the level of risks criticality. Control over business processes of MOM at a pharmaceutical enterprise must be organized in a way to ensure the minimum value average cost of business process in each of possible conditions is.

Conclusions and prospects for further research. Control over business processes in marketing-oriented management at a pharmaceutical company through continuous recording, analyzing and forecasting the implementation of business processes helps minimizing failures and risks in pharmaceutical production and thus reduce the overall pharmaceutical company costs. Prospects for further research is to implement the models for control over business processes in marketing-oriented management at a pharmaceutical company.

References:

Ареф'єва О.В., Луцька Т.В. Бізнес-процеси підприємств сфери послуг: фактори, формування, конкурентоспроможність: Монографія. – К.: Європейський університет, 2009. – 96 с.

Беллман Р. Динамическое программирование. – М.: Издательство иностранной литературы, 1960. – 400 с.

Герасимов Б.Н., Герасимов К.Б. Введение в эффективность экономических систем: Монография. – Пенза: МАКУ, ПГУ, 2011. – 120 с.

Герасимов Б.Н., Герасимов К.Б. Управление операциями организации: подпроцессы, потенциал, эффективность: Монография. – Пенза: МАКУ, ПГУ, 2009. – 164 с.

Ковалев С.М. Бизнес-процессы и бизнес-проекты компании // Консультант директора.– 2003.– №21. – С. 12–14.

Лысенко Ю.Г., Беленко Д.В., Кравченко В.Н. Имитационное моделирование экономических систем: прикладне аспекты: Монография / Под. ред. Ю.Г. Лысенко. – Донецк: Ноулидж, 2013. – 359 с.

Рубцов С.В. Уточнение понятия «бизнес-процесс» // Менеджмент в России и за рубежом.– 2001.– №6. – С. 27–33.

Сурженко А.В. Реструктуризация и реинжиниринг бизнес-процессов как инструменты повышения конкурентоспособности предприятия // Вестник Белгородского университета кооперации, экономики и права.– 2009.– №2. – С. 419–423.

Теорія та практика моделювання бізнес-процесів: Монографія / В.С. Пономаренко, С.В. Мінухін, С.В. Знахур та ін. – Х.: ХНЕУ, 2013. – 244 с.

Чупров К.К. Экспресс-метод диагностики бизнес-процессов компании // Консультант директора.– 2005.– №20. – С. 27–30.

Эддоус М., Стэнсфилд Р. Методы принятия решений / Пер. с англ. под ред. член-корр. РАН И.И. Елисеевой. – М.: Аудит, ЮНИТИ, 1997. – 590 с.

Стаття надійшла до редакції 23.06.2015.