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Assessment of Commercialization of Canola Cultivation in Guilan Province, Application of Policy Analysis Matrix

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ABSTRACT

Local production systems will cover 20 percent of Iranian consumer demand in for oil, and Iran has excessively dependent to import of these supplies. Therefore, to achieve self-sufficiency in production is necessary increasing of cultivation of various oil seeds and Long-term planning. Development of second culture Provides Opportunities to expand of canola oil seed cultivation In Paddy lands of the province of Guilan. This study will investigate of Comparative advantage indices Protection and Competitive cost a production of canola in city of Anzali, Talesh and Rudbar of Gilan Province. In this regard, With the nine scenarios, The results are Implies advantage In Scenarios 2, 6, 7 and 8 For Of canola production systems In cities of Bandar Anzali, Talesh And Rudbar. In all nine scenarios, Calculation values Of EPC for production systems in Bandar Anzali and Talesh Shows that, Be useful The effects of government intervention In product markets And Inputs For producers Of canola. In Current Conditions, Results of export competitiveness index (U_{Cx}) Show that all nine scenarioscanola production In Bandar Anzali and Talesh have Compete In global markets captivating inputs and Domestic prices. Agronomic benefits of fall planting, Sustainability of farming, Work, Create ancillary revenue and increased production of oil seeds In Province of Guilan are important reason for Increasing autumn sowing of canola.

KEY WORDS: Competitive, oil seeds, Production, Guilan Province.

INTRODUCTION

Agriculture is Set of economic activities That, these purpose are providing food needs of the community and production of agricultural raw materials for Industrial requirements. Population growth in most developing countries, using of business agricultural products for realization goals of developed countries, expansion of global conflict and increased risk of agricultural trade and high correlation between food security and national security are most reasons to thinking of independence in agricultural production and minimum dependence on imported products in most developing countries of the World. Optimal allocation of internal sources and specialized up products in different regions based on capacity and resource abundance are important issue at Improvement of agricultural production. In the economic literature, used of comparative advantage for analyze of power competitiveness of a country or region in producing and business products. Hence, in addition to developing an appropriate framework for economic planning and developmental of the study area, assess the relative benefits of regional agricultural production can be important role in the achieving Improvement goals. According to many policymakers,

A regional economic growth has large dependence to use of the relative advantages of that area. Comparative advantage producing used as normative to prioritization of productive activities. When the regional will be specialize of commodity in the production or service that has a comparative advantage and providing other products and services of the other regions, maximum use of resources and facilities is applied and social benefits is increase. Identify the comparative advantages is to use of the sources of regional production. Addition of technical progress on a comparative advantage, capacity and regional approach, features and product features and climate and geographic region indicates a comparative advantage of

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regional in the end. In fact, comparative advantage of production is dependent to inventory of resources, style of production, technological progress, skilled labor and efficiency of inputs. Oilseed plants are strategic agricultural products that are highlighted to development of its culture due to the limited cultivation and high per capita consumption in all provinces of Iran. At present, according to the 6 / 71 million in Iran and 16 kg per capita consumption of oil for the Iranians, less than 20 percent of domestic needs Produced in inside and other will be imported from outside. There are four major oil seeds in Gilan province including Peanuts, Sunflower, Canola and Soya that their area under cultivation Are 2550, 18, 1600, 8 hectares respectively. Performances of these products are 3350, 1067, 1110 and 2600 kg ha respectively. Comparative advantage can be investigated in two actually and potential. Actual comparative advantage will check comparative advantage in product or special sections that it is produced an actual period and specific geographic boundaries. The other hand, potential comparative advantage Will review comparative advantage in product or special sections that defined by period and geographical boundaries and not done an actual production, but, can be produced potentially and the talent(1). Many international and internal studies are studied comparative advantage in agricultural products. Fang and Beghin (2000) studied comparative advantage agricultural products in China By using policy analysis matrix and HO Model. The results showed that products which require large land Such as oilseed plants and grains haven't advantage while user products such as vegetables have comparative advantage. Also, for login of China to the WTO, china's model trade in Agricultural products should be changed. Hallett (2005) assessed comparative advantage and competitive South Africa's oilseed plants. Results of this study indicate comparative advantage for grain of peanut butter and sunflower in South Africa. Jooste and Van Schalkwyk (2001) were evaluated of comparative advantage downstream industries of oilseed plants in South Africa. The results showed that this industry has comparative advantage in areas with high yield and irrigation system but there isn't comparative advantage in dry land areas and a low yield. Another study conducted about this by Shafiq and Solomon (2006), Funing and Lonbo (2001), Mohanty and Fang (2002), Decorated and Karimi (1385), Light (1387) and Safdar Hosseini and et al (1387). This study reviews of index of comparative advantage, protection and cost-competitive production ofcanola in Anzali, Talesh and Rudbar cities of Guilan province. In this regard, obtained indicators of advantage, protection and competitive cost with collecting information about technical coefficients Consumption inputs, yield, cost and canola's product at mentioned cities in 86-1385 crop years. In the next step, index of DRC and SCB calculated by using Linear programming model and for Determination of social optimum cultivation ofcanola products, social optimum cropping pattern for the fall crop is calculated under different scenarios in the each of them.

MATERIALS AND METHODS

Policy Analysis Matrix (PAM) is a technique of double accounting that provides budget information of activities within ranch and Farm output in summary. This process resulted in topic of analysis of Social Cost-benefit and international trade theory in the economy. Framework of policy analysis matrix for each product and in the each city is as follows: (23):

Table 1 - The policy analysis matrix (Rial).

Profit	Cost inputs		Revenues	**Description**
	Non-trade	Consumer Business		
D	C	B	A	**Private values (Based on market prices)**
H	G	F	E	**Social values (Based on shadow prices)**
L	**K**	**J**	**I**	**Difference (the effect of policy)**

Based on the above table, there are 12 input variables to the PAM matrix that are shown with A to L Respectively. With using by a policy analysis matrix can be obtained different relations. Domestic Resource Cost (DRC) is the shadow cost to non-trade input to Value shadow without considering internal Inputs. Much smaller unit shows comparative advantage in producing.

$$DRC = \frac{G}{E - F} \qquad (1)$$

Social Cost Benefit Ratio (SCB) shows real competitive advantage by eliminating price distortions and input and achieved division of the shadow cost of inputs to shadow income. Smaller amounts of the indicator unit are represents of comparative advantage in production.

$$SCB = \frac{F+G}{E} \quad (2)$$

Net Social Profit (NSP) is profits obtained from production using the shadow price of a product and input. Positive values of this index indicate social profitability and comparative advantage of production.

$$NSP = (E - F - G) \quad (3)$$

Nominal Protection Coefficient on Output (NPCO) is ratio of market income (A) to shadow income (E) and it expressed the effect of government policies on product prices. Much larger unit of these indicators shows indirect subsidies to producer and/ or protection of product market. Nominal Protection Coefficient on Input (NPCI) is ratio of cost significant business inputs based on of market prices (B) to the cost of inputs based on shadow prices (F). Lower value of unit of these indicators shows protect of market inputs consumer business or indirect subsidy to produce. Effective Protection Coefficient (EPC) achieved from division the value added product without taking non-agricultural trade based on of market prices to value add of manufacturing based on shadow prices. Much larger of the unit these indicators represents that effects of government intervention on product of market and input are beneficial to manufacturer.

$$EPC = \frac{A-B}{E-F} \quad (4)$$

Index of Profitability Coefficient (PC) obtained from division of profits or private (D) to social benefits or shadow (H) and it is normative to compare the profitability on two modes of market and shadow. Values close unit of these indicators are represents deviations less in the market inputs and product. Standard of Subsidy Ratio to Producers (SRP) obtained from division of pure effect of policy (L) on the shadow income (E). If mentioned index is smaller represents less disruption on farming systems and possibility domestic production activities on liberated competitive conditions (Business). Private Cost Ratio (PCR) obtained from division of the cost non-agricultural trade on the value added production without taking non-agricultural trade based on of market prices. Whatever value of this index is less; indicate that capability of cost competitiveness domestic of product manufacturer is more. According to current conditions and the diversion of product prices and inputs, Unit Cost Domestic (UC_d) shows that, whether domestic producers are able to compete in the domestic market? (UC_d) obtained from dividing of cost savings market on income market. If The value of this index is smaller than unit, manufacturer has competitive power built cost in its product.

$$UC_d = \frac{(B+C)}{A} \quad (5)$$

Unit Cost Export (UCx) indicate that whether the product manufacturing has competitive power at global markets at current conditions and with spend inputs with domestic prices (may be it have diverted). This index obtained from dividing of cost savings market on shadow income. If value index is less than unit farmer has competitive power of export cost in its product.

$$UC_X = \frac{(B+C)}{E} \quad (6)$$

After determination advantage of indicators, were used of linear programming in various scenarios for calculation of protection and competitive power cost to determination pattern social optimum culture autumn

of agriculture in Bandar Anzali, Talesh and Rudbar city and determine area under cultivation ofcanola. Used data in this pattern are includes shadow income crop per hectare, shadow cost of inputs non-manufacturing business in agriculture per hectare, shadow cost inputs can generate trade in agriculture per hectare, technical coefficients of production each product and stock of productive resources. Decision variable in the pattern is optimal area under cultivation each of the crops in Bandar Anzali, Talesh and Rudbar. Manufacturing resource constraints in model are restrictions related to the area under cultivation, labor, fertilizers in separation of nitrogen fertilizer Phosphate fertilizer and potash fertilizers, chemical pesticides separation herbicides, fungicides and pesticides, time working of machinery, water and budget. General figure of linear programming model is

$$
\begin{aligned}
& Max\ \ Z = \sum_{j=1}^{N} (R_j - C_{1j} - C_{2j}) X_j \\
& \text{Subject to:} \\
& \sum_{i=1}^{M} \sum_{j=1}^{N} a_{ij} X_j \le b_i \\
& DRCX_j - C_{1j} \times Y_j = 0 \\
& R_j \times Y_j - C_{2j} \times Y_j = 1 \\
& SCBX_j - C_{1j} \times Z_j - C_{2j} \times Z_j = 0 \\
& R_j \times Z_j = 1 \\
& X_j \ge 0
\end{aligned}
\tag{7}
$$

In the above model, Z is social benefits, Xj is production levels or decision variable per acre, Rj is shadow income per acre, C1j is shadow cost of internal resources agriculture ha, C2j is shadow cost of imported inputs ha, aij is the coefficient of technical inputs, is bi amount of resource available or input i, DRCXj is domestic resource cost of the product and SCBXj is cost ratio to social benefits. Data needed to perform this research are achieved cost of production of ministry of Agriculture for 85 to 86 year of crop, central bank of Islamic Republic of Iran, World Food Organization and Customs of Islamic Republic of Iran.

RESULTS AND DISCUSSION

This study is considering all three methods of exchange rate calculation shadow for computing shadow exchange rate in studies of comparative advantage. Shadow exchange rate index (E1) is according to America's dollar monetary unit and its value was computing by using relative purchasing power parity. The shadow E1 was obtained 4760 Rials. Rate of exchange shadow II (E2) was computing according to USD and based on absolute approach purchasing power parity (Gold). Shadow value of E2 is equal 9160 Rials. Rate of third shadow of exchange (E3) is calculated based on the conversion ratio and its value were obtained equivalent to 5876 Rials. Three types of shadow price of land was used to calculation according to exist uncertainties in shadow price of land based on collected data and earlier research. In the first shadow price, be considered average value of land rent for canola crop in the study area. This method has been used in most international studies comparative advantage such as Kavousy Klashmy (1387), Rafiee (1387), Abedi (1387), Nouri (1387), Mohammadi (1383) and Nouri (1381). The second scenario of the shadow price of land will be 85% highest price of land rent in the study area as a shadow price of land. This method provided by Gonzales and et al. (1993), and in local studies provided By Goodarzi et al (1387) Azizi and Zibayee (1380). In the third method of computing a shadow price of land which introduced in studies of Mcintire and Delgado

(1985) and NourBakhsh (1375), quarter of product price will intended as a occasion cost of land. According to computing three types of shadow exchange rate and three types of land shadow prices in total of nine different scenarios, In Scenario of 1, shadow exchange rate relative PPP is equivalent to 4760 Rials and shadow price of land is equivalent average value of the rent. In scenario of 2, shadow exchange rate PPP relative is equivalent to 4760 Rials and shadow price of land is equivalent to 85% rent value. In scenario of 3, shadow exchange rate relative PPP is equivalent to 4760 Rials and shadow price of land is equivalent quarter of value of product. In scenario of 4 shadow exchange rate absolute PPP is equivalent to 9160 Rials and shadow price of land is average equivalent of rent value. In scenario of 5, shadow exchange rate of absolute PPP is equivalent to 9160 Rials and shadow price of land is equivalent to 85% rent value. In scenario of 6, shadow exchange rate absolute PPP is equal to 9160 Rials and shadow price of land is equivalent Quarter of the value of product. In Scenario of 7, shadow exchange rate CF is equivalent to 5876 Rials and shadow price of land is equivalent average value of the rent. In Scenario of 8, shadow of exchange rate of CF is equivalent to 5876 Rials and shadow price of land is equivalent to 85% of rent value. In Scenario of 9, shadow of exchange rate of CF is equivalent to 5876 Rials and shadow price of land is equivalent quarter to the value of product. Results in above are based on all calculations took for index of advantage, protection and competitive cost in Bandar Anzali, Talesh and Rudbar city. To determine of shadow price of water at areas with abundant water resources such as province of Guilan, high cost of water is considered as shadow price. Hence, shadow price of water consumed forcanola is intended equivalent most expensive cost of water extraction. In this regard, with regard to cost of water supply of springs, river, deep wells, semi-deep wells, shallow wells and modern and semi-modern irrigation systems, maximum cost was considered as shadow prices. For calculating shadow price of labor, high wages at agricultural activities of each city was considered as opportunity to cost of labor. On the other hand, is considered 64% of machinery cost of consumer business and 36 percent of its non-trade. World prices of this product were used for calculating of shadow price of canola. In the city of Bandar Anzali, Talesh and Rudbar , shadow exchange rates of E1, E2 and E3 were calculated with performance values and technical coefficients, income and market price and shadow each hectare of canola. With identify of above mentioned values, can be obtained policy analysis matrix and indicators of advantage, protection and competitive cost for canola in all studied city.

Results of calculated mentioned indicators are submitted in the following table.

Table 2 - Indicators of Advantage ،Protection And Competitive for canola Crop cost In Guilan Province

Rudbar	Talesh	Bandar Anzali	Index	Scenario of shadow price of land	**shadow exchange rate**
1.8	1	0.84	DRC	The average of value of the rent	**Equality Of relative purchasing power of dollars**
1.58	1	0.92	SCB		
-1.28	-0.003	4.03	NSP*		
1.7	0.92	0.93	NPCO		
0.84	0.63	0.55	NPCI		
2.03	1.05	1.35	EPC		
-0.44	-32.1	3.24	PC		
0.84	0.03	0.16	SRP		
0.82	0.95	0.62	PCR		
0.84	0.96	0.74	UC_d		
1.44	0.89	0.68	UC_x		
1.63	0.89	0.8	DRC	85 % of Rent value	**Equality Of relative purchasing power of dollars**
1.46	0.92	0.9	SCB		
-1.01	0.26	0.5	NSP*		
1.7	0.92	0.93	NPCO		
0.84	0.63	0.55	NPCI		
2.03	1.05	1.35	EPC		
-0.56	0.46	2.61	PC		

0.72	-0.04	0.14	SRP		
0.82	0.95	0.62	PCR		
0.84	0.96	0.74	UC_d		
1.44	0.89	0.68	UC_x		
1.26	0.59	1.08	DRC	Quarter of Value productive crops	**Equality Of relative purchasing power of dollars**
1.18	0.71	1.03	SCB		
-0.41	0.99	-0.21	NSP*		
1.7	0.92	0.93	NPCO		
0.84	0.63	0.55	NPCI		
2.03	1.05	1.35	EPC		
-1.39	0.12	-6.2	PC		
0.45	-0.24	0.28	SRP		
0. 82	0.95	0.68	PCR		
0.84	0.96	0.74	UC_d		
1.44	0. 89	0.68	UC_x		
0.88	1.23	1.96	DRC	The average of Rent Value	**Equality Absolute purchasing power of dollars**
0.9	1.13	1.19	SCB		
0.38	-0.47	-1.04	NSP*		
0.94	0.92	0.93	NPCO		
0.7	0.43	0.36	NPCI		
0.99	1.29	3.16	EPC		
1.5	-0.26	-1.24	PC		
0.04	0.16	0.43	SRP		
0.82	0.95	0.62	PCR		
0.84	0.96	0.74	UC_d		
0.79	0.89	0.68	UC_x		
0.79	1.09	1.87	DRC	85% of Rent value	**Equality Absolute purchasing power of dollars**
0.83	1.05	1.17	SCB		
0.65	-0.19	-0.95	NSP*		
0.94	0.92	0.93	NPCO		
0.7	0.43	0.36	NPCI		
0.99	1.29	3.16	EPC		
0.88	-0.61	-1.37	PC		
-0.01	0.09	0.41	SRP		
0.82	0.95	0.62	PCR		
0.84	0.96	0.74	UC_d		
0.79	0.89	0.68	UC_x		
0.61	0.73	2.53	DRC	Quarter of Value productive crops	**Equality Absolute purchasing power of dollars**
0.68	0.85	1.3	SCB		
1.25	0.52	-1.66	NSP*		
0.94	0.92	0.93	NPCO		
0.7	0.43	0.36	NPCI		
0.99	1.29	3.16	EPC		
0.46	0.23	-0.78	PC		
-0.16	-0.11	0.54	SRP		
0.82	0.95	0.62	PCR		
0.84	0.96	0.74	UC_d		
0.79	0.89	0.68	UC_x		
1.42	1.05	0.98	DRC	The average of Rent Value	**USD conversion rate Equal to 5876 Rials**
1.32	1.03	0.99	SCB		
-0.68	-0.12	0.03	NSP*		
1.41	0.92	0.93	NPCO		
0.8	0.56	0.49	NPCI		
1.6	1.1	1.58	EPC		
-0.66	-1	36.86	PC		
0.54	0.06	0.23	SRP		
0.82	0.95	0.62	PCR		
0.84	0.96	0.74	UC_d		
1.19	0.89	0.68	UC_x		
1.29	0.93	0.93	DRC	85 %of Rent Value	**USD conversion rate**

1.22	0.95	0.97	SCB		**Equal to 5876 Rials**
-0.59	0.14	0.13	NSP*		
1.41	0.92	0.93	NPCO		
0.8	0.56	0.49	NPCI		
1.6	1.1	1.58	EPC		
-0.97	0.82	9.89	PC		
0.44	-0.007	0.21	SRP		
0.82	0.95	0.62	PCR		
0.84	0.96	0.74	UC_d		
1.19	0.89	0.68	UC_x		
0.99	0.62	1.26	DRC	Quarter of Value productive crops	**USD conversion rate Equal to 5876 Rials**
0.99	0.75	1.1	SCB		
0.007	0.87	-0.57	NSP*		
1.41	0.92	0.93	NPCO		
0.8	0.56	0.49	NPCI		
1.6	1.1	1.58	EPC		
74.15	0.14	-2.25	PC		
0.21	-0.21	0.34	SRP		
0.82	0.95	0.62	PCR		
0.84	0.96	0.74	UC_d		
1.19	0.89	0.68	UC_x		
Reference: research findings *According million Rials					

Calculating of advantage indices showed that in scenarios of 2, 6, 7 and 8, system of canola crop in the city of Bandar Anzali, Talesh and Rudbar, have comparative advantage and they could compete with foreign producers at deviation from the market inputs and output. Computing of indicator of support market-based shows direct subsidies to market and there is deviation in the input market in all nine scenarios. In all nine scenarios for production systems of Bandar Anzali and Talesh, quantities of index EPC indicates total effects of government intervention in product market and input and it is favorable for manufacturers in both cities. On the other hand, The value of this index for production systems in Rudbar city, According to scenarios of 1, 2, 3, 7, 8 and 9, total interventions two market-based and output have profit for canola producers. computing of index of competitiveness internal (UCd) in nine scenarios indicate that farmers Bandar Anzali, Talesh and Rudbar could compete in current situation and with deviation in product prices and inputs. Results of index of export competitiveness (UCx) shows that all nine scenarios rapeseed production in the city of Bandar Anzali And Talesh have compete in global markets in current situation and with the inputs internal prices (may be have a distraction). However canola production system in Rudbar city under scenarios of 4, 5 and 6 has power competition with international producers. To determine optimal levels of rapeseed cultivation in the each city examined, pattern formation linear programming was considered for maximization gross profit social under the agriculture sector for the autumn crop per city. Therefore, linear programming model was generated for scenarios of 2, 6, 7 and 8 between fall crops in pattern of cultivation and rapeseed products separately for each city. The results presented in the following table.

Table 3 - Results of Linear programming model for To determine levels of rapeseed cultivation For scenarios of with Positive NSP.

Share in NSP Total (Million rials)	SCB	DRC	NSP	Area under cultivation (Hectars)	Gross profit (Million rials)	Yeild (KG)	sityes	**Senarios**
87.5	0.9	0.8	0.5	175	1.95	1440	Bandar anzali	**2**
30.5.5	0.92	0.89	0.26	1175	1.93	932	Talesh	
611	0.85	0.73	0.52	1175	1.93	932	Talesh	**6**
281.25	0.68	0.61	1.25	225	2.39	1075	Rudbar	
22.75	0.97	0.93	0.13	175	1.95	1440	Bandar anzali	**7**
164.5	0.95	0.93	0.14	1175	1.93	932	Talesh	
1022.25	0.75	0.62	0.87	1175	1.93	932	Talesh	**8**
1.575	0.99	0.99	0.007	225	2.39	1075	Rudbar	
Reference: results of research								

Thus, Canola was the main agricultural product in fall in city of Bandar Anzali and Rudbar that the gross profit of cultivation of canola in two cities are equivalent 95.1 and 39 / 2 million rials respectively. Hence, recommended land equipment of this city for canola cultivation during the autumn crop. However, abundant rainfall during the autumn crop and sawed-off of agricultural lands are the main obstacles to development fall crop in these cities. On the other hand, due development area under cultivation of canola to 1,175 hectares in City of Talesh and become capability this city to polar of canola cultivation in fall planting, planners must be more attention to this region.

Conclusion and Suggestions

Second culture after rice, has been one of the primary concerns of planners. Many planners focus on develop all of 238 thousand hectares paddy land in Guilan province to second culture and increase yields of agricultural products of this province. However, agricultural research indicate that due lack of drainage substrates and low paddy land, second culture can be done only 20 percent on paddy land of Guilan province. On the other hand, problems such as lack of relevant research with types of crops to develop the culture according to the province of Guilan, non-payment facility to protect farmers to provide of current costs second culture, lack of clear criteria exploitation of the land in the second half the wandering animals and damage by animals to crops and lower degree of mechanization products includes second culture and consequently the rising cost of cultivation are important parameters which development of second culture in the province of Guilan faced with the serious limitations. The present study examined advantage of canola. The results showed that canola production in city of Bandar anzali, Talesh and Rudbar in scenarios of 2, 6, 7 and 8 have comparative advantage. Although values of NSP canola crop is not significant compared with spring products but agronomic benefits of fall planting, sustainable farming and create ancillary revenue and increase agricultural products the reasons which considered to cultivation of rapeseed as the appropriate option for the autumn crop.

Conclusion

Increased competition in agricultural production systems and moving to removal of price distortions of market inputs and output in agriculture, recommends review on patterns of crop cultivation and the models mentioned on basis of comparative advantage and to ability of competitive. The present study Investigated with using by policy analysis matrix for ability of competitive on manufacturing systems canola oil seed in three cities of Guilan province. The results showed that enjoyment these cities to competitiveness, provided fine position to the culture of oilseed plants in Guilan Province. Hence, can be increased the value of oilseed production in to Guilan province using with existing capacity in pattern of crop second culture after the rice.

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