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CONTRIBUTION TO THE SUSTAINABLE RURAL DEVELOPMENT IN DEVELOPING COUNTRIES. CASE STUDIES.

Authors: Prof. Bohumil HAVRLAND, Prof. Richard SOVJAK. Czech University Of Agriculture Prague (**CUA**), Institute of Tropical and Subtropical Agriculture (**ITSA**)

Abstract

The sustainable development of rural areas is dependent, inter allia, on know-how transfer and adequate training/education of land-user who is pillar of the rural economy. No doubt that the agricultural extension plays a very important role in promoting peasant's knowledge and improving his technologic thinking whereby putting it on more economic base. It is a continued process that extends the former basic education level (given by school or courses) for, mainly, rural population employed within the agricultural sector. Namely in developing countries it plays a very important role in the rural development. The extension work is mostly technologically oriented and effective with regard to farming improvements. However, correct approach of extension workers gets sometimes difficult because they very often miss necessary professional background and appropriate methods and tools. Institutional building is also usually lag behind which does not permit a proper extension service development. The extension worker is mostly of lower level of his professional education.

A methodological approach represented by introduction of technological and managerial programs can be of great assistance to the extension workers. Institutional building properly prepared by respective authorities and professionally provided with know-how is also of extreme importance as the base of the whole process. The paper refers on the approach that has been undertaken at the ITSA Prague to strengthen advisory activities in selected developing countries.

Agricultural Technology Management Program was conceived and built by ITSA researchers to help extension workers in the developing countries. Projects of Advisory Centres in Mali and Jordan have been worked out to conduct advisory activities among agricultural producers focusing especially on the small-scale farmers. The paper explains philosophy and approach in both of two directions and gives details on the Program as well as Centres. It supplies more information about the first part of the Program that has been completed. Projects of Education & Experimental Centre in Kayes (Mali) and Advisory Centre in Ajlun Region (Jordan) are described and discussed.

Introduction: World Food Summit - Six Years After

The World meeting named WORLD FOOD SUMMIT: SIX YEARS AFTER(1) held this year in Rome focused on progress achieved from the *World Food Summit* (1996, Rome). During the above *Summit* (1996) the highest representatives of respective governments from **185** countries declared their political willing to reach a worldwide food security for the total of the world population. Especially, they bound themselves to strengthening effort at removing hunger and diseases in all countries, specifically to reducing number of hungry people at latest up to 2015 on *one half of the at present existing number* (approximately 800 million people).

The World Community once again affirmed its readiness to fulfilling obligations regarding the World Food Security that had been formulated by the "**Rome Declaration on the World Food Security"** and "**World Food Summit Plan of Action"**.

It has been stated, that the only *consistent political and economic approach* of the World Community to the problem of "Food Security" can result in a relevant solution. The approach must be backed by intensive forms of **technical (development) assistance** provided by developed (industrial) countries for developing (less developed) countries and **immediate responsibility of national governments** for the Food Security of their population.

Frequently declared general principles and assumptions for reducing hunger in the World were refined by a more specific way and especially continuous rural education, good governance, respecting laws, respect to human rights, etc were underlined.

It is obvious that a realistic rural development requires especially **mass forms of education**, e.g. instruction of peasants and other rural population in main activities they execute most frequently in their life. Improvements of their technologies, regardless whether they are very simple or primitive, get raising their life standard by a sustainable way. Such an education is, in fact, professional training done as rural extension, e.g. transmission of know-how from the research to the user.

Gradual replacement of hand-operated tools (hand-tool technologies) or animal drawn implements (animal draught technology) requires relevant educational level, more financing and local small-scale industries (artisans) to back the development progress by services and to absorb excessive workforce avoiding rural unemployment. We can conclude that enhancing rural crafts and small-scale industries by preparing specialists on lowest level is a parallel way to sustainability in the rural areas as the World Food Summit called for.

Rural Extension: Mission and Constraints

The rural extension is a form of non-formal agricultural education for rural population. The most part of this instrument focuses on the farmer as the main rural producer. However, the extension should touch other areas of the rural live including human habitation and infrastructure as a very important for the farmer's life environment. When the rural extension is employed as a publicly supported tool to improving technologies and increasing incomes of the rural population, there are two main schools of thought as to its purpose(2). One considers public expenditure on the extension as an economic investment concerned primarily with technology transfer to increase agricultural productivity, the other views extension as a social investment that has been designed to cater to the needs of the economically disadvantaged population, notably small scale men and women farmers, rural youth and landless producers.

Actually, the rural extension can contribute, sometimes by a decisive way, to both economic growth and human resource development in rural areas whereas its impact is more significant in more backward areas than in the rest of the Third World countryside. In view of a general shortage of funds for development the public expenditure on the rural extension is more considered as an economic investment (in the agriculture) and its human capital development mostly concentrates on the commercial farm sector, where immediate economic returns are the greatest and quickly visible. Such an approach is not fully correct(3).

Another constraint of the rural extension consists in its methodological and institutional backgrounds. In spite of the fact that the number of rural (agricultural) specialists in the developing regions has considerably grown the small-scale farmer and sometimes medium-size farmer are helpless because the ratio "*extension worker : farmer*" goes up to 1 : 2000. HAVRLAND proves that due to (especially) lack of funding and expertise the less developed countries are not able to build up proper institutions for training farmers and improving methods of their extension work(4). The payment conditions of extension workers do not represent any proper incentives for extension workers who, logically, are not stimulated to improve their work. DUVEL confirms that no direct links between quality of their work and resulting improvements in farmer's incomes have ever been defined. No form of private (paid) extension services is feasible in developing regions(5).

The Institute of Tropical and Subtropical Agriculture spends much effort to eliminate some of the above constraints. Since many years it is involved in the rural extension services for/in less developed countries. Some of the staff was taking part in projects FAO and EU TACIS projects (HAVRLAND, (6) (7)). The Institute activities in the considered area have recently got more intensive and efficient. ITSA research programs and some ITSA development projects focus on measures in both the institutional building and methodological improvements.

Institutional Building: Case Studies

ADVISORY CENTRE IN "JORDAN"

The Advisory Centre establishment(8) is an organic follow-up of the previous project "*Crossbreeding of local Awassi Sheep with Imported Meat Breeds"* that was implemented from 1997 to 2000. In fact this part of the project is still continuing. However, it was found that useful results achieved by the well-thought-out crossbreeding had not been disseminated and, what was surprising, the Jordan Ministry of Agriculture that runs the agricultural extension in Jordan is not interested in. It is because there is much rivalry between the Ministry and other institutions. Also other progressive technologies and know-how were not offered or demonstrated to primary producers to make them improve their farming practices.

Thus, the only feasible solution appeared to institutionally strengthen the extension services in one of the main production areas in Jordan by establishing an Advisory System run by the University (in Irbid). The System should cover research and extension focusing especially on the animal production as the main agricultural branch in Ajlun Region. The following research/dissemination program was designed:

- run register of animals for breeding and their selection for the sake of improving the desired production properties,
- make reproduction of sheep and goats, including insemination,
- improve nutrition of ruminants, e.g. optimization of feeding ration under local conditions,
- practical demonstrations and training courses for farmers and students.

Although the program of the Center includes research, the main impact is laid on dissemination of know-how (progressive technologies in the animal production) that has been tested under the local conditions and proved to be of good production (economic) prospects. The activities would be done under the leadership of experienced Czech Specialists.

The project is so conceived that its activities had to response on actual pressing needs of the rural producer. A kind of Steering Committee has been proposed as composed of elected farmers, university specialists in the field (JUST) and Czech specialists responsible for the Centrum. Involvement of the Jordan Ministry of Agriculture and its institutions has also been suggested.

A deeper assessment of the project shows that the project platform does not offer a classical extension service model however the institution (Centre) can effectively group the research and dissemination functions in a narrow field of animal production – especially sheep and goats.

EXPERIMENTAL AND TRAINING CENTRE IN „MALI“

Also this project was a follow-up of a preceding project that had focused on “Small Ruminants and Embryo Transfer Technology”. No good results were achieved as to the first one because it had built no institutional base for experimental and educational (extension) activities and its effort (and funds) was dissipated in couple of “ad hoc” actions.

The above project was initiated in 2001. Taking into account the gained experience its main objective focused on assisting at increasing demand on safety food products of animal origin. Especially seasonal shortage of milk and meat and their quality products should be solved.

At present, in accordance with the agreement between ITSA CAU Prague and IER (Institut d'Economie Rural) a proper building with chemical and microbiological laboratories has been adapted by the project. The Centre is found in Kayes, North-West Mali, and makes part of the IER Branch localised at the River of Senegal. At the same time, housing and enclosures for experimental sheep and goats were constructed.

Experiments with exotic breeds of laying hens kept under local conditions (the fodder of the local origin included) have also been conducted this year. Their main goal was to assess seasonal influence of heat tolerance ratio and the use of local feed-stuff on laying performance. Results obtained up to now have proven successful and no negative response has been observed as it often happens with introduction of exotic breeds into tropical conditions.

The second part of the project focuses on the conservation of local breeds of sheep (Toronké) and goats (Sahel). First information concerning meat and milk production were obtained in the rainy season and will continue in the course of the whole year to obtain picture about seasonal variation. Mali Research Workers are participating in this part of the project ensuring research activities during the period of when the absence of Czech specialists.

In fact, the project educational (training) component that is considered as the core activity has not been launched yet. This is projected for the next mission when training sessions with local farmers will be organized and demonstrations of some technologies of feeding animals and milk processing prepared. Quality assessment of meat from local slaughterhouses has also been carried out with very sad results. Proposals for improvements in this field are also under preparation.

In this case, the institution under development (Experimental and Training Centre) does not offer a typical extension service, too. However it has got all tools to make effective experimental work with extensive dissemination among farmers in a very sensitive region of the Sahel. A positive note will be fulfilled by the Steering Committee that should follow the project activities. Farmer communities in Kayes region are represented in the above Committee as a project counter-part .

Methodological Approach: ATMP

Lack of proper methods the extension worker could make use of so that he gets more efficient work an better results has been stated by many authors (HAGMANN, KIBWANA, VAN DER BAN,[11]. Namely, the importance of economic (appropriate) mechanization in context with reasonably conceived technology has often been addressed. Such a technology need not to be the most sophisticated however, it should be rationally conceived using operations with maximum profit at reasonable costs. The cost/profit approach is the leading conception, although not always the only one.

The complexity of such a competitive technology is apparent and, under conditions of modern farming, requires a tool to facilitate its construction. A kind of ATMP computer program could satisfy the above objective. The program must be rigorously backed by a conveniently constructed theoretical base and supported by practical experience.

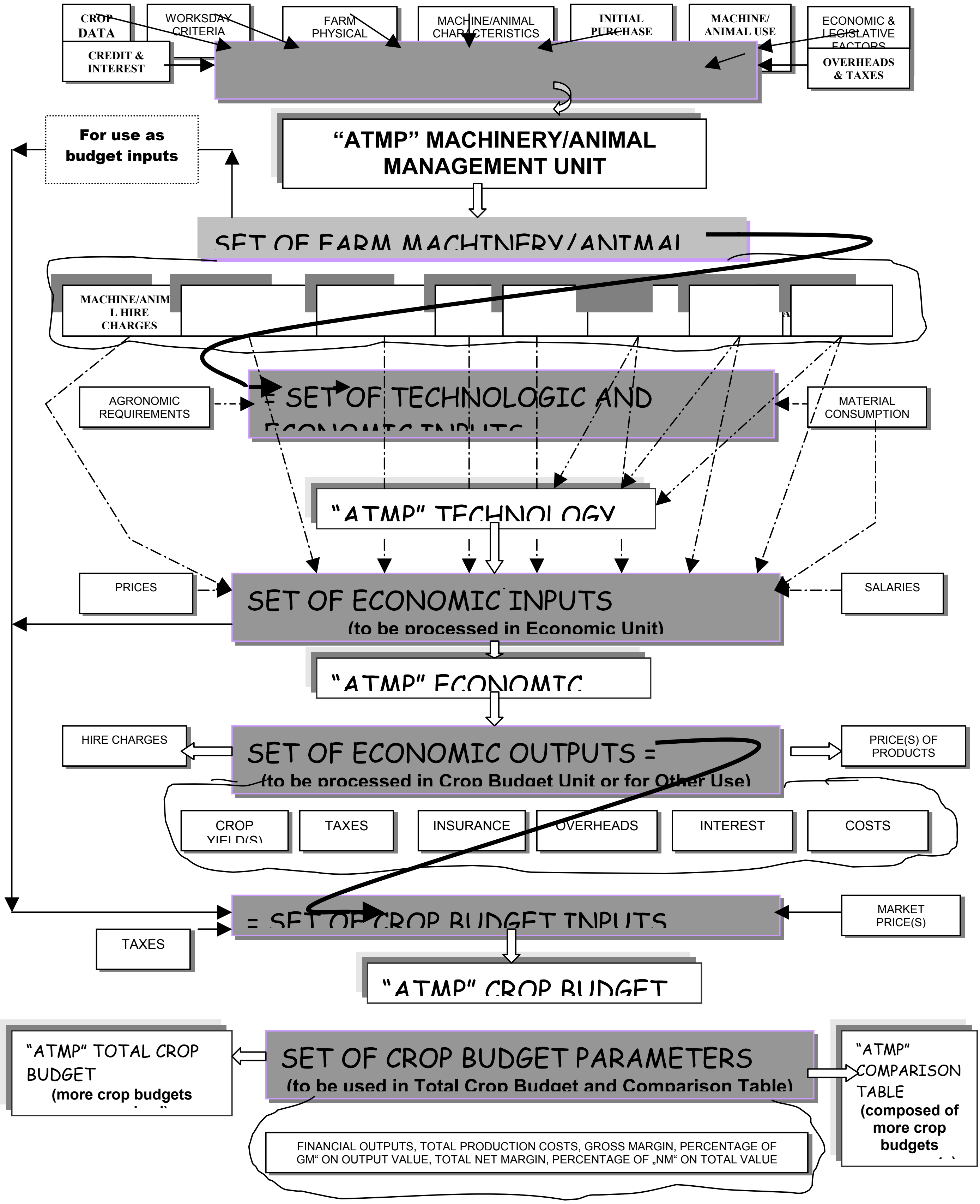
The concept of the ATMP prefers the agricultural producer – farmer without respecting the level of his farming. HAVRLAND[4] in his work in Uzbekistan notes the picture was almost the same to that existing in the developing countries. The main task is being to help farmers appreciate the role of costing operations. Direct use of the program can be constrained by difficult access to the program and problems of understanding it. In these cases extension workers, as the main recipient of the Program, should help the farmer by his services of sustainable farming that includes both appropriate technological solutions and economical approaches to the farming.
CONCEPT OF THE "ATMP" AGRO-EXPERT PROGRAM

Flow Chart of the program is shown on the Fig. 1.

The program is conceived as technical-economic facilitator that should make easier the life of extension workers in their advisory work when designing agricultural technologies for farmers. It is also be designed as user friendly. The main principle of farmer's work is to respect the equipment facilities available at the farm (or possibility to acquire them) and farm main economic parameters.

The main outputs of the above program will be a reasonable (appropriate) technology for growing main crops, and possibility of comparison of different crops on basis of their budgets (crop budgets). The main criterion for

Fig. 1. "ATMP" Flow Chart



The main outputs of the above program will be a reasonable (appropriate) technology for growing main crops, and possibility of comparison of different crops on basis of their budgets (crop budgets). The main criterion for the comparison will be a net margin the farmer gets from its crop. Agronomic requirements as well as environmental aspects are included in the technology conception, which ensures sustainability of the farming.

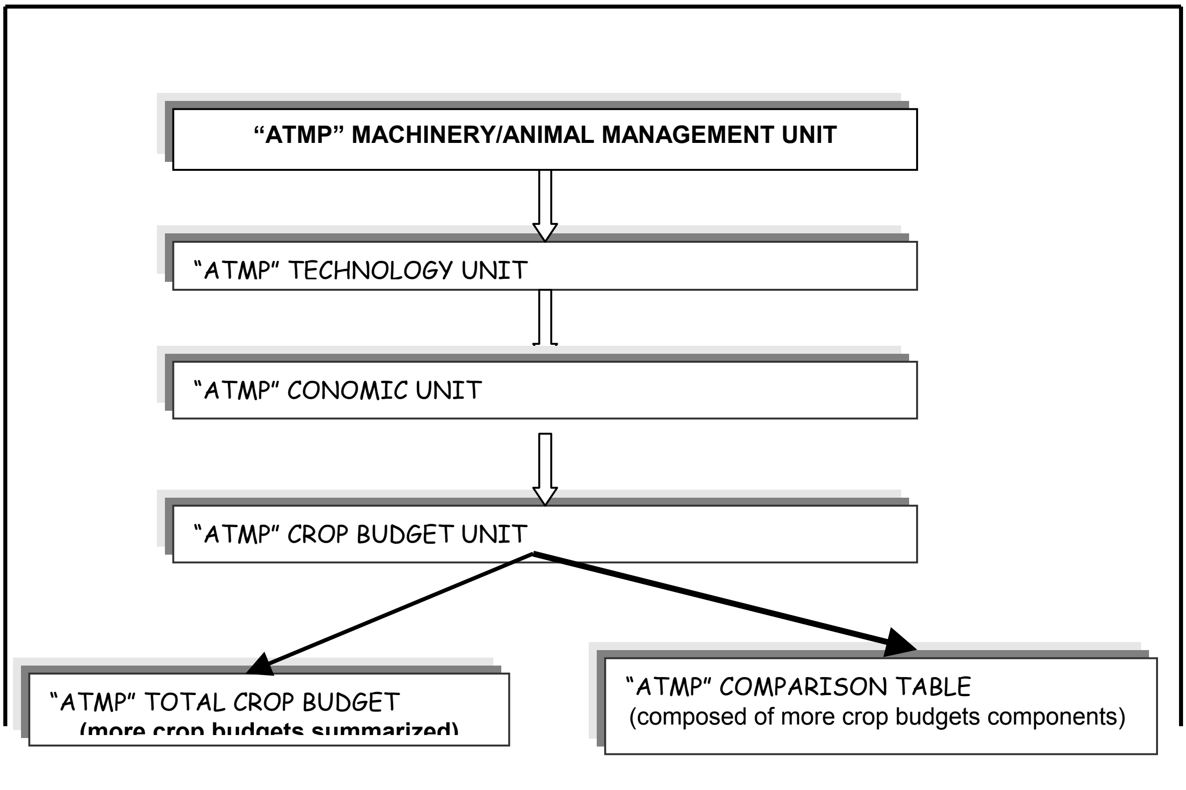
The program is so provided with possibility to design technologies on different technological levels. This requirement is so respected that growing of an individual crop is alternatively formulated with operations and their sequences relevant to the respective technologic level. The inputs (including the equipment) are so assigned that their availability and possibility to get it from outside characterizes the technological level.

The program implementation will respect actual conditions in the field and, in its extreme, it can be used only as a hardware (forms filled in by pencil).

“ATMP” Units Characteristics

Five functional units create backbone of the ARGO-EXPERT structure. They are programmed in Windows Access Program (Machinery/Animal Management Unit - MAMU) and Windows Excel Program (other ATMP units). The ATMP Program outline with main program units is schematically shown on the Fig. 2.

Fig. 2. “ATMP” Program Overall Lay-Out



“ATMP” Machinery/Animal Management Unit

It is positioned at the starting point of the whole Program and processes mostly technical and managerial data concerning machinery, animals and Labour. Fed with a set of farm machinery/animals inputs it offers output parameters for their use in another Program units.

In conformity with the program conception its main inputs belong:

- *Crop data;*
- *Worksday criteria;*
- *Farm physical data;*
- *Machine/animal characteristics;*
- *Initial purchase data;*
- *Machine/animal use data;*
- *Economic & legislation factors,*

The above inputs are completed with *credit & interest* and *overheads & taxes* as concern the machinery use.

The unit produces a set of farm machinery/animal outputs, like:

- *machinery/animal hire charges;*
- *machinery/animal operating costs;*
- *machinery/animal fixed costs;*
- *repair & maintenance costs;*
- *fuel/energy & lubricants;*
- *drivers & operators;*
- *effective capacity;*
- *machinery set.*

Its outputs completed with *agronomic requirements* and *material consumption* supplied (as inputs) to the following Technology Unit*.*

The charges and costs are specifically calculated per hour or/and per ha. The charges (hire charges) are preferably used for contractor services offers whilst operating costs are important for farmer's production costs calculations. Alternative use of new, second hand or hired (or leased) machines and/or animals is possible, in this context.

The parameters necessary for calculations are be imported from the D-base that is included as a Program Assistant Unit (PAU). It provides main technical-economic parameters of power units (including animals), implements, self-propelled machines, etc. and animals necessary for both technology design and economic assessments of the designed technology.
NOTE: **the PAU contains machinery records and other parameters both technical and economical to aid in the computations (see Annex).**

Cost Analysis Of The Machinery Set

The Cost Analysis of the Machinery Set is, in fact, estimating costs components for a tractor and implement and their summarizing. The machinery set cost estimations follows after its set up. The costs summary list contains four categories of costs associated with owning and operating machinery (see Annex).

Once satisfied with the cost analyses recommendations the set can be exported to the Excel Files and work proceeds in ATMP Technology Unit.

"ATMP" Technology Unit

The unit is conceived to design technologies as sequences of working operations. It follows the *"ATMP" Machinery/Animal Management Unit* having for the objective:

- *to construct the technology on desired technologic level;*
- *to process output data from the "ATMP" Machinery/Animal Management Unit;*
- *to incorporate the machinery sets, animal draught sets or hand-tool sets into individual operations.*

It is evident that only couple of parameters from the *"ATMP" Machinery/Animal Management Unit* are fed as inputs into this Operator Unit. They are:

- *machinery set;*
- *effective capacity;*
- *drivers & operators;*
- *fuel/energy & lubricants.*

The operations are proposed on basis of agronomic requirements including the operation optimum timing. They are provided with relevant machinery set, animal drawn implements or hand-tools and doted with basic and secondary materials. Working hours of drivers and operators per hectare and fuel (energy) and lubricants consumption per both working hour and hectare are included, as well.

The complete range of operations represent the whole cycle of working processes starting from the filed preparation (or cleaning) and terminating by post-harvest treatment (processing) of the crop. It directly provides information on the total Labour, fuel, lubricants and feed-stuff consumption per hectare.

The main output is a proposal of operations in its sequences. The operations are provided with brief but clear agronomic characteristic enough to define them properly. Particular outputs such as *Labour, fuel* consumption, *lubricant* consumption *or, eventual, feed-stuff* in individual operations are exported into the following **Costing Unit**.

The technology spreadsheets are used to describe the technology of a given crop. Their energy sources can be combined by three different levels: mechanical, draught animal and hand-tool. The data used here for operations is the pre-prepared data from the Agro-Expert Machinery/Animal Use and Management Unit of the "ATMP".

"ATMP" Costing Unit (Economical Spreadsheet)
This is the third Unit in the Program Algorithm. The Unit analytically reviews a complete picture of costs within individual operations and for the whole technology. The costs are broken down on:

- *fixed costs including repair & maintenance costs;*
- *cost of fuel, energy & lubricants;*
- *costs of Labour;*
- *costs of hired services;*
- *material costs.*

The Set of Economic Inputs as supplied from the **"ATMP" Machinery/Animal Management Unit** is completed with prices of materials and salaries of driver and operators.

The data from the costing analyses of the MAMU component (Machinery Set Cost analyses) are transferred to this spreadsheet. It shows the break-down of costs in unit of performance**.** This is according to the calculation relationship described in Machinery Set Cost Analyses.

The analytic approach enables to calculate costs per hectares, hours and unit of production (tone, tone-km) respectively. Finally, the specific operating costs (per hectare, hour and tone) and total operating costs (the same) are summarized. Example of a Costing Unit Spreadsheet – see **Annex**.

"ATMP" Crop Budget Unit

It is the final sheet of the calculations containing all the costs and incomes linked to the crop. The Unit is split into 6 sections:

- *Main crop characteristics;*
- *Material, Labour and energy costs;*
- *Machinery costs;*
- *Animal costs;*
- *Hand-tool costs;*
- *Main crop budget parameters.*

The outputs from the Economic Unit are used as Crop Budget inputs. Some outputs from MUM unit are put in the Crop Budget and another Market Prices and Taxes are used to complete the Crop Budget Unit Input.

As the main outcomes (parameters) from the crop budget are considered:

- *total output value;*
- *total production costs;*
- *gross margin;*
- *percentage of GM on output value;*
- *total overheads;*
- *total net margin;*
- *percentage of NM on the output value;*
- *price at farm gate;*
- *trade and transport costs;*
- *own market price;*
- *percentage of own market price.*

The Crop Budget Sheet is presented in the annex.

NOTE: *the Crop Budgets of different crops are summarized and the **Total Crop Budget** is finally produced*.

"ATMP" Comparison Unit

It is a table serving for comparison of effectiveness of different crops grown under comparative production conditions. This facilitates sound decision-making. The user can choose which alternative technology to use. Inputs for the Comparison Table are main outcomes from Crop Budgets (see Table 1):

CROP	*Crop 1*	*Crop 1*	*Crop 1*	*Crop 1*	*Crop 1*
TECHNOLOGY	*MPT*	*DAT*	*MIXED 1*	*HTT*	*MIXED 2*
Main Crop Yield Expected (ton/ha):					
By-product Yield Expected (ton/ha):					
Main Product Average Market Price (cur/ha):*					
By-product Average Market Price (cur/ha):*					
Main Product Output Value (cur/ha):					
By-product Output Value (cur/ha):					
Total Crop Sales (Sum of Main and By-product) (cur/ha):					
Percentage of NM on Output Value (%):					
Costs of Labour Driver + Operator (cur/ton)					
Labour Taxes and Insurance (cur/ton):					
Machinery Costs Total (cur/ton):					
Animal Costs Total (cur/ton):					
Hand-tool Costs Total (cur/ton):					
Hire Costs (Services) (cur/ton):					
Seed&Seedling Costs (cur/ton):					
Manure and Compost Costs (cur/ton):					
Fertilizer Costs (cur/ton):					
Chemicals Costs (cur/ton):					
Fuel&Lubricants, Other Energy (cur/ton):					
Machinery Repairs (cur/ton):					
Total Production Costs (cur/ton):					
Total Overheards					

*** (without VAT):**

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ANNEX

Fig. 1 Card for Power Units (including Animals)

Wheel Tractor Zetor 3320.5 Zetor 3320.2

Producer: **ZETOR, a.s. Brno**

Technical Data:

Code:	**121004**	Rated Power:	**33,1 kW**	Price in H.C.:	**377600 *Kč***
Prec. type:	**TR**	No Driver:	**1**	Rate of Exch.:	**Kč 1,00**
Masse:	**2 680 Kg**	Repair Factor:	**1,00**	*Price in S.C.:*	***377600 Kč***
Width:	**1 800 mm**	Depreciation Period:	**6**	Annual Use:	**1300 h/y**
Length:	**3 308 mm**			Depreciation Rate:	**12,5 %**
Height:	**2 614 mm**				

Engine		**Chassis**		**Other Parameters**	
Type:	**Zetor 5201**	Type:	**Frameless**	Slope Assesibility:	**DEG**
No of Cylinders:	**3**	Track:	**1350-1800 mm**	Control Positions:	**regulated**
Bore:	**102 mm**	Wheelbase:	**2123 mm**	Lift Force Capacity:	**19 kN**
Stroke:	**110 mm**	Ground Clearance:	**462 mm**		
Capacity:	**2696,5 ccm**	Height of Linkage:	**mm**	Max. Drawb. Force:	**kN**
Max Torque:	**160,83 Nm**	No of Axles:	**1**	3 Point Hitsch:	**ront and rear**
Rated Speed:	**2200 1/min**	Weight Distr. Rear:	**70 %**	Fuel Cons.@ 50 % of Power Utiliz.):	**5,2 l/h**
Max. Torque Sp.	**1500 1/min**	Tyre Front:	**6.00-16**		
Max. Speed:	**1/min**	Tyre Rear:	**12.4-28**		
S.F.C.:	**251 g/kW/h**	Speed Range:	**max.25 km/h**		
PTO Speed:	**540 1/min**	No of Speeds: Forw.:	**10**		
	1000 1/min	Reverse:	**2**		

Work Operation:

Code	Description	U	Fuel Consump.	Hour Capacity	Dayly Capacity
5151	Tractor Utilization - Low Use of Power	**h**	**4,1**		
5152	Tractor Utilization - Medium Use of Power	**h**	**5,9**		
5153	Tractor Utilization - High Use of Power	**h**	**7,6**		

Fig. 2 *Cost Estimation Screen*

Economic Consideration on Machinery Systems

Operation:		Payer of V.A.T.:
System:		Field Capacity:
Price of Machne:	Price of Energ. Means:	Type of Power:

1. Input Data

Machine	En. Means	Other Data
Annual Use:	Annual Use:	Interest on Capital.
Own Fin. Resource:	Own Fin. Resource:	Credit Rate:
Useful Life:	Useful Life:	Discharge Period:
Depr. Rate:	Depr. Rate:	No of Instalments:
Road Tax Rate:	Road Tax Rate:	Repayment?:
Insurance Rate:	Insurance Rate:	Adv.Paym.:
Mand. Insurance:	Mand. Insurance:	El. En. Consumpt..:
Garage Rate.:	Garage Rate:	Price of kWh:
Repair Factor:	Repair Factor:	Fodder Costs:
No of Operators:	No of Drivers:	Medical Expenses:
Power Input:	Rated Power:	Grooming Costs:
Wage of Operator:	Wage of Driver:	Other Care Costs:
Fuel Consumption:	Price of Fuel:	Other Taxes:

Fig. 3. ***Machinery Set Cost Summary***

2. Cost

Machine				Power Unit				Mach. Set		
Item	Kč/Y	Kč/ha	Sum Kč/ha	Item	Kč/Y	Kč/ha	Sum Kč/ha	Item	Kč/ha	Sum Kč/ha
Amortiz.:				Amortiz.:				Amortiz.:		
Inter. on C.				Inter. on C.				Inter. on C.		
Interest:				Interest:				Interest:		
Road Tax:				Road Tax:				Road Tax:		
Insurance:				Insurance:				Insurance:		
Mand. Insur.				Low Insur.:				Low Insur.:		
Garage:				Garage:				Garage:		
Repairs				Repairs:				Repairs:		
Sum:				Sum:				Energy:		
								Labour:		
Fodder Cost				Grooming Cost				Sum:		
Medical Expens.				Other Care:						
Other Taxes				Supp.Mat.Costs				Variable Cost:		
Labour Cosumption:				Lh/ha						

Fig. 4 Example of a Technology Spreadsheet

AGRICULTURAL TECHNOLOGY SHEET

CROP : ______
CROP VARIETY : ______
AREA : ______
PRECEDING CROP : ______
USE OF THE CROP : ______
YMP : ______
YBP : ______
FPM : ______
FBP : ______

EMPLOYED TECHNOLOGY (prevailing):
MECHANICAL POWER TECHNOLOGY

MAIN MATERIALS Rate per ha (tons, kg, liter, amount)
Seed and seedlings : ______
Fertiliser 1 : ______
Fertiliser 2 : ______
Fertiliser 3 : ______
Farmyard manure : ______
Pesticides 1 : ______
Pesticides 2 : ______
Pesticides 3 : ______
Pesticides 4 : ______
Water : ______

No.	Operation	Type Power	Work Optimum Timing	Machines System Set	No. of staff		Capacity		Fuel		Other e[cut off]	
					No. of drivers	No. of operator	ha/hour	hour/ha	liter/hour	liter/ha	kWh/hour	[cut off]
1.												
2.												

Fig. 5 Example of a Costing Spreadsheet

AGRICULTURAL COSTING SHEET

MAIN INPUT COSTS Costs (Cur. per hectar)
Seed and seedlings : ______
Fertiliser 1 : ______
Fertiliser 2 : ______
Fertiliser 3 : ______
Farmyard manure : ______
Pesticides 1 : ______
Pesticides 2 : ______
Pesticides 3 : ______
Pesticides 4 : ______
Water : ______

Remarks 1 : ______
Remarks 2 : ______
Remarks 3 : ______
Remarks 4 : ______
Remarks 5 : ______
Remarks 6 : ______
Remarks 7 : ______
Remarks 8 : ______
Remarks 9 : ______
Remarks 10 : ______

No.	Fixed costs + R & M								Labour					
	Power unit		Equipment		Total		F & L, Energy		Driver		Operators		Hire costs	
	cur/hour	cur/ha	cur/hour	cur/ha	cur/hour	cur/ha	cur/hour	cur/ha	cur/hour	cur/ha	cur/hour	cur/ha	cur/hour	cur/ha
1.														

Fig. 6 Crop Budget Unit Spreadshed

EMPLOYED TECHNOLOGY: (prevailing)

Main Crop Characteristics:			**Tones per ha**	**Currency per Unit**	**Currency per ha**
Crop:		Main Crop Yield Expected:			
Variety:		By-product Yield Expected:			
Area (in hectares):		Main Product Average Market Price*			
Preceding Crop:		By-product Average Market Price*			
		Main Product Output Value:			
		By-product Output Value:			

Material, Labour and Energy Costs			**Machinery Costs**		
Item	**Cost per hectar (cur. / ha)**	**Costs per Unit (cur. / ton)**	**Item**	**Costs per hectar (cur. / ha)**	**Costs per Unit (cur. /ton)**
Labour driver:			Depreciation:		
Labour operator:			Interest:		
Labour Taxes and Insurance:			Insurance:		
Seed & Seedlings:			Shelter:		
Manure and Compost:			Repair and Maintenance:		
Fertilizers:			Hire Costs (services):		
Chemicals:			Overheads Machinery:		
F&L, other energy:			Taxes:		
Material, Labour and Energy Costs Total:			**Machinery Costs Total:**		

Animal Costs			*Hand-tool Costs*		
Item	**Costs / ha (Cur/ha)**	**Costs / unit (cur./ton)**	**Item**	**Costs per hectare (cur/ha)**	**Costs per Unit (cur./ton)**
Depreciation:			Depreciation:		
Interest:			Interest:		
Insurance:			Insurance:		
Shelter:			Repair & Maitenance:		
Medical expenses:			Taxes:		
Fodder:					
Grooming:					
Other Care:					
Hire Costs:					
Overheads:					
Taxes:					
Animal Costs Total:			**Hand-tool Costs Total:**		

MAIN CROP BUDGET PARAMETERS

Item	**Per hectare**	**Per unit**	***Item***	**Per hectare**	**Per unit**
Total Output Value:			Main Product Price at Farm Gate:		
Total Production Costs:			By-product Price at Farm Gate:		
Gross Margin:			Main Product Trade & Transport Costs:		
Percentage of GM on Output Value:			By-product Trade & Transport Costs:		
Total Overheads:			Main Product Value Added Tax:		
Taxes on labour and Insurance:			By-product Value Added Tax:		
Other Taxes:			Main Product Own Market Price:		
Total Net Margin:			By-product Own Market Price:		
Percentage of NM on Output Value:			Percentage of Main Product Own Market Price:		
			Percentage of By-product Own Market Price:		