Title:

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

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Abstract

- The sustainable development in rural areas depends, inter allia, on know-how transfer and adequate training/education of land-user that is a pillar of the rural economy.
- There is 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.
- The rural extension 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.

Abstract

- 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 the base of the whole process.
- 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 implemented to conduct advisory activities among agricultural producers focusing especially on the small-scale farming.

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).
- 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".

Introduction: World Food Summit - Six Years After

- The only consistent political and economic approach of the World Community to the problem of "Food Security" can result in 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.
- Realistic rural development requires especially mass forms of education, e.g. instruction of peasants and other rural population in main activities they execute.

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 focus on the farmer as the main rural producer.
- The rural extension can contribute, sometimes by a decisive way, to both economic growth and human resource development in rural areas. Its impact is more significant in the most backward regions than in the rest of the Third World.

Rural Extension: Mission and Constraints

- Methodological and institutional background is another constraint.
- Number of rural (agricultural) specialists in the developing regions has considerably grown however the small-scale farmer and sometimes medium=size farmer are helpless because the ratio "extension worker : farmer" goes up to 1 : 2000.
- The payment conditions of extension workers do not represent any proper incentives for extension workers

Rural Extension: Mission and Constraints

 The Institute of Tropical and Subtropical Agriculture is involved since many years in the rural extension services for/in less developed countries.

Institutional Building: Case Studies ADVISORY CENTER IN JORDAN (AJLUN)

- The Advisory Centre establishment is an organic follow-up of the previous project "Crossbreeding of local Awassi Sheep with Imported Meat Breeds.
- It was found that very good results achieved by well-thought-out crossbreeding had not been disseminated. The Jordan Ministry of Agriculture that runs the agricultural extension was not interested to inform farmers about the research.

Institutional Building: Case Studies ADVISORY CENTER IN JORDAN (AJLUN)

- The only solution appeared to establish an Advisory System run by the University.
- Research and extension will especially focus on animal production, being this branch the main agricultural sector in the Ajlun Region. E.g.
 - run register of animals for breeding and their selection,
 - make reproduction of sheep and goats.
 - improve nutrition of ruminants.
 - practical demonstrations and training courses for farmers and students.

Institutional Building: Case Studies ADVISORY CENTER IN JORDAN (AJLUN)

- Proper response on actual pressing needs of the rural producer.
- The Steering Committee has been proposed as composed of elected farmers, university specialists in the field (JUST) and Czech specialists..
- The project platform does not offer a classical extension service model however the institution (Centre) can effectively group the research and dissemination functions

Institutional Building: Case Studies 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".
- Its main objective focusedson 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.
- The Centre is found in Kayes, North-West Mali, and makes part of the IER.
- In one part experiments with exotic breeds of laying hens kept under local conditions fodder included have also been conducted this years.

Institutional Building: Case Studies EXPERIMENTAL AND TRAINING CENTRE IN "MALI"

- Another part of the project concentrates on the conservation of local breeds of sheep (Toronké) and goats (Sahel).
- The project educational (training) component that is considered as its core activity has not yet been launched.
- The institution under development (Experimental and Training Centre) does not offer a typical extension service, but it is able to make effective experimental work with extensive dissemination among farmers in a very sensitive region of the Sahel.

Methodological Approach: ATMP

- The importance of economic mechanization in context with reasonably conceived technology has often been addressed.
- Such a technology needs not to be sophisticated mechanization however, it should assure optimum profit at reasonable costs on the respective level
- The concept of the **ATMP** was worked out and prefers the agricultural producer farmer without respecting the level of his farming.
- The main task is being to help farmers appreciate the role of costing operations.
- The main recipient is extension worker who should help the farmer by his services of sustainable farming that includes both appropriate technological solution and economical approaches to the farming.

CONCEPT OF THE "ATMP" AGRO-EXPERT PROGRAM

- The program is conceived as technicaleconomic facilitator that should make easier the life of extension workers.
- 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.



"ATMP" Units Characteristics

Five functional units create backbone of the ARGO-EXPERT structure.



"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.
- Main inputs:
 - Crop data;
 - Worksday criteria;
 - Farm physical data;
 - Machine/animal characteristics;
 - Initial purchase data;
 - Machine/animal use data;

"ATMP" Machinery/Animal Management Unit

Farm machinery/animal outputs:

- 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 are supplied (as inputs) to the following Technology Unit.

Cost Analysis Of The Machinery Set

- Estimating costs components for tractor, animal or human and implement and their summarizing.
- The machinery set cost estimations follows after its setting-up (design).
 The costs summary list contains four categories of costs associated with owning and operating machinery.

"ATMP" Technology Unit

- Design of technologies as sequences of working operations.
- Objectives:
 - construct the technology on desired technologic level;
 - process output data from the "ATMP" Machinery/Animal Management Unit;
 - incorporate the machinery sets, animal draught sets or hand-tool sets into individual operations.
- parameters from the "ATMP" Machinery/Animal Management Unit are used:
- machinery set;
 - effective capacity;
 - drivers & operators;
 - fuel/energy & lubricants.
- The complete range of operations represent the whole cycle of working processes..

Costing Unit

(Economical Spreadsheet)

- "ATMP" Costing Unit 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.

Costing Unit (Economical Spreadsheet)

 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.

"ATMP" Crop Budget Unit

- Final sheet of the calculations containing all the costs and incomes linked to the crop. 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. 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.

"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



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:	
No of Operators	No of Drivers:	Fodder Costs:
No of Operators.		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. 1 Card for Power Units (including Animals)

Wheel Tractor Zetor 3320.5 Zetor 3320.2

Producer:	ZE	TOR, a.s. Brno					
Technical	Data:						
Code:		121004	Rated Power:	33.1 kW	Price in H.C.:	3	77600 KA
Prec. type:		TR	No Driver:	1	Rate of Exch	K⊊~	1.00
Masse:		2 680 Kg	Repair Factor:	1.00	Price in S.C.:		77600 KA
Width:		1 800 mm	Depreciation Period:	6	Annual lise		1300 h/c
Length:		3 308 mm		 	Depreciation Rate		12 5 0/
Height:		2 614 mm			Depresiation rate.		12,5 70
Engine			Chassis				
Type:		Zetor 5201	Туре:	Frameless	Sione Assesibility		DEC
No of Cylind	ders:	3	Track:	1350-1800 mm	Control Positions		DEG
Bore:		102 mm	Wheelbase:	2123 mm	Lift Force Canacity:	regu	lated
Stroke:		110 mm	Ground Clearance:	462 mm	Littl of the Dapacity.		19 kN
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	l rear
Rated Spee	ed:	2200 1/min	Weight Distr. Rear:	70 %	Fuel Cons.@ 50 %		
Max. Torque	e Sp.	1500 1/min	Tyre Front:	6.00-16	of Power Utiliz.):		5.2 l/h
Max. Speed	l:	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 Opera	ation:						
Code	Desc	cription		L	J Fuel Consump.	Hour Capacity	Dayly Capacity
5151	Tractor	Utilization - Low Use	of Power	h	4,1		
5152	Tractor I	Jtilization - Medium	Use of Power	h	5.9	,	
5153	Tractor l	Jtilization - High Use	e of Power	h	7.6		

Fig. 2 Cost Estimation Screen

2	C -	- 4
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Machine				Pow	er Unit		Mach. Set				
Kč/Y	Kč/ha	Sum Kč/ha	Item	Kč/Y	Kč/ha	Sum Kč/ha	Item	Kč/ha	Sum Kč/ha		
		Ar	mortiz.:				Amortiz.:				
		In	ter. on C.				Inter. on C.				
	Interest:						Interest:				
ad Tax: Road Tax:						Road Tax:					
Insurance: Insural							Insurance:				
I. Insur. Lo			Low Insur.: Low Insur.:								
		G	arage:				Garage:				
		R	epairs:				Repairs:				
		S	um:				Energy:				
							Labour:				
t		Groo	oming Co	ost			Sum:				
oens.		Othe	er Care:								
S		Supp	o.Mat.Co	sts			Variable (Cost:			
		1 6 /6 2									
	Machine Kč/Y t pens.	Machine Kč/Y Kč/ha t pens. s	Machine Kč/Y Kč/ha Sum Kč/ha Ari In In Comparison Kč/ha Kč/ha Ari In In Comparison Kč/ha No No No No No No No No No No	Machine Kč/Y Kč/ha Sum Item Kč/ha Amortiz.: Inter. on C. Inter. on C. Interest: Road Tax: Insurance: Low Insur.: Garage: Repairs: Sum: t Grooming Coordination Other Care: s Sup.Mat.Coordination	Machine Pow Kč/Y Kč/ha Sum Item Kč/Y Kč/ha Sum Amortiz.: Inter. on C. Interest: Interest: Road Tax: Insurance: Low Insur.: Garage: Low Insur.: Garage: Repairs: Sum: t Grooming Cost Other Care: Sup.Mat.Costs	Machine Power Unit Kč/Y Kč/ha Sum Kč/ha Item Kč/Y Kč/ha Amortiz.: Inter. on C. Interest: Road Tax: Insurance: Low Insur.: Garage: Repairs: Sum: Sum: t Grooming Cost Other Care: Sup.Mat.Costs Item	Machine Power Unit Kč/Y Kč/ha Sum Item Kč/Y Kč/ha Sum Kč/Y Kč/ha Sum Item Kč/Y Kč/ha Sum Amortiz.: Inter. on C. Interest: Road Tax: Insurance: Low Insur.: Garage: Repairs: Sum: Sum: Sum: Sum: Sum: Sum: t Grooming Cost Other Care: Supp.Mat.Costs Supp.Mat.Costs Supp.Mat.Costs	Machine Power Unit Kč/Y Kč/ha Sum Item Kč/Y Kč/ha Sum Item Kč/Y Kč/ha Sum Item Kč/Y Kč/ha Sum Item Kč/Y Kč/ha Sum Item Kč/Y Kč/ha Sum Item Kč/ha Amortiz.: Inter. on C. Inter. on C. Inter. on C. Inter. on C. Interest: Interest: Road Tax: Interest: Road Tax: Insurance: Insurance: Low Insur.: Garage: Garage: Garage: Repairs: Sum: Energy: Labour: Labour: Labour: Sum: Variable O t Grooming Cost Sum: Variable O Variable O Variable O	Machine Power Unit Machine Machine		

Fig. 3. Machinery Set Cost Summary

			AGR	CULTURAL	. TECH	INOLO	GY SH	EET			
	CF PREC USE C EMPLOYED TECHNOLOGY (<u>f</u> MECHANICAL POWER TECHNOLOGY	CROP : OP VARIETY : AREA : EDING CROP : OF THE CROP : YMP : YBP : FPM : FBP : prevailing):		V	Se	MAIN MA eed and se Fer Fer Farmyard Pest Pest Pest	ttiliser 1 : ttiliser 1 : ttiliser 2 : ttiliser 3 : icides 1 : icides 2 : icides 3 : icides 3 : icides 4 : Water :	Rate per h	ia (tons, kg,	, liter, amou	unt)
No.	Operation	Type Power	Work Optimum Timing	Machines System Set	No. of drivers	of staff No. of operator	Ca ha/hour	pacity hour/ha	liter/hour	Fuel liter/ha	Other er kWh/hour
1. 2.											

Fig. 4 Example of a Technology 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 :	********************************
	==****************************

			Fixed costs	+R&M						نا ا	abour			
No.	Power unit		Equipment		Total		F&L,	Energy	D	river	Оре	rators	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. 5 Example of a Costing Spreadsheet