This article represents an economic-mathematical model of optimization of the production program of sewing enterprise, which provides a gradual transition from the production made on commission to manufacture products from own raw materials, and optimizes the product mix in the limited internal resources.

[2-7]

F – ( );

a_i^1 – ;

a_i^2 – ;

b_i^1 – ;

b_i^2 – ;

c_{ij} — j ;

d_{ij} — j ;

h_i^A —   ;

h_{ij} — j;

h_i^Z —   ;

$g_i^{A_1}$ —   ;

g_{ij} —
j;

$g_i^{Z_1}$ —   ;

$g_i^{A_2}$ —   ;

$g_i^{Z_2}$ —   ;

x_i^1 —   ,   ;

x_i^2 —   ,
;

y_{ij} —   , j
               ;

z_{ij} —   , j
.

:

$$F = \sum_{p=1}^{2}\left(\sum_{i=1}^{m} a_i^p x_i^p - \sum_{i=1}^{m} b_i^p x_i^p \right) - \sum_{i=1}^{m}\sum_{j=1}^{k} c_{ij} y_{ij} - \sum_{i=1}^{m}\sum_{j=1}^{l} d_{ij} z_{ij} \to \max .$$

.

:

$$\sum_{p=1}^{2} x_i^p \le h_i^A + \sum_{j=1}^{k} h_{ij} y_{ij} , \qquad = 1, 2, \ldots, m.$$

:

$$h_i^A + \sum_{j=1}^{k} h_{ij} y_{ij} \le h_i^Z , \qquad = 1, 2, \ldots, m.$$

:

$$x_i^1 \le g_i^{A_1} + \sum_{j=1}^{l} g_{ij} z_{ij} , \qquad = 1, 2, \ldots, m.$$

:

$$g_i^{A_1} + \sum_{j=1}^{l} g_{ij} z_{ij} \le g_i^{Z_1} , \qquad = 1, 2, \ldots, m.$$

:

$$g_i^{A_2} \le x_i^2 \le g_i^{Z_2} , \qquad = 1, 2, \ldots, m.$$
,   :
$$x_i^1 \ge 0, x_i^2 \ge 0, \qquad = 1, 2, \ldots, m;$$
$$y_{ij} \ge 0, \qquad = 1, 2, \ldots, m; j = 1, 2, \ldots, k;$$
$$z_{ij} \ge 0, \qquad = 1, 2, \ldots, m; j = 1, 2, \ldots, l.$$
:
$$y_{ij} - \qquad , \qquad = 1, 2, \ldots, m; j = 1, 2, \ldots, k;$$
$$z_{ij} - \qquad , \qquad = 1, 2, \ldots, m; j = 1, 2, \ldots, l.$$

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( ):

1

, . / .

- (A^1)	- (B^1)	- (A^2)	- - (B^2)
42	32	19	15
46	34	20	16
82	58	–	–
–	–	22	17

$k = 2$

. . 2

, ,

.

2

, (C), . .		(H^A), . .	(H), . .		(H^Z), . .
40	35	140	2	1	150
36	32	70	3	2	80
30	28	20	3	3	25
25	24	10	4	3	15

$l = 3$ . . 3

, ,

.

3

(D), . .			(G^{A1}), . .	(G), . .			(G^{Z1}), . .
30	20	15	5	2	3	2	10
25	18	14	4	2	2	1	9
20	15	12	4	1	2	1	8
18	12	0	3	1	1	0	8

, . . 4

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(G^{A2})	(G^{Z2})
100	150
50	70
0	25
8	12

:

$F = 10 \cdot x^1_1 + 12 \cdot x^1_2 + 24 \cdot x^1_3 + 4 \cdot x^2_1 + 4 \cdot x^2_2 + 5 \cdot x^2_4 - 40 \cdot y_{11} - 36 \cdot y_{21} - 30 \cdot y_{31} - 25 \cdot y_{41} - 35 \cdot y_{12} - 32 \cdot y_{22} - 28 \cdot y_{32} - 24 \cdot y_{42} - 30 \cdot z_{11} - 25 \cdot z_{21} - 20 \cdot z_{31} - 18 \cdot z_{41} - 20 \cdot z_{12} - 18 \cdot z_{22} - 15 \cdot z_{32} - 12 \cdot z_{42} - 15 \cdot z_{13} - 14 \cdot z_{23} - 12 \cdot z_{33}.$

:

$x^1_1 + x^2_1 - 2 \cdot y_{11} - y_{12} \ 140;$

$x^1_2 + x^2_2 - 3 \cdot y_{21} - 2 \cdot y_{22} \ 70;$

$x^1_3 + x^2_3 - 3 \cdot y_{31} - 3 \cdot y_{32} \ 20;$

$x^1_4 + x^2_4 - 4 \cdot y_{41} - 3 \cdot y_{42} \ 10;$

$2 \cdot y_{11} + y_{12} \ 10;$

$3 \cdot y_{21} + 2 \cdot y_{22} \ 10;$

$3 \cdot y_{31} + 3 \cdot y_{32} \ 5;$

$4 \cdot y_{41} + 3 \cdot y_{42} \ 5;$

$x^1_1 - 2 \cdot z_{11} - 3 \cdot z_{12} - 2 \cdot z_{13} \ 5;$

$x^1_2 - 2 \cdot z_{21} - 2 \cdot z_{22} - z_{23} \ 4;$

$x^1_3 - z_{31} - 2 \cdot z_{32} - z_{33} \ 4;$

$x^1_4 - z_{41} - z_{42} \ 3;$

$2 \cdot z_{11} + 3 \cdot z_{12} + 2 \cdot z_{13} \ 5;$

$2 \cdot z_{21} + 2 \cdot z_{22} + z_{23} \ 5;$

$z_{31} + 2 \cdot z_{32} + z_{33} \ 4;$

$z_{41} + z_{42} \ 5;$

$x^2_1 \ 150;$

$x^2_2 \ 70;$

$x^2_3 \ 25;$

$x^2_4 \ 12;$

$x^2_1 \ 100;$

$x^2_2 \ 50;$

$x^2_3 \ 0;$

$x^2_4 \ 8.$

' :

$x^1_i \geq 0, x^2_i \geq 0, \quad = 1, 2, 3, 4;$

$y_{ij} \geq 0, \quad = 1, 2, 3, 4; j = 1, 2;$

$z_{ij} \geq 0, \quad = 1, 2, 3, 4; j = 1, 2, 3.$

:

$y_{ij} - \quad , \quad = 1, 2, 3, 4; j = 1, 2;$

$z_{ij} - \quad , \quad = 1, 2, 3, 4; j = 1, 2, 3.$

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[1, *175*].

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Visual Basic Microsoft Excel.

' (. 5-7).

$$x_i^1 \quad x_i^2, \quad . \quad .$$

(X^1)	(X^2)
5	135
4	66
8	0
0	10

$$y_{ij}, \quad .$$

(Y)	
0	0
0	0
0	0
0	0

$$z_{ij}, \quad .$$

(Z)		
0	0	0
0	0	0
0	2	0
0	0	0

$$F_{(0)}{}^* = 1\,114 \quad . \quad .$$

. - , ,

. , .

. - , $z_{32} = 2$

3.

, $F_{(0)} = 1\,048 \quad . \quad .,$

6,3%.

, .

1. ,

20%. . 8 (

):

1

A^1	B^1	A^2	B^2	C		H^A	H		H^Z	D			G^{A1}	G			G^{Z1}	G^{A2}	G^{Z2}
42	32	19	15	40	35	140	2	1	150	30	20	15	5	2	3	2	10	*80*	*120*
46	34	20	16	36	32	70	3	2	80	25	18	14	4	2	2	1	9	*40*	*56*
82	58	–	–	30	28	20	3	3	25	20	15	12	4	1	2	1	8	*0*	*20*
–	–	22	17	25	24	10	4	3	15	18	12	0	3	1	1	0	8	*6,4*	*9,6*

, (. 9).

1

X^1	X^2	Y			Z		
10	120	0	0	0	1	1	
8	56	0	0	0	2	0	

8	0	0	0	0	2	0
0	9,6	0	0	0	0	0

$$F_{(1)}^{*} = 1\ 039 \quad . \quad .$$

$$F_{(0)}^{*} = 1\ 114 \quad . \quad .,$$

6,7%. '

(: $z_{12} = 1$; $z_{13} = 1$; $z_{22} = 2$; $z_{32} = 2$).

, $F_{(1)} = 946 \quad . \quad .,$

9,8%. , $x^1_1 \quad x^1_3$

,

1 3.

2. 30%.

, (. 10).

2

A^1	B^1	A^2	B^2	C		H^A	H		H^Z	D			G^{A1}	G			G^{Z1}	G^{A2}	G^{Z2}
42	32	19	15	40	35	140	2	1	150	30	20	15	6,5	2	3	2	13,0	100	150
46	34	20	16	36	32	70	3	2	80	25	18	14	5,2	2	2	1	11,7	50	70
82	58	–	–	30	28	20	3	3	25	20	15	12	5,2	1	2	1	10,4	0	25
–	–	22	17	25	24	10	4	3	15	18	12	0	3,9	1	1	0	10,4	8	12

, (. 11).

2

X^1	X^2	Y		Z		
6,5	133,5	0	0	0	0	0
5,2	64,8	0	0	0	0	0
10,2	0,0	0	0	0	2	1
0,0	10,0	0	0	0	0	0

$$F_{(2)}^{*} = 1\ 173,4 \quad . \quad ., \quad 5,3\% \quad ,$$

$$F_{(0)}^{*} = 1\ 114 \quad . \quad ., \quad 7,1\% \quad ,$$

$$F_{(2)} = 1\ 095,4 \quad . \quad . \quad z_{ij} = 0.$$

17 . . 21,9 .

., 290 372,2 . ., 28,3%.

3.

. . 12.

3

A^1	B^1	A^2	B^2	C		H^A	H		H^Z	D			G^{A1}	G			G^{Z1}	G^{A2}	G^{Z2}
42	32	19	15	40	35	140	2	1	150	30	20	15	5	2	3	2	10	100	150
46	34	20	16	36	32	70	3	2	80	25	18	14	4	2	2	1	9	50	70
82	58	–	–	30	28	20	3	3	25	20	15	12	4	1	2	1	8	0	25
41	*30*	22	17	25	24	10	4	3	15	18	12	0	3	1	1	0	8	8	12

, (.

13).

3

X^1	X^2	Y	Z

5	135	0	0	0	0	0
4	66	0	0	0	0	0
8	0	0	0	0	2	0
3	11	1	0	0	0	0

$$F_{(3)}^{*} = 1\ 127 \qquad . \qquad ., \qquad 1,2\% \qquad ,$$
$$F_{(0)}^{*} = 1\ 114 \qquad . \qquad .$$

$$y_{41} = 1.$$

$$F_{(3)} = 1\ 060 \qquad . \qquad .,$$

6,3%.

4. ,   .
,   ,   10%,

50%.   . 14   .

14

A^1	B^1	A^2	B^2	C		H^A	H	H^Z	D			G^{A1}	G			G^{Z1}	G^{A2}	G^{Z2}
42	32	19	15	*20*	*17,5*	*126*	2	1	150	30	20	15	5	2	3	2	10	100	150
46	34	20	16	*18*	*16*	*63*	3	2	80	25	18	14	4	2	2	1	9	50	70
82	58	–	–	*15*	*14*	*18*	3	3	25	20	15	12	4	1	2	1	8	0	25
–	–	22	17	*12,5*	*12*	*9*	4	3	15	18	12	0	3	1	1	0	8	8	12

,

(. 15).

15

4

X^1	X^2	Y		Z		
5	121	0	0	0	0	0
4	59	0	0	0	0	0
8	0	0	0	0	2	0
0	12	0	1	0	0	0

$$F_{(4)}^{*} = 1\ 028 \qquad . \qquad ., \qquad 7,7\% \qquad ,$$
$$F_{(0)}^{*} = 1\ 114 \qquad . \qquad . \qquad ,$$

, $y_{42} = 1.$
($y_{ij} = 0$ $z_{ij} = 0$),

$$F_{(4)} = 959 \qquad . \qquad . ($$

7,2%).

5.   ,
                                                                   10%.

(. 16).

16

5

A^1	B^1	A^2	B^2	C		H^A	H	H^Z	D			G^{A1}	G			G^{Z1}	G^{A2}	G^{Z2}
42	*28,8*	19	15	40	35	140	2	1	150	30	20	15	5	2	3	2	10	100	150
46	*30,6*	20	16	36	32	70	3	2	80	25	18	14	4	2	2	1	9	50	70
82	*52,2*	–	–	30	28	20	3	3	25	20	15	12	4	1	2	1	8	0	25
–	–	22	17	25	24	10	4	3	15	18	12	0	3	1	1	0	8	8	12

5

| X^1	X^2	Y			Z	
10	130	0	0	0	1	1
8	62	0	0	0	2	0
8	0	0	0	0	2	0
0	10	0	0	0	0	0

1,

(: $z_{12} = 1$; $z_{13} = 1$; $z_{22} = 2$; $z_{32} = 2$).

1,

$F_{(5)}^* = 1\ 210,6$ . ., 8,7% ,

$F_{(0)}^* = 1\ 114$ . . ,

$F_{(5)} = 1\ 101$ . ., 10,0%.

/

(. 1).

. 1. /

(. 2).
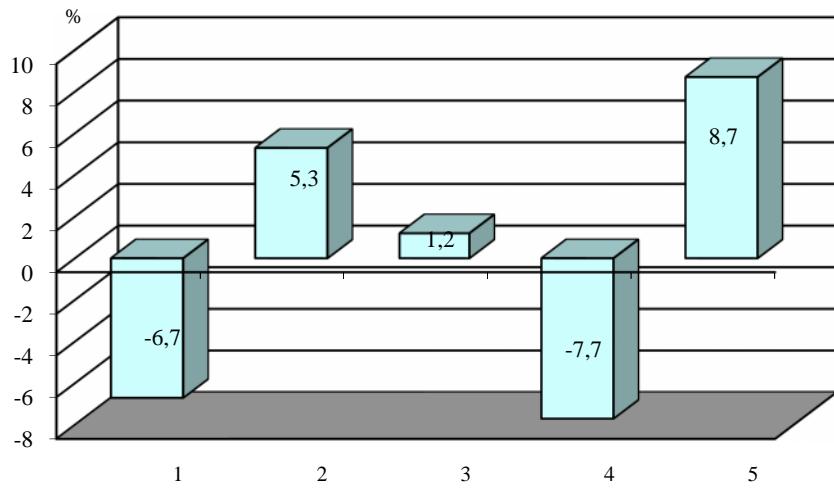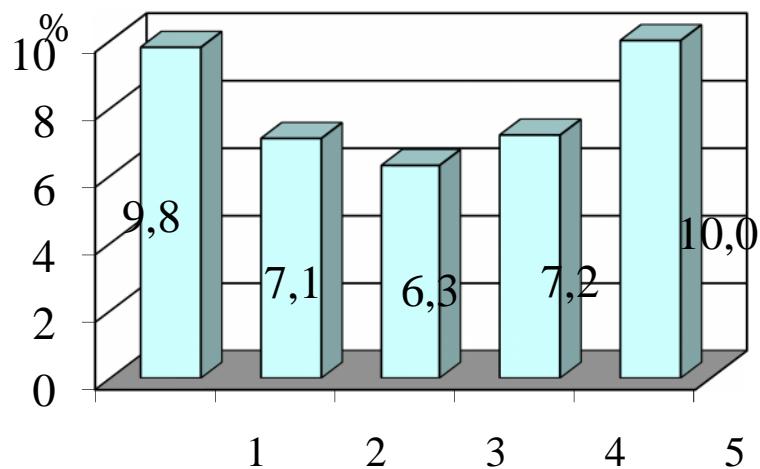
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1.   . .   : .
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2.   . .   : .   / . .   . – .:   , 2003. – 524 .

3.   . .   -
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6.   . .   / . .   . – .:   , 2003. – 269 .

7.   . .   :
  / . .   . – .:   .   , 2003. – 282 .

07.10.2010 .