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Determination of Minimal Sized Series of Sewing Goods, According to the Rate of Profitability

Key words: *sewing goods, price segments, method of optimization of technological process, series of rational assortment*

Annotation: *In the given article it is shown the results of the work on determining minimal size of series and volumes of producing goods, supplied given rate of profitability for several pricing segments of the market. The price level is determined by belong to the goods of given quality level to one or another price of category, depending on a customer.*

In the modern economical conditions for the enterprises of light industry the main role is to gain the problems of increasing competitiveness and work out technological processes on producing sewing goods for several segments of market.

Enterprises try to cover all the layers of consumers, to spread the influence on the market (price segments of the markets) independently of their social and financial conditions. Price rate is determined by belonging the unit of given quality level to one or another price category, depending on purchasing power of the consumer (1).

However the requirements to the goods of several price category is essentially distinguished from material quality and technology of processing, which is finally influenced on the unit price and becomes to determine on establishing technique- economical indicators of the unit for supporting competitive priority on working with resident and retail buyers.

Actuality of the problem, the development of technological process on manufacturing of sewing goods for several price segments of the market, supplying given product profitability, especially increase in the term of mini-series production with flexible assortment policy. Decision of such problem is effective with the help of automation system and methods of mathematical modeling.

In the given article are shown the results of the research on determining the minimal size of series and volume of production, which supply the given rate of profitability for several price segments of the market. On the base it is taken the method of optimization of technological process, which was offered by N.S. Mokeeva and Z.N.Bakanovskaya (2,3).

There aren't technique- economical indicators on account of several price groups for sewing goods on the settlement of optimal volume series generally accepted method in light industry. Therefore, general view of the problem to determine minimal size of series is done on account of existing practice of design. Rational assortment of series- it is a set of clothes

models of one certain type (purpose) of various constructive decision, united not only by size and age characteristics, but also by other indicators, reflected the peculiarities of typical group of consumers (such as, buyer's ability, social status, attitude to the fashion, traditions and e.t.c.). On calculating series of rational assortment it is preferable to foresee opportunity of maximum diversity exterior of goods, by minimal technical work of main details. As the object of research it is chosen the models of men's costume of three price levels which are produced in the enterprises LLC "Rauf-Aziz" (Namangan city). The list of initial information for determining minimal size of series for each model includes:

-common information about a unit;

-information about fabrics, the cost of fabrics from which is made a unit (upper part, lining, trimming, furniture e.t.c.);

-total amount of producing expenditure (energy, gas, feeding, transport, service);

-given rate of profitability;

-information about equipments.

In the purpose of formalism the problem we determine by x_i- the quantity *i*- the production (the quantity of given model's units); *A*- permanent (fixed) expenditures linked with the work *i*- production (working out patterns and design of technological documents for the model); B_i- specific changeable expenditures linked with preparation of the unit *i*- production (the cost of fabrics and making the unit. C_i- realization price of the unit *i*- production; *P(x)*- operating profit x_i units of production O_i *(x)*- receipts; *R(x)* total expenditures of manufacture. The purpose of expenditures for manufacture $R_i(x)$, receipts O_i *(x)* and profits *P(x)* from realization x_i units of productions may be shown in the following way:

$$R_i(x) = A_i + B_i x_i = 70000 + 166949{,}6 * 20 = 275304{,}6 \quad (1)$$
$$Q_i(x) = C_i x_i = 230390{,}45 * 20 = 4607809$$
$$P_i(x) = (C_i - B_i)x_i - A_i = (230390{,}45 - 166949{,}6) * 20 - 70000 = 1268817{,}0$$

Where accepted linear dependence by shown indicators from the size of series x_i. The terms supplied given rate of profitability of production may be expressed in such way:

$$\frac{(C_i - B_i)x_i - A_i}{A_i + B_i x_i} \geq r_i = \frac{(230390{,}45 - 166949{,}6) * 20 - 70000}{70000 + 166949{,}6 * 20} = 35 \quad (2)$$

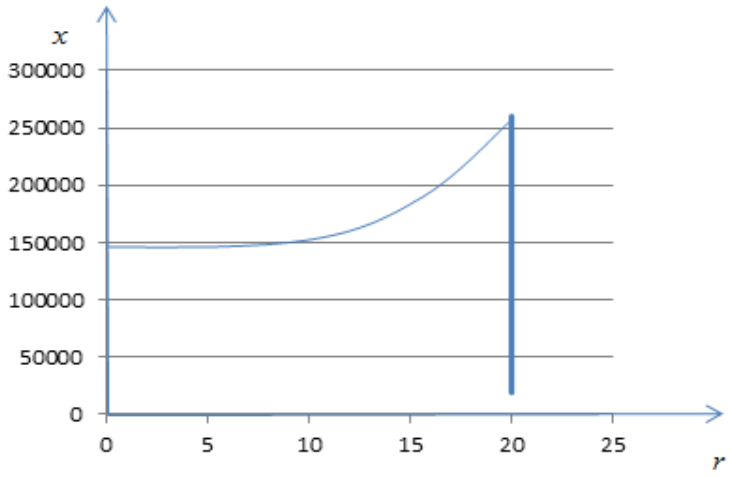
Where r_i- given rate of profitability of production of *i*- unit. From ratio (2) we think, that minimal meaning of the size of series will be defined in such way.

$$x_i = \frac{A_i(1 + r_i)}{C_i - B_i(1 + r_i)} = \frac{70000 * (1 + 35)}{230390{,}45 - 166949{,}6(1 + 35)} = 41 \quad (3)$$

On the picture 1 is shown the dependence minimal size of series from the rate of profitability of production.

Marginal meaning of profitability $r_0(x \to \infty, r \to r_0)$ corresponds large-scale production, meaning $r = 0$ corresponds not entailing loss of series x_{i0};

$$r_0 = \frac{C_i - B_i}{B_i} = \frac{230390{,}45 - 166949{,}6}{166949{,}6} = 0{,}38 \quad (4)$$
$$x_{i0} = \frac{A_i}{C_i - B_i} = \frac{70000}{230390{,}45 - 166949{,}6} = 1{,}1$$



Pic.1. The graph of dependence minimal size of series from the rate of profitability

Correlation (4) allows to evaluate influence of laying expenditure for the construction on minimal size of series (orders) on the stage of designing. Maximum number of models in the collection may be determined due to terms of entirely satisfaction of demand (order).

$$\sum_{i=1}^{n} x_i = V \qquad (5)$$

where *V*- volume of production in units. For example, the volume of production men's costume for high price groups is 360 units, per year (graph). *n*- the number of models in the collection.

Calculating in correlation (4) and (5) the medium-sized meaning of the sizes A_i,B_i,C_i, r_i, we get roughly evaluation of the number of models in the collection.

$$n = \frac{V\ (\bar{C} - \bar{B}(1 + \bar{r}))}{\bar{A}(1 + \bar{r})} = \frac{360\ (230390{,}45 - 166949{,}6(1 + 35))}{70000 * (1 + 35)} = 90 \qquad (6)$$

$\bar{A}$, $\bar{B}$, $\bar{C}$, $\bar{r}$ – medium-sized meaning of A_i,B_i,C_i, r_i.

Thus, the correlation (1)-(6) allow to count minimum sized of series for each models and dimension of collection in the given technique-economical indicators.

Technique-economical indicators of production output for several price segments of the market is shown in the graph.

According to the given calculation is made a program modulus "Determination of minimal-sized series" suggested method of determining minimal sized series of models on the given rate of profitability for several price segments of the market is approved in the enterprises such as LLC "Rauf-Aziz" which may be used both on planning and on designing technological processes of other types of goods.

The graph of Technique-economical indicators of production output for several price groups goods (fragment).

№		Mea.in	Name of the goods

	Name of indicators		Men's jacket (high price group)	Men's jacket (middle price group)	Men's jacket (low price group)
1	Permanent (fixed) expenditures linked with working out *i*-production (working out of pattern and design-technological documents) for a model	A_i	70000	55000	45000
2	Spesific, changeable expenditures linked with making of a unit *i*-production	B_i	166949,6	124949,7	117750,2
3	The price of realization *i*-production	C_i	230390,45	162434,61	141300,24
4	The profit from realization x_i – production, thousand sums	$P(x)$	1268817,0	5622735,0	4710008,0
5	Reciepts, thousand sums	$Q(x)$	4607809,0	24365191,5	28260048,0
6	Complete expenditures of manufacture, sums	$R(x)$	3408992,0	18797455,0	23595040,0
7	Given rate of profitability	r	35	30	20
8	The number of *i*- production (minimum-sized of series) units	x_i	20	150	200
9	Profit from a unit of *i*- production, sums		63440,85	37484,9	23550,04
10	Volume of manufacture, units per year	V	360	15000	60200

Thus, it is solved the problem of placed minimal sized series for each model and the number of models on the whole, making the collection on the base of reversing process a plan from wish rate of profitability, according to technique-economical indicators and market's demands.

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