RESEARCH ON OPTIMAL ALLOCATION AND USE OF INVESTMENT RESOURCES FOR AGRICULTURAL PRODUCTS PROCESSING COMPANY

CERCETĂRI PRIVIND ALOCAREA ŞI FOLOSIREA OPTIMĂ A RESURSELOR INVESTIȚIONALE PENTRU O SOCIETATE DE PRELUCRARE PRODUSE AGRICOLE

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***Abstract**: In the free market competitive system, the entrepreneurs' actions are competitive if they are efficient. By applying the method of dynamic scheduling, the optimal policy obtained by tabular calculation is upgrading in the first and third operating year, and no upgrading in the rest of the time horizon. The value of the allocated investments for the two years amounts RON 300 million. By adopting this policy, a maximum profit of RON 9179 million is obtained.*

Keywords: *investment, optimization, upgrading, development strategies, dynamic scheduling*

INTRODUCTION

The extremely high responsibility of the investment decision is given by the role of investments in the economy of economic operators, their economic, financial, social impact, the limitation of investment resources, and the risks involved. Before taking an investment decision, several inquiries, studies and calculations are made aimed to establishing the priorities regarding the allocation of resources in view of establishing the objectives which, for the economic operator are the most needed.

MATERIAL AND METHODS

The study was made for an agricultural product processing company and its aim was to repare the development strategy for a period of five years. For preparing and optimizing the strategy, the dynamic scheduling method

is used for the optimal allocation and use of investment resources. The dynamic scheduling method is based on a sequential analysis of the decision making processes by studying the phenomena in time, meaning dynamically. It can be used to optimize the use of investment resources in case that the development of activities may be affected by a decision which is aimed to the achievement of the objective specified by the economic efficiency criterion. Optimizing the distribution of an investment fund over several projects with different production capacity development options, substantiating the optimal decision regarding the repair, upgrading or replacement of used equipment are only few of the problems which can be solved with the help of dynamic scheduling.

RESULTS AND DISCUSSIONS

Preparing and optimizing the development strategy of a company are based on the
following conditions:

- value of the sold and cashed in production (Q) amounted RON 3.000 million;
- production costs related to the sold and cashed in production (C) were of RON 1.800 million
- the forecasted investments (I_t) for upgrading the fixed capital related to the sold production

incomes were of RON 130 million.

Preparing and optimizing the strategy are based on two policies which can be adopted, increase of production with an average of 8 % yearly based on several organizational measures not involving investments or with 12 % by assigning an annual investment fund for upgrading the fix capital.

Within the first policy, a policy which is marked with E, the annual rate of growth for the investment costs (I_c) will be of 5 % in years 1, 3, 5 and of 4 % in years 2 and 4. For the second policy, upgrading policy which is marked with M, the forecasted costs will increase starting with the first year as follows: 7 %, 10 %, 8 %, 10.5 %, 10 %. The value of the annual investment necessary for upgrading which will be provided from own sources will be of RON 140 million, RON 150 million, RON 160 million, RON 162 million, RON 165 million. Because the upgrading action which represents mainly the purchase of new equipment, takes place in each year

of the horizon, the investments are not included in costs and appear separately in calculations. The optimal policy for the development strategy of the company in the next five years will be modeled in tabular format. First, the profit evolution in case of applying E policy for the entire horizon is established.

Table 1

Profit evolution in case of applying E policy

Indicators	Measure Unit	Initial state	Optimization horizon					Total
			1	2	3	4	5	
Q	Million Ron	3000	3240	3499,2	3779,1	4081,4	4407,9	19007,6
Iq	%	-	8	8	8	8	8	-
C	Million Ron	1800	1890	1965,6	2063,9	2146,5	2253,8	10319,8
I_c	%	-	5	4	5	4	5	-
I_t	Million Ron	130	-	-	-	-	-	-
P_h	Million Ron	1070	1350	1533,6	1715,2	1934,9	2154,1	8687,8

By applying the operating policy without upgrading the fixed capital, a profit of RON 8687.8 million is foreseen for the entire horizon. For optimizing the investment, M policy is applied with the allocation of annual investment funds. As shown, for each stage, the decision is based on its consequences on the remaining stages (of the remaining subhorizon). For example, the optimal decision for year two is the one which maximizes the profit in 2-5 interval.

Table 2

Profit evolution in case of applying M policy -Step 1

Indicators	Measure Unit	Initial state	M_1	E_2	E_3	E_4	E_5	Total
			0	1	2	3	4	
Q	Million Ron	3000	3360	3628,8	3919,1	4232,6	4571,2	19711,7
Iq	%	-	12	8	8	8	8	-
C	Million Ron	1800	1926	2003	2103,2	2187,3	2296,7	10516,2
I_c	%	-	7	4	5	4	5	-
I_t	Million Ron	130	140	-	-	-	-	140
P_h	Million Ron	1070	1294	1625,8	1815,9	2045,3	2274,5	9055,5

By applying M policy in the first year of horizon, it was noticed that it positively influences the total profit which is increased with RON 367.7 million. Therefore, in the first year, the optimal policy is the upgrading policy.

Table 3

Profit evolution in case of applying M policy in year two- Step 2

Indicators	Measure Unit	Initial state	M_1	M_2	E_3	E_4	E_5	Total
				0	1	2	3	
Q	Million Ron	3000	3360	3763,2	4064,3	4389,4	4740,5	20317,4
Iq	%	-	12	12	8	8	8	-
C	Million Ron	1800	1926	2118,6	2224,5	2313,5	2429,2	11011,8
I_c	%	-	7	10	5	4	5	-
I_t	Million Ron	130	140	150	-	-	-	290
P_h	Million Ron	1070	1294	1494,6	1839,8	2075,9	2311,3	9015,6

It was noticed that the upgrading policy applied in year two has negative influences on the subsequent stages, generating a lower total profit than in the previous case. Therefore, in year two, the non-upgrading operating policy is optimal.

Table 4

Profit evolution in case of applying M policy in year three- Step 3

Indicators	Measure Unit	Initial state	M_1	E_2	M_3	E_4	E_5	Total
					0	1	2	
Q	Million Ron	3000	3360	3628,8	4064,3	4389,4	4740,6	20183,1
Iq	%	-	12	8	12	8	8	-
C	Million Ron	1800	1926	2003	2163,2	2249,7	2362,2	10704,1
I_c	%	-	7	4	8	4	5	-
I_t	Million Ron	130	140	-	160	-	-	300
P_h	Million Ron	1070	1294	1625,8	1741,1	2139,7	2378,4	9179

The upgrading policy for year three generates a better situation for the entire horizon, so it is optimal.

Table 5

Profit evolution in case of applying M policy in year four- Step 4

Indicators	Measure Unit	Initial state	M1	E_2	M_3	M_4 0	E_5 1	Total
Q	Million Ron	3000	3360	3628,8	4064,3	4552	4916,2	20521,3
Iq	%	-	12	8	12	12	8	-
C	Million Ron	1800	1926	2003	2163,2	2390,3	2509,8	10992,3
I_c	%	-	7	4	8	10,5	5	-
I_t	Million Ron	130	140	-	160	162	-	462
P_h	Million Ron	1070	1294	1625,8	1741,1	1999,7	2406,4	9067

Because the total profit is lower than in the previous step, the optimal policy in year four is non-upgrading operation

Table 6

Profit evolution in case of applying M policy in year five -Step 5

Indicators	Measure Unit	Initial state	M_1	E_2	M_3	E_4	M_5 0	Total
Q	Million Ron	3000	3360	3628,8	4064,3	4389,4	4916,1	20358,6
Iq	%	-	12	8	12	8	12	-
C	Million Ron	1800	1926	2003	2163,2	2249,7	2474,7	10816,6
I_c	%	-	7	4	8	4	10	-
I_t	Million Ron	130	140	-	160	-	165	465
P_h	Million Ron	1070	1294	1625,8	1741,1	2139,7	2276,4	9077

As shown in the method description, the decision taken in the last stage of the horizon is substantiated only by taking into account the objective of this stage and the optimization policy, by adding the optimal sub-policy of 1-4 sub-horizon to the optimal sub-policy of year five we obtain the optimal function

CONCLUSIONS

1. The optimal policy obtained by tabular calculation is upgrading in years one and three and non-upgrading in the rest of the time horizon.

2. The last two tables show that the highest profit in year five is obtained in case of non-upgrading operation.

3. The value of investments assigned for the two years amounts RON 300 Million. By adopting this policy, a maximum profit of RON 9,179 million is obtained.

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