

A STUDY ON INVESTMENT EFFICIENCY IN HORTICULTURAL ACTIVITIES

(CASE STUDY ON OLIVE IN NORTH SINAI GOVERNORATE)

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ABSTRACT

Objectives of this study are: (1) measurement of investment efficiency indicators according to farm capacity (orchard acreage). (2) Measurement of this impact of expected technical changes (number of trees, productivity and dominant Variety structure). major economic changes (farm capacity, price/kg of main product, cost items, return items and land rent)and their impact on investment efficiency in olive business. (3) determining the critical levels of major changes on investment efficiency.

findings of the study are: (1) investment efficiency is higher in olive orchards in north since ,as IRR is estimated by 30% and net present wealth is about L.E 106.4 thousands per faddan. (2) Reduction of fruitful trees to 80 per faddan instead of 120 per faddan this causes IRR to decline by 25% the switching value is estimated by 34 tree/faddan in big farm. (3)Dominant variety structure is 60% foreign and 40% local, this causes IRR to rise by 6.8%. (4) Specialization in foreign varieties is better followed pure local varieties. (5) Investment efficiency is more sensitive to high yield of foreign trees by about 10% compared with local varieties. If yield of foreign trees is increased by 10% IRR increased by 5.4% against 2.8% in local varieties the switching value of yield per tree is estimated by about 27.5% of the current productivity. (6) Efficiency response to price rise is consistent with the result obtained when tree productivity rises .The switching value of price is estimated by 31% of the current price. (7) IRR increases by about 6.8% if earning from olive increases 10% only . IF earnings from by – products increases by 10% , IRR increases by 2.8% and by 9% if earnings from main and by –products increase by 10% in the same time. (8) Impact of change in cost of manner in the highest item of cost overrun on IRR . If this item increases by 10% IRR declines by 2.8% against 8.3% if all cost overrun rise collectively by 10%. (9) The switching value of land rent reaches about L.E 11280 per faddan, assuming all other variables remain constant.

Keywords: Investment, Olive, Efficiency, IRR, NPV, Switching value, Price.

INTRODUCTION

Investment opportunities in the desert and new landes are fairly lower than those in Delta and Valley area. This could be easily attributed to major difficulties existing in the desert landes.

Investment opportunities in Horticultural prouduction and olive business in North Sinai are of great importance for the following reasons: a) The comparative importance of Horticultural crops in the total value of the Agricultural prouduction value. Fruites, Vegytables, Medicinal and aromatic crops constituted 26.7% of plant, animal and fish production value 2009⁽¹⁾. b) The comparative importance of area and value olive in relation to total

⁽¹⁾ Ministry of Agriculture and land reclamation- agric. Economics Sector, Agric. Econ. Resources Dept. Nattional Agric. Income Gulletion 2009.

Horticultural crops is fairly high. C) Changes in prices as a result of the application of economic reform policies at the national level. D) Private sector has begun to take bigger role in crops production and marketing.

Problem and objective and methodology of the research:

Problem and objective:

First: Non – planned investment and its relation with investment efficiency of Olive Orchards in North Sinai.

Second: Point out technical and economic factors affecting investment efficiency.

Third: Measurement of sensitivity degree of investment efficiency indicators and their response to technical and economic Problem changes.

In the light of what mentioned above, objectives could be drawn as follows: (1) Measurement of sensitivity of efficiency indicators as matching with Orchards areas. (2) Measurement of the impact of probable variables on major technical changes (number of trees, productivity and dominant variety structure on unit of area). Major economic variables are manifested in (farm capacity, price/kg. of main product, cost items, return items and rent). Impact of such variables on investment efficiency in olive business. (3) Finding critical levels for major variables affecting investment efficiency.

Methodology and Source of Data:

It was necessary to estimate Internal Return rate IRR and Net Present Value NPV at the discount price which represents. Job opportunity for capital investment in the population. This was followed by a Sensitivity Analysis to find the response of investment efficiency indicators to probable changes from technical and economic perspective. Switching value was applied to find critical levels for the studied variables (number of trees, productivity and price Of main product).

The study relied on a field random sample of sixty olive growers in Aresh⁽¹⁾ district North Sinai Governorate. Comparative importance of cultivated area and number of holders reached 75% and 25% respectively for seasons of 2010/2011 later, the sample was classified into two farm capacities. Small farm capacity includes 5 and less than 5 faddans with a total of 33 farm. Big farm capacity includes over 5 faddans with a total of 27 farm. Dominant Foreign varieties are Beckole and Shemlaly and domestic varieties are Tophah and Sebhawey.

As shown in table (1) cash flow per faddan for each capacity was figured out. Cash inflow included (a) share per faddan of investment cost (well digging, lifting pump and irrigation network). (b) Number of grown trees which is estimated between 80 and 120 per faddan. (c) Foreign variety constituted 60% and domestic varieties 40%. (d) Tree productivity per kg. (e) Farm price per kg. in accordance with various varieties.

Price at big farms is higher than that in small farms due to (1) Strong bargaining power practical by big farms. (2) Big farms sell at the current price (3) Bigger marketing power of big farms.

⁽¹⁾ Collected and calculated from official records, Ministry of Agriculture, North Sinai 2010.

Table (1): The Production and Technical Coefficients for Cash Flow Sheet and The Initial IRR and NPV in Olive Orchards

Year	1		02:04		05:20		21:30		30-35		36	
Items	small scale	large scale	small scale	large scale	small Scale	large scale	small scale	large scale	small Scale	large scale	small scale	large Scale
Inflow/ fed:												
Olive Production												
No. of trees	120	120	120	120	120	120	120	120	120	120	120	120
Diversity %												
1-foreign variety	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
2-local variety	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%
Yield (kg / tree)												
1- foreign variety	0	0	0	0	70	75	65	75	40	50	20	25
2- local variety	0	0	0	0	65	65	55	60	40	40	20	20
Price (LE / Kg)												
1- foreign variety	0	0	0	0	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
2- local variety	0	0	0	0	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Sub- Total (LE)	0	0	0	0	21660	23502	19470	22878	12720	15252	6360	7626
Clipping Production(LE)	0	0	0	0	120	120	360	360	360	360	0	0
Intercrop Revenue (LE)	2000	2750	2000	2750	2000	2000	0	0	0	0	0	0
W.& scrape Production Sub- Total (LE)	0	0	0	0	0	0	0	0	0	0	3500	3500
Total Inflow	2000	2750	2000	2750	21660	23502	19470	22878	12720	15252	9860	11126
seedlings												
1- foreign variety (LE)	672	0	0	0	0	0	0	0	0	0	0	0
2- local variety (LE)	672	0	0	0	0	0	0	0	0	0	0	0
fertilizers (LE)	99	160	300	240	300	240	150	140	0	0	0	0
cultivation	600	500	0	0	0	0	0	0	0	0	0	0
manure (LE)	1440	1920	1440	1920	1920	2400	1920	2400	1920	2400	0	0
pesticides (LE)	0	0	130	150	200	150	200	150	200	150	0	0
labor (LE)	1500	1200	1500	1200	1500	1200	1500	1200	1500	1200	1500	1200
machinery (LE)	50	50	50	50	50	50	50	50	50	50	0	0
hacked	50	50	50	50	50	50	50	50	50	50	0	0
clipping	120	120	120	120	120	120	360	360	360	360	0	0
irrigation	280	300	280	300	280	300	280	300	280	300	0	0
harvest& packing	0	0	0	0	2040	2130	1830	2070	1200	1380	600	690
Packaging mat.	0	0	0	0	122.4	127.8	109.8	124.2	72	82.8	36	33
safeguarding	0	0	120	100	120	100	120	100	120	100	120	100
rent	500	500	500	500	500	500	500	500	500	500	500	500
well & pump	5000	5000	0	0	0	0	0	0	0	0	0	0
irrigation system	1500	1500	0	0	1000	1000	1000	1000	1000	1000	0	0
Intercrop costs	1200	1800	1200	1800	1000	1500	0	0	0	0	0	0
Total Outflow	13011	13772	5570	6330	6963	7147.8	6949.8	7344.2	6132	6472.8	2916	2431.4
Net Benefits	-11011	-11022	-3570	-3580	14698	16354	12520	15534	6588	8779	6944	8695
Large Scale	IRR = 37%						NPV = 112181.2					
Small Scale	IRR = 35%						NPV = 100683.5					

Source: Compelled and Computed from The Field Sample Survey Data. 2010/2011.

Weighed average of the Intercropping crops during the first 10th years of the orchard. Intercropped crops returns in big farms include barely L.E 1500, lentil L.E 2000, foliars L.E 2500 in summer. In small farms returns are

estimated at L.E 1300 for barely, L.E 1800 for lentil, L.E 2500 for foliars. Plus value of timber, irrigation network and others at the end of production age.

Cash out flow includes cost of seedlings, chemical fertilizer, manure, pesticides, hatched, labor, Packaging materials, oil & fuel and rent which are estimated by around L.E 500 per faddan. Plus interest on borrowed loans. Intercropped crops in big farms includes L.E 600 for barely, L.E 800 for lentil, L.E 900 for foliars in summer. In small farms returns reached L.E 500 for barely, L.E 650 for lentil in winter, L.E 800 for lentil, L.E 1000 for foliars plus investment cost as irrigation network, harrowing and weed control.

The Project lifetime estimated by 36 year was divided into five phases as follows:

- (1) The first year for orchard establishment.
- (2) From year two through year four. No returns but for Intercropped crops.
- (3) From year one to year twenty most trees are fruitful and Intercropped crops returns diminishes gradually and vanishes in year eight.
- (4) From year 21 up to year 30, productivity becomes stable.
- (5) From year 30 up to year 36, trees deterioration appears.

Most orchard owners tend to cancel the last phase and start growing new seedlings.

Investment efficiency in the current status:

Table (1) shows the current status of olive orchards management. Table results indicate that Net Present Wealth in this activity is estimated at about L.E 100.7 and L.E 112.2 thousand per faddan for small and big orchards respectively. Value of IRR reached about 35% for small farms against about 37% for big orchards with an average about 36%.

Impact of probable technical changes on investment efficiency:

Impact of changes in the number of trees: Table (2) shows that fruitful trees decreased from 120 to 80 per faddan which leads to reduction of IRR by 25.7% in small farms against 44.3% in big farms, with an average⁽¹⁾ 25%. Net Present Wealth declined by 46.4% in small farms against 24.3% in big farms with an average of 45.3%. 180 trees per faddan increases IRR by 20% in small farms and by 19.5% in big farms. As for Net Present Wealth its value increases by 46.4% in small farms against 24.3% in big farms. Findings also say that Net Present Wealth is more sensitive than IRR with respect to changes in number of trees. The Switching value reached 34 tree/faddan in small farms against 30 tree/ faddan in big farms.

Impact of changes in variety structure: Table (2) shows that dominant variety structure in the current status is (60% foreign and 40% domestic) turns to (100% foreign and zero% domestic).

This leads to increasing IRR by 5.7% in small farms against 8.1% in big farms, with an average of 6.8%. This is equivalent to 35.9% IRR. Net Present Wealth its value increased by 14% in small farms against 15.3% in big farms, with an average of 14.7%. Findings indicate that sensitivity in big farms exceeds its counterparts in small farms. Change in dominant variety structure reached (zero% foreign and 100% domestic or local varieties). This leads to reduce IRR by about 11.4% in small farms against 10.8% in big farms, with

⁽¹⁾ geometrical average.

an average of 11.1%. This is equivalent to 24.4% IRR. Net Present Wealth its value declined by 21% in small farms against 23% in big farms. Change in dominant variety structure by (50% foreign : 50% domestic or local varieties) leads to decreasing IRR by 2.7% in small farms against 2.9% in big farms. This is equivalent to 34% IRR. Net Present Wealth its value decreased by 3.5% in small farms against 2.7% in big farms, with an average of 14.7%. Findings say that specializing in the foreign varieties is better from the investment efficiency perspective, followed by foreign and domestic varieties in the last place.

Table (2): Results of Sensitivity Analysis and Switching Value for Number of Trees, Diversity Ratio, Specialization and Yield in Olive Orchards

Variables	Tested Levels	IRR				NPV			
		large Scale		small scale		large Scale		small scale	
		%	Change	%	Change	Change	LE	Change	LE
No. of Trees	current (120)	35		37		10683.5		112181.2	
	80	26	-25.7	28	-24.3	53978.9	-46.4	62470.9	-44.3
	160	42	20	44	18.9	147388.2	46.4	161891.4	44.3
	Switching Value	small scale = 71.7%				large scale = 75%			
Diversity Ratio	current 60:40	35		37		10683.5		112181.2	
	100% foreign v.	37	5.7	40	8.1	114798.2	14	129367.2	15.3
	100% local v.	31	-11.4	33	-10.8	79511.4	-21	86402.2	-23
	50% F : 50% L	34	-2.9	36	-2.7	97154.8	-3.5	107884.7	-2.7
Increase in Yield (10%)	current	35		37		10683.5		112181.2	
	foreign v	37	5.7	39	5.4	110036.8	9.3	122259.7	9
	local v.	36	2.9	38	2.7	105503.2	4.8	117177.2	4.5
	F. & L.	37	5.7	39	5.4	114856.4	14.1	127255.7	13.4
	Switching Value	small scale = 71%				large scale = 74%			

* F = foreign variety, L = local variety

Source: Computed from Table (1).

Impact of changes in tree productivity: Table (2) indicates the increases of tree productivity compared with the present status which reaches 10% for each variety plus 10% for both varieties. Findings say that IRR and value of Net Present Wealth are higher sensitive to any increase in foreign varieties productivity only. Sensitivity goes up to its peak when productivity of the varieties are raised by 10%. Sensitivity of investment efficiency increases in small farms than big farms in all cases. When productivity of foreign varieties is increased by 10%, IRR increases by 5.7% in small farms against 5.4% in big farms. Value of Net Present Wealth increases by about 9.3% in small farm against 9% in big farm. If productivity of local varieties increases by 10%, IRR increases by 2.9% in small farm against 2.7% in big farm. This is equivalent to 36% increase in IRR. Net Present Wealth increases by about 4.1% in small farm against 4.5% in big farm. If productivity of trees from both varieties is increased 10%, IRR increases by 5.7% in small farm against 5.4% in big farm. This is equivalent to 35.9% of IRR. Net Present Wealth increases by about 14.1% in small farm against 13.4% in big farm. Switching value of olive productivity. As shown in table (2), concludes that this business becomes useless economically when productivity be reduced by 71% in small

farm and by 74% in big farm. Critical levels of productivity reached 29% and 26% for the two capacities respectively.

Impact of propable economic changes on investment efficiency:

Impact of changes in olive price: Table (3) shows the propable Impact or 10% increase in each variety and both varieties. Sensitivity of IRR and value of Net Present Wealth become high, if price of foreign varieties is increased by 10%. Sensitivity of investment efficiency increases in big farm than in small farm in all cases of price raise. If price of foreign varieties is increased by 10%, IRR increases by 5.4% in small farms against 5.7% in big farms. This is equivalent to IRR estimated at 35.9%. value of Net Present Wealth increases by 10% in small farms against 9.7% in big farms. If price of local varieties is increased by 10%, IRR increases by 2.7% in small farms against 2.9% in big farms. This is equivalent to IRR estimated by 36%. Value of Net Present Wealth increases by 4.8% in small farms against 5.2% in big farms. If price of both varieties olive is increased by 10%, IRR increases by 5.4% in small farms against 2.7% in big farms. This is equivalent to IRR estimated by 36%. Value of Net Present Wealth increases by 5.7% in small farms against 14.8% in big farms.

As shown in table (3), Switching value of olive price clarifies that this business becomes more feasible economically when current price declines by 70% in small farm and 68.5% in big farm. Critical levels of price represent about 30% and 31.5% of current price for the two capacities (small& big) respectively.

Impact of changes in inflow components: The inflow contains earning from olives sales, intercrops, timber, depreciation of irrigation network and finally scrap of lifting pump at the end of its working life (secondary). table (3) shows the expect impacts on investment in olive , if earnings from olive is increased by 10% only and earnings from by – products is increased by the some percentage and finally earnings from bath wain and by – products are increased by 10% as well .

Firstly: Rise of earnings from olive: If earnings from olive because of productivity and price , is increased by 10% IRR increases by 8,6% in small for against 5,95 in big form. this is equivalent to 39,9% IRR. value of present wealth increases by 15,2% in small form against 14,5% in big form this simply means that sensitivity of the two indicators of investment efficiency to changes in olive earnings in small form surpasses its counterpart in big form. Also , value of present wealth is more sensihve than IRR, with respect to the response to changes.

Secondly : Rise of secondary earnings : If earnings from by – product is increased by 10%, IRR increases by amount 2,9% in small form against 2,8% in big form value of net present wealth increases by 2,3% in small form against 2,7% in big form . that is equivalent to 35,96% of IRR . as for net present wealth , it increases by 2,3% in small form against 1,6% in big form .this mean that sensitivity of both indicators of investment efficiency to changes in secondary earnings in small form surpasses its counterpart in big form . Also, IRR is more sensitive than net present value , with regard to the response to such changes .

Thirdly: Rise of total earnings: If total earnings (mean and by – product) is raised by 10% net present wealth rise by 17,5% in small form against 16,1% in big form . Mean while , IRR increases by 8,6% in small form against 10,8% in big form . this is equivalent to IRR estimated by 35,7% . this mean that value of net present wealth surpasses its counterpart in IRR 613 Impact of change in cost items: Table (3) clarifies the expected changes in investment efficiency in olive, if each cost item is by 10% finding say that changes in cost of manner, guards and irrigation, total investment cost followed by changes in internist rate are all affecting investment efficiency. the rest of cost items as chemical fertilizer,seed lings faddan, tillage irrigation (electricity), pest control, harvest and packaging , cost of inter crops and rent are of little effect as investment efficiency. As shown in the table , if cost of manner is raised by 10% IRR decline by 2,9% in small form against 2,7% in big from . this is equivalent to IRR 34% .If cost of interest rate is raised by 10% ,IRR decline by about 0,4% in small form against 0,8% in big form. This is equivalent to IRR of 35,2% . It is worth mentioning that if outflow collectively is increased by 10% IRR decline by 8,6% in big form. Value of net present wealth declines by 5% in small form against 6,1% in big form . As shown in table (3), critical value of land rent, (switching value) is estimated by L.E 9885 per faddan in small farm against L.E 12,500 per faddan in big farm .

Table (3): Results of Sensitivity Analysis and Switching Value Prices of Olive , Components of Total Inflow, Outflow Items and Land rent in Olive Orchards

Variables	Tested Levels	IRR				NPV			
		large Scale		small scale		large Scale		small scale	
		%	Change	%	Change	Change	LE	Change	LE
Increase in Prices (10%)	current	35		37		10683.5		112181.2	
	foreign variety	37	5.7	39	5.4	110748	10	123026.1	9.7
	local variety	36	2.9	38	2.7	105931	5.2	117620.7	4.8
	F. & L.	37	5.7	39	5.4	110748	5.7	128465.6	14.8
	Switching Value	small scale = 68.5%				large scale = 70%			
Increase in Total Inflow (10%)	current	35		37		10683.5		112181.2	
	Main P.	38	8.57	39	5.41	115996	15.21	128466	14.52
	Secondary p.	36	2.86	38	2.7	102959	2.26	113957	1.58
	M. & S.	38	8.57	41	10.81	118271	17.47	130242	16.1
Increase in Outflow Items (10%)	current	35		37		10683.5		112181.2	
	manure	34	-2.9	36	-2.7	99579.5	-1.1	110763.1	-1.3
	labors	34	-2.9	36	-2.7	99232	-1.4	111020	-1
	Interest rate	31	-11.45	35	-5.41	94635.1	-6.01	108221	-3.53
	Total Outflow	32	-8.6	34	-8.1	94154.6	-6.5	105339.3	-6.1
Land rent	current (500 LE)	35		37		10683.5		112181.2	
	Increase (10%)	35	0	37	0	0	10683	0	112180
	Switching Value	small scale = 9885				large scale = 12500			

* M = Main Production (Olive), S = Secondary Production (Clipping Production, Intercrop, Wood.& scrape Revenue).

Source: Computed from Table (1).

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دراسة كفاءة الاستثمار في الأنشطة البستانية (دراسة حالة الزيتون في شمال سيناء)

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استهدفت الدراسة: (١) قياس مؤشرات كفاءة الاستثمار وذلك وفقا للسعة المزرعية (مساحة البستان). (٢) قياس أثر التغيرات المحتملة في أهم المتغيرات الفنية (عدد الأشجار، إنتاجية الشجرة، التركيبي الصنفى السائد على وحدة المساحة الأرضية)، وأهم المتغيرات الاقتصادية (السعة المزرعية، سعر الكيلو جرام من المنتج الرئيسي، مكونات التكاليف، مكونات العائد، وكذلك إيجار الأرض الزراعية) على كفاءة الاستثمار في نشاط الزيتون على مستوى السعة المزرعية. (٣) تحديد المستويات الحرجة Critical levels لأهم المتغيرات المؤثرة على كفاءة الاستثمار. ولتحقيق أهداف الدراسة تم حساب كلا من: معدل العائد الداخلي (IRR) وصافي الثروة الحاضرة (NPV) عند سعر الخصم الذي يمثل تكلفة الفرصة البديلة لاستثمار رأس المال في المجتمع كمؤشرين لكفاءة الاستثمار للبتانيين موضع الدراسة وعلى مستوى السعة المزرعية ووفقا للصياغة الرياضية للمقاييس المخصوصة Discounted Measures لقيمة المشروع. تطبيق أسلوب تحليل الحساسية Sensitivity Analysis . استخدام أسلوب الـ Switching Value وذلك لتحديد المستويات الحرجة Critical Levels لأهم المتغيرات المدروسة. توصلت الدراسة إلى عدة نتائج أهمها: (١) ارتفاع كفاءة الاستثمار في بستان الزيتون في شمال سيناء حيث يقدر معدل العائد الداخلي بحوالي ٣٦%. والقيمة الحاضرة للثروة بنحو ١٠٦.٤ ألف جنية للقدان. (٢) قدرت الـ Switching Value لعدد الأشجار ٣٤ شجرة/فدان في حالة السعات الصغيرة مقابل ٣٠ شجرة/فدان في حالة السعات الكبيرة. (٣) التخصص في زراعة الأصناف الأجنبية هو الأفضل من ناحية قيم مؤشرات كفاءة الاستثمار المستخدمة. (٤) مؤشرات كفاءة الاستثمار أكثر حساسية لزيادة إنتاجية أشجار الأصناف الأجنبية فقط بنسبة ١٠% عن نظيرتها في حالة زيادة إنتاجية أشجار الأصناف المحلية. وتقدر الـ Switching Value لإنتاجية الشجرة بحوالي ٢٧.٥% من الإنتاجية الحالية. (٥) استجابة مؤشرات الكفاءة للزيادة في الأسعار مطابقة للنتيجة المتحصل عليها عند زيادة إنتاجية الأشجار. وتقدر الـ Switching Value للسعر بحوالي ٣١% من المستوى السعري الحال.

قام بتحكيم البحث

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