ОРГАНІЗАЦІЯ ТА ЕКОНОМІКА ФАРМАЦІЇ

DEVELOPMENT OF THE REGRESSION MODEL FOR FORMING AND PLANNING THE ASSORTMENT OF PARAPHARMACEUTICAL GOODS

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The results of studies on development of a regression model for forming and planning the assortment of parapharmaceutical goods are presented; it reflects the specificity of parapharmaceutical goods selling. Using the results of analysis of factors for selling the skin care products with the help of the given indicators will allow to organize a model of the pharmacies functioning, which is more efficient from the economic point of view and provide the population with qualitative parapharmaceutical products in full.

The problem of formation of the assortment of parapharmaceutical products sold in pharmacies remains one of the most important priorities of the pharmaceutical market. In the current economic conditions for the effective operation of pharmacies it is advisable to pursue the product strategy aimed at diversification of the parapharmaceutical products range that are most in demand [1, 2, 3].

Among the scientific works related to the modeling process of parapharmaceuticals works by Z.M.Mnushko, S.V.Zhakhalova and others are of a great significance [2, 3].

The aim of this work is to develop a regression model for forming and planning the assortment of parapharmaceutics sold by the example of the skin care products that reflect the specificity of the parapharmaceutical goods selling most of all.

Materials and Methods

When conducting this study such methods as logical, generalization, planned calculations, statistical and the analytic hierarchy process (AHP) have been used. The most important factors influencing on selling the skin care products have been calculated and analyzed. These factors have been calculated mathematically and expressed numerically. On the basis of it the regression model for forming and planning the assortment of parapharmaceutical goods has been proposed.

Results and Discussion

Currently the domestic parapharmaceutical market has a number of trends, in particular, saturation and overload with imported skin care products, many domestic enterprises duplicate parapharmaceutical goods, which range have long been formed at the pharmaceutical market, availability of market niches filled and unclosed market windows. Therefore, the problem of formation of the assortment of parapharmaceutical products sold in pharmacies remains one of the most important priorities of the national pharmaceutical market. Based on the current conditions of the parapharmaceutical market development there is the need for development of methods for selling such goods that are in greatest demand, namely medicinal cosmetics [1, 3].

We have proposed a regression model for forming and planning the assortment of parapharmaceutical products developed using the AHP. By the method of AHP factors influencing on selling of the skin care products have been detalized in more simple component parts and processed sequentially using pairwise comparisons. After performing all pairwise comparisons compliance, i.e. consistency of statements, has been determined. As a result, the relative degree of interaction of factors in the hierarchy has been found; it allows to determine which factors influencing on consumption of parapharmaceutics are important.

Analysis of the literature sources and the results of questioning of pharmaceutical professionals and consumers of parapharmaceutical goods has allowed to determine seven key factors influencing on selling parapharmaceuticals in the pharmacy, namely:

x_1 − is the maximum range and availability of the related products on sale;

x_2 − is the quality of parapharmaceuticals;

x_3 − is the price of the goods;

x_4 − is the staff motivation (actions among sellers);

x_5 − is the quantitative assessment of providing benefits in relation to producers;

x_6 − is actions for buyers;

x_7 − is the quantitative use of promotions [1, 2, 3].

To construct the regression model we performed a test for statistical independence of factors (x_1–x_7) to be analyzed. For this purpose the Pearson correlation coefficients (τ_{kj}) between all pairs of factors have been calculated (Tab. 1).

Table 1

The coefficients of Pearson correlation calculated between all pairs of factors

	x_1	x_2	x_3	x_4	x_5	x_6	x_7
x_1	1	0.234029	-0.18867	0.235524	0.192978	0.235143	0.234938
x_2	0.234029	1	0.053946	0.080607	0.234214	0.150683	-0.11494
x_3	-0.18867	0.053946	1	0.202973	0.235858	0.231849	0.229327
x_4	0.235524	0.080607	0.202973	1	0.232789	0.1335	0.154859
x_5	0.192978	0.234214	0.235858	0.232789	1	0.189612	0.020905
x_6	0.235143	0.150683	0.231849	0.1335	0.189612	1	0.179748
x_7	0.234938	-0.11494	0.229327	0.154859	0.020905	0.179748	1

Table 2

The values of the Student t-test to determine the significance of the Pearson correlation coefficients

	x_1	x_2	x_3	x_4	x_5	x_6	x_7
x_1		2.25809	1.802272	2.273368	1.84497	2.269473	2.267377
x_2	2.258091		0.506794	0.758625	2.259984	1.429859	1.085384
x_3	1.802272	0.506794		1.944536	2.276782	2.235858	2.210177
x_4	2.273368	0.758625	1.944536		2.245447	1.263655	1.470449
x_5	1.844971	2.259984	2.276782	2.245447		1.81158	0.196149
x_6	2.269473	1.429859	2.235858	1.263655	1.81158		1.7141
x_7	2.267377	1.085384	2.210177	1.470449	0.196149	1.7141	

To test the significance of the correlation coefficients we have used the Student t-test

$$t_{\kappa p} = \frac{|\tau_{kj}|\sqrt{N-2}}{\sqrt{1-\tau_{kj}^2}},$$

its calculated value (Tab. 2) is compared with tabulated data $t_{1-\alpha/2}(N-2)$ (according to the law of the Student distribution) where N – is the sample size, $(N-2)$ – is the number of degrees of freedom; α – is the error of the 1-st kind when taking the main hypothesis H_0. The level of significance $(1-\alpha/2)$ has been selected with the value of 0.95. In this case, there is the hypothesis H_0 about independence of factors when $t_{\kappa p} < t_{1-\alpha/2}(N-2)$. Otherwise, the hypothesis H_1 when there is a relationship between the factors is taken.

It has been found that all values of the Student t-test is less than the table value $t_{0.975}(88) = 2.2804005$. Thus,

the zero hypothesis is taken since there is no relationship between pairs of the factors analyzed (all factors are independent).

Therefore, we have formed a regression model of the factors influencing on selling of medicinal cosmetics by the pharmacies, namely:

$$y = 0.127 - 0.275x_3 + 0.271x_2 + 0.246x_5 + \\ + 0.244x_7 + 0.155x_1 + 0.1x_6 + 0.066x_4.$$

Testing for the significance of the regression model coefficients has shown that all the coefficients are significant.

As a result of the research it has been found that using the analytic hierarchy process the relative degree (intensity) of the interaction of factors can be determined (Figure).
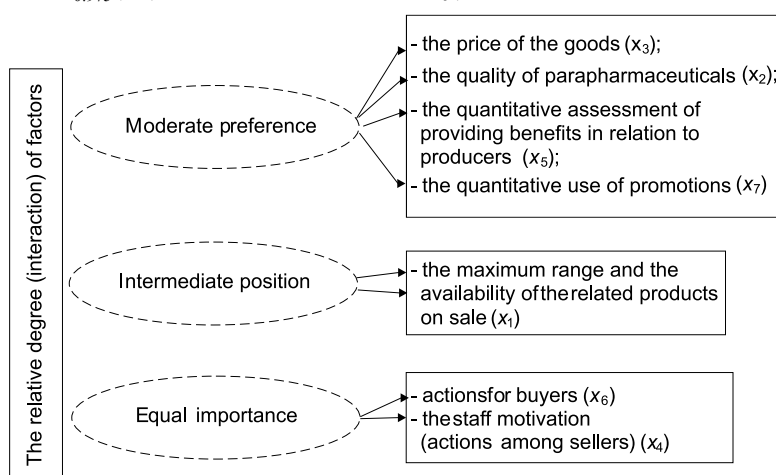

Fig. Determination of the relative degree (interaction) of factors influencing on selling parapharmaceutical products in pharmacies.

The regression model contains seven indicators that reflect the specificity of selling, forming and planning the assortment of parapharmaceutical goods as a socioeconomic parameter. In general, using the results of the analysis of parapharmaceutical goods selling with the help of the following indicators will allow to organize a more efficient model of pharmacies functioning from the economic perspective and fully provide the population with qualitative medical and preventive aid regardless of the material and social status in the society.

CONCLUSIONS

1. Using our regression model of the process for forming and planning the assortment of parapharmaceutical goods (by the example of medicinal cosmetics) it has been found that the factors of a «reasonable benefit» are the price of the goods (x_3), the quality of parapharma-ceuticals (x_2), the quantitative assessment of providing benefits in relation to producers (x_5) and the quantitative use of promotions (x_7). That is, these factors are the most important, probable and attractive. The factor of the maximum range and availability of related products on sale (x_1) is in the «intermediate position» in the regression model. Equally important are such factors as actions directed to end buyers (x_6) and the staff motivation (actions among sellers) (x_4).

2. The regression model for forming and planning the assortment of parapharmaceutical goods by the example of medicinal cosmetics has been developed; it reflects the specificity of parapharmaceutical goods selling. It can be used both by internal and external users of information in organization of the activity of manufacturers, distributors, pharmacies.

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УДК 615.32:659.1:34
РАЗРАБОТКА РЕГРЕССИОННОЙ МОДЕЛИ ДЛЯ ФОРМИРОВАНИЯ И ПЛАНИРОВАНИЯ АССОРТИМЕНТА ПАРАФАРМАЦЕВТИЧЕСКИХ ТОВАРОВ
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Приведены результаты исследований по разработке регрессионной модели для формирования и планирования ассортимента парафармацевтических товаров, отражающие специфику реализации парафармацевтических товаров. Использование результатов анализа факторов реализации средств лечебной косметики позволит организовать более эффективную с экономической точки зрения модель функционирования аптечных учреждений и в полном объёме обеспечить население качественными парафармацевтическими товарами.

УДК 615.32:659.1:34
РОЗРОБКА РЕГРЕСІЙНОЇ МОДЕЛІ ДЛЯ ФОРМУВАННЯ ТА ПЛАНУВАННЯ АСОРТИМЕНТУ ПАРАФАРМАЦЕВТИЧНИХ ТОВАРІВ
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Наведені результати досліджень з розробки регресійної моделі для формування та планування асортименту парафармацевтичних товарів, що відображають специфіку реалізації парафармацевтичних товарів. Використання результатів аналізу факторів реалізації засобів лікувальної косметики за допомогою наведених показників дозволить організувати більш ефективну з економічної точки зору модель функціонування аптечних закладів та у повному обсязі забезпечити населення якісними парафармацевтичними товарами.