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Computer system for farms (SITEFA): An opportunity for performant agricultural management

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COMPUTER SYSTEM FOR FARMS (SITEFA) - AN OPPORTUNITY FOR PERFORMANT AGRICULTURAL MANAGEMENT

ELENA COFAS¹

Abstract: *Any modern agricultural unit, regardless of profile, size, ownership and socio-economic space in which they operate, requires a management style based on flexibility, dynamism and foresight, which is inconceivable without a complex, operative and quality information, to underpin decision making. Therefore, any farmer needs objective, relevant, reliable, timely, useful, concerning: market demand, new products and technologies, the position of competitors, suppliers and customers, their performance, etc., so that their analysis to directly influence and as the competitiveness of the farm in a particular market or market segment. Based on the theme of the "Determination of economic indicators of crop production technologies and animal applied in order to increase environmental performance (costs, productivity, profitability, gross margin)" from the Sector Plan ADER 2020 was developed computer system SITEFA- a product developed and designed program-technical-economic analysis of the performances of farm economic and efficient use of production factors in classical operating conditions.*

Keywords: *agriculture, computer system, farm, management, analysis*

INTRODUCTION

SITEFA is a software developed and produced for technical and economic analysis of the performances of farm economic and efficient use of production factors in classic operating conditions.

The main structural elements of the informatic system SITEFA are:

- technical basis or hardware system, which consists of all technical means for collecting, transmitting, storing and processing data, the central site computer returns electronically.
- Software system, which includes all programs built for operation of the product, according to the functions and objectives that have been preset (profitability analysis and efficient use of factors of production).
- scientific and methodological basis, which consists of mathematical models of economic processes and phenomena, methodologies, methods and techniques for achieving information systems.
- information base, which include data undergoing processing, information flows, systems and nomenclatures codes.

MATERIAL AND METHODS

From a technical standpoint, SITEFA is an application built on a platform Microsoft Excel using Visual Basic tool because it allows to describe control structures, procedures and user functions. Visual Basic is part of Microsoft's Visual Studio package and, as well as other languages 'visual' Microsoft is focused on component interface of the program is easily possible to create Windows-standard interfaces (windows, buttons, lists etc.), without having to be written source code for this.

Visual Basic as a library of visual components (lists, calendars, menus etc.) whose components (graphics and functional) are already implemented, with the possible introduction and use of its components or realized within other applications. On the basis of information system design SITEFA stayed both elementary functions and special functions (called macros, involving macro-commands and macro-functions), the latter being in the utility of the application Microsoft Excel Visual Basic.

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RESULTS AND DISCUSSIONS

From a functional perspective, the computer system SITEFA has the following functions:

- Generating technology/technology and estimate of revenue and expenditure for each of the types of crops recognized by the system based on the input data.
- Determination economic indicators of crop production technologies.
- Maintenance of all subsystems (lists and tables) used to obtain the results generated by the computer system.
- Function to create/update: the system is equipped with a special feature for creating and updating its constants (maintenance); This function can perform the following:
 - updating /changing information contained in system nomenclatures and tables;
 - adding new records (mechanical works, manual work, materials and equipment, crop types, etc.);
 - deletion of certain information from databases;
 - looking/checking the desired information;
 - nomenclatures listing or other useful information from the system.
- Search functions, location, calculating, extracting information from the database and preparing for listing will be the most important component of the system that will be incorporated algorithms calculation procedure.

Description of information flow

In terms of construction, a computer system includes input into the system (inputs), constant system (information taken from lists and tables) and system output data (outputs or reports).

a. *The input data* is any information entered by the user of the system, according to the objective pursued, for example:

- type of culture,
- production area (plains, hills, mountains) /production system (irrigated, non-irrigated)
- used agricultural surface
- rates mechanical works,
- manual work rates,
- materials and materials prices,
- selling price main production,
- selling price secondary production,
- the subsidy per hectare,
- the proportion of different types of expenses (supplies, labor, with insurance, and general management, with the interest rate)
- values for other expenses (reduction in value on buildings and utilities, taxes and fees)
- opening balance etc.

b. *The constants* are classifications system, internal tables and tables linking the program; system uses the following tables:

- table culture
- table with manual work
- table with mechanical works
- making materials and materials
- making the necessary annual (monthly rations of forage types)
- action table for each crop plant
- table with pesticides (fungicides, herbicides).

These constants can be updated through maintenance (maintenance) nomenclatures and tables used.

c. *The output* are there ports that are generated after charging system input and constants defined, based on algorithms specific to each module design; examples:

- [illegible]

10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473
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Fig. 2. Spreadsheet „Technology”

- The spreadsheet "Prices" – in this spreadsheet user is given the possibility to insert /update the prices of raw materials and materials used for the crop; also lists the quantities which are recommended to be used for each of the selected materials(Figure 1):
 - Herbicides;
 - Fungicides;
 - Insecticides,
 - Fertilizers,
 - Other materials (string, seed treatments, etc.); seed;
 - Water for irrigation;
 - Rates mechanical works (unfinished production and production in progress).
- The spreadsheet "frame technology" (Figure 2) is generated culture technology based on prices and tariffs introduced/ updated above.
- The spreadsheet "The income and expenses" (Figure 3) is shown culture budget. It is a synthesis of all revenue and expenses that crop. The budget is calculated in three variants: no lease, the lease and lease expenses from income

	A	B	C	D	E
4	Calculatii pe hectar				
5					
6					
7	Cod: D.01				Sistem: Neirigat
8	Zona geografica:	Campie			Productia principala (kg)
9	Potential:	Mediu			Productia secundara (kg)
10	INDICATORI	U.M	VALOARE		
11			fara arenda	cu arenda in cheltuieli	cu arenda din venit
12	A. VALOAREA PRODUCTIEI	lei	5748	5748	5748
13	A ₁ . Din care productia principala	lei	5460	5460	5460
14	B (+) SUBVENTII	lei	771,5	771,5	771,5
15	C (=) PRODUS BRUT	lei	6519,5	6519,5	6519,5
16	D (-) CHELTUIELI TOTALE	lei	4223,5	4743,5	4223,5
17	D ₁ . Din care pentru productia principala	lei	3935,5	4455,5	3935,5
18	I. CHELTUIELI VARIABLE	lei	3701,1	3701,1	3701,1
19	1. Cheltuieli cu materii prime si materiale	lei	1849,92	1849,92	1849,92
20	- Sămânță și material săditor	lei	675	675	675
21	- Ingrasaminte chimice	lei	555	555	555
22	- Pesticide	lei	565,9	565,9	565,9
23	- Alte materiale	lei	54	54	54
24	2. Cheltuieli cu lucrari mecanizate	lei	1703,9	1703,9	1703,9
25	3. Cheltuieli cu irigatii	lei	x	x	x
26	4. Cheltuieli de aprovizionare	lei	55,5	55,5	55,5
27	5. Cheltuieli cu forta de munca temporara*	lei	x	x	x
28	6. Asigurari	lei	91,8	91,8	91,8
29	II. CHELTUIELI FIXE	lei	522,4	1042,4	522,4
30	- Cheltuieli cu forta de munca permanenta	lei	62,0	62,0	62,0
31	- Cheltuieli generale si de management	lei	73,4	73,4	73,4
32	- Dobanzi la credite	lei	217,0	217,0	217,0
33	- Arenda**	lei	x	520	x
34	-Amortisment pentru cladiri si utilitati	lei	170	170	170
35	E. (=) VENIT IMPOZABIL	lei	1524,5	1004,5	1524,5
36	(-) Impozite si taxe	lei	243,9	160,7	243,9
37	(-) Arenda**	lei	x	x	520
38	F. (=) VENIT NET+subventii	lei	2052,1	1615,3	1532,1
39	G. RATA VENIT IMPOZABIL (%)	%	38,7	22,5	38,7
40	H. RATA VENIT NET+subventii (%)	%	52,1	36,3	38,9
41					
42	COST DE PRODUCTIE	lei/to	937,0	1060,8	937,0
43	PRET PIATA INTERNA PREVIZIBIL	lei/to	1300	1300	1300
44					
45	* Aceste cheltuieli se regasesc la exploatatile de dimensiuni mijlocii, mari si foarte mari.				
46	** Pana la 600 kg/ha la pretul pietei (400 kg/ha grau X 1,3 lei/kg = 520 lei)				

Fig. 3. Spreadsheet „Budget for revenue and expenditure”

The spreadsheet "Standard gross margin" (Figure 4) enables calculation of standard gross margin (expressed in RON and EUR).

For the calculation of standard gross margin were considered direct costs or expenses standardized variables specific crop production such as:

- Seed and planting stock (purchased or produced on the farm)
- Chemical fertilizers,
- The purchase or manure from their own farms,
- Crop protection products,
- Crop insurance
- Water for irrigation,
- Heating,
- Specific marketing costs (cleaning, packaging)
- Other specific costs proportionate.

The specific costs are not included in labor costs, mechanization, buildings with fuels and lubricants, car repairs, depreciation and expenses made by third units. These expenses are highlighted specific cultures of their size unit activity in each culture.

	A	B	C	D	E
1	MARJA BRUTA STANDARD-UNITARA				
2	GRAU - Cod. D.01				
3	Zona geografica: Campie; Sistem neirigat; Potential Mediu				
4	Rezultate estimate pentru recolta 2013/2014				
5	CALCULATII PE HECTAR				
6					
7	Productia:	Grau boabe (4200 kg) in sol cernoziomic			
8					
9					1 EURO = 4,5383
10	GRAU neirigat	Kg/ha	Pret livrare -lei/kg-	Lei	Euro
11	Productia medie	4200,0	1,30	5460,0	1203,1
12	Productia secundara	1440,0	0,20	288,0	63,46
13	Produs brut mii lei	pe ha	pe t	euro/ha	euro/t
14		6519,5	1552,3	1436,6	342,0
15	Subventii acordate lei	771,5	0,184	170,0	0,040
16	Cheltuieli variabile lei	1941,7	0,462	427,8	0,102
17	Marja bruta mii lei	4577,8	1090,0	1008,7	240,2
18	Pondere marja bruta in produs br	70,22%			
19					
20					
21					
22	Variatia Marjei Brute in functie de diferite	Media	M.B.S	M.B.S	1 UDE=1200 E
23		kg/ha	lei	euro	
24	Productie medie mare	5040	5669,8	1249,3	1,041
25	Productie medie medie	4200	4577,8	1008,7	0,841
26	Productie medie mica	3360	3485,8	768,1	0,640
27					
28					
29	Cheltuieli variabile	Cantitatea Kg, l	Pret unitar	Total lei	Euro
30	Ingrasaminte cu N, kg sa/ha	135	3	405,00	89,2
31	Ingrasaminte. P ₂ O ₅ Kg sa/ha	60	2,5	150,0	33,1
32	Samanta Kg/ha	250	2,7	675,0	148,7
33	Insecto-fungicid Tonic Plus 2,5 l/to	0,625	183,6	183,6	40,5
34	Erbicid - Bucril universal l/ha	1	90,7	90,7	20,0
35	Fungicid - Evolus l/ha	1	200,9	200,9	44,3
36	Insecticid - Pyrinex 25 CS l/ha	1	90,72	90,7	20,0
37	Apa irigatii mii m ³	x	x	x	x
38	Sfoara Kg/ha	2	27	54,0	11,9
39	Asigurari	1	91,8	91,8	20,2
40	Total cheltuieli variabile	x	x	1941,7	427,8
41					
42					
43	Aportul de ore munca/ha si t				
44	Total:		22,1 ore/ha - 6,3 ore/t		
45	din care:		ore/lucrari mecanice 10.1 ore/ha - 2.9 ore/t		
46					

Fig. 4. Spreadsheet „Standard gross margin”

In the spreadsheet "technical-economic indicators" (Figure 5) are calculated a number of financial indicators:

- Unit cost of production,
- Price recovery,
- Labor costs 1000 lei production value,
- Expenditure on materials lei 1000 production value,
- Profit,
- Rate of return etc.

1	INDICATORI ECONOMICI DE SINTEZA			
2	GRAU - Cod. D.01			
3	Zona geografica: Campie; Sistem neirigat; Potential Mediu			
4	Rezultate estimate pentru recolta 2013/2014			
5		INDICATORI	U.M	VALOARE
6	1	Producția medie la ha	to/ha	4,2
7	2	Valoarea prod. la ha	lei/ha	5748
8	3	Valoarea prod. principale la ha	lei/ha	5460
9	4	Cheltuieli de prod la ha	lei/ha	4223,5
10	5	Cheltuieli pentru productia principala	lei/ha	3935,5
11	6	Cheltuieli variabile	lei	3701,1
12	7	Materii prime si materiale	lei	1849,9
13	8	Cheltuieli cu forta de munca permanenta	lei	62,0
14	9	Cheltuieli fixe	lei	522,4
15	10	Costul de prod. unitar	lei/kg	0,937
16	11	Pretul de valorificare	lei/to	1300,0
17	12	Consum de timp de muncă	ore-om/ha	22,0
18	13	Consum de timp de muncă	Z.O/ha	2,8
19	14	Remunerarea la ha pt forta de munca	lei/ZO	22,5
20	15	Productivitatea muncii în expresie fizică	ore-om/tonă	6,3
21	16	Productivitatea muncii în expresie valorică	lei/oră-om	247,6
22	17	Cheltuieli cu forta de munca la 1000 lei prod. val	lei	11,4
23	18	Cheltuieli cu materialele la 1000 de lei prod valori	lei	338,8
24	19	Cheltuieli la 1000 de lei prod principală	lei	720,8
25	20	Profit sau pierdere pe unitatea de producție	lei/ha	1524,5
26	21	Profit sau pierdere pe unitatea de produs	lei/to	363,0
27	22	Rata rentabilității	%	38,7
28	23	Marja asupra cheltuielilor variabile (MCV)	lei	2046,9
29	24	Marja asupra cheltuielilor variabile %	%	35,6
30	25	Pragul de rentabilitate în unitati valorice	lei	1467
31	26	Pragul de rentabilitate în unitati fizice	to	1,13
32	27	Rata riscului de exploatare	%	26,9
33	28	Indicele de securitate (Is)		0,731
34	29	Pozitia absoluta fata de PR	lei	3993,0
35	30	Pozitia realtiva fata de PR		2,722

Fig. 5. Spreadsheet „Technical and economic indicators”

Profitability analysis is important not only for assessing performance in economic unity, but also for choosing the most effective measures on the financing of economic growth, as achieved breakeven junction between industrial and financial strategy.

In the spreadsheet "Breakeven" (Figure 6) are some possible scenarios: increased production by 20%, decreased production value by 20% and 10% decrease in fixed costs.

Analysis of profitability forecasting gross product based on break-even scientifically possible to establish physical volume output is obtained and delivered cost-effective and also indicates the physical volume of output produced and sold (including the structure and its average selling price the recipients subunits, period and quality) in order to achieve a competitive level of gross profitability of domestic and foreign product coming period.

1	ANALIZA PRAGULUI DE RENTABILITATE					
2	Simulări de scenarii posibile					
3	Grau neirigat					
4						
5	Explicatii	Valori	%	Pragul de rentabilitate RE=0	Rez. obținabil la o creștere a val. prod cu 20%	Rez. obținabil la o scădere a val. prod cu 20%
6	Cifra de afaceri (CA)	5748	100	1467	6898	4598
7	Cheltuieli variabile (CV)	3701	64,4	945	4441	2961
8	Marja asupra cheltuielilor variabile (MCV)	2047	35,6	522	2456	1637
9	Cheltuieli fixe (CF)	522		522	522	470,1
10	Rezultatul brut	1524,5		0	1934	1115
11						

Fig. 6. Spreadsheet „profitability threshold”

Also, breakeven analysis serves in making financial diagnosis, ie economic risk analysis of the farm.

CONCLUSIONS

Analysis of manufacturing activity is based on specific economic and physical indicators which along with accounting packages allow the farmer more analytical records of expenditure and revenue and provide management information needed to plan the best allocation of resources (eg staffing, operational mobility and the amount of resources required) to choose one of several possible or to conduct a study on the impact of the use of certain resources or to compare the results with those planned.

Among the indisputable advantages of this analysis mention:

- allows for production levels that no longer loss or programmed to produce a level of profit;
- highlights correlations between production development revenue and costs, grouped into variable costs and fixed costs;
- allows for utilization of production capacities in terms of obtaining a particular profit program and its growth paths;
- allow the development of hypotheses and simulations on the profits of the company;
- allows optimal sizing decisions on production capacity and make investments for the development and modernization of each company.

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