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Determining Comparative Advantages of Corn in Optimal Cultivation Pattern

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Abstract

The purpose of this study is to investigate comparative advantages of corn in comparison with other competitor crops. To do so, Linear Programming, to 2004-2005 data related to classic index (DRC) in Kermanshah province was applied. Results showed that corn has comparative advantages in all regions of Kermanshah province while in optimal cultivation pattern of 37.5 percentages of regions in existence of rotation and 50 percentages of regions in lack of rotation, corn acreage has been increased. In addition, comparing optimal cultivation pattern resulted from linear programming models with crops ranking based on comparative advantage indices indicated that, resources availability and limitations, tradable and non-tradable inputs costs and yield will lead to shift in production's comparative advantage from one crop to another. Factors such as supporting policies and rotation might also have effects on comparative advantages and optimal cultivating pattern.

Keywords:
Corn, Comparative Advantage, Kermanshah Province, Linear Programming Method, Optimal Cultivation Pattern.

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INTRODUCTION

Agriculture is one of the most prominent economical sectors in Iran. Since agriculture is directly related to human's nutrition, it pursues goals in macro level such as reaching at self sufficiency, providing food safety and maximizing social profit. Among policy makers' out standing objectives in macro level, reaching at self sufficiency in producing agricultural crops is politically significant.

Corn, after wheat and rice, as the third strategic agricultural crop in the world, is a crop of great importance. Besides providing about 70% of poultry feed, this valuable agricultural crop is a useful seed for producing edible oil, starch, glucose, raw material in industrial productions and some other products (Hosseini and Abedi, 2007). Considering the population enlargement and the need for eggs and poultry, which are of great importance in the family baskets, corn acreage in the world, has consistently been increasing. In Iran cultivating corn is also very important. The country's demand of corn is about 3.7 to 4 million tons per year from which 2.2 million tons are internally produced and nearly 1.5 million tons are provided by importing (Ministry of Agricultural Jihad, 2005). So, the prominent part of corn is provided by importing, and consequently, expanding the acreage and increasing this crop production have special priorities.

Another macro-level goal which is followed by policy makers is maximizing the social profit. Social profitability is maximized when produced crops own high comparative advantages. Consequently, regarding the constraints in production inputs, and in order to make use of these inputs in its optimized way, as well as reaching at the highest level of production, it is necessary for acreage expanding and increase in corn production in different regions on the basis of comparative advantage principle, to be taken place regarding the competitor crops and restrictive resources. Several studies have been made about investigating the comparative advantage: Including Fallahi and Chizari (2007), Forghani and Kiani rad (2005), Mohammadi (2004), Najafi and Mirzaei (2003), Salami and Pishbahar (2001), Shahabuddin and Dorosh (2002), Tsia (2001), Dachin (2003) and Zhong *et al.,* (2002). Results from their investigations shows that comparative advantage depends on the abundance of resources and production inputs, production method, sophisticated technology, manpower skill, and proficiency of the inputs.

Kermanshah province, with its diverse climate, soil and water resources enjoys higher potential capability for agricultural development. The wide pains of this province have been expanded in cold, mild and hot regions. Producing agricultural crops pertaining to the cold and semi-tropical regions is one of the special characteristics of this province. The province's water resource also enjoys a considerable capacity (Ministry of Agricultural Jihad, 2005). Since one of the government plans for agriculture sector is expanding corn cultivation, regarding the existing capabilities and capacities of this province in agriculture sector, it is necessary for the advantages of the region to be recognized and the optimal cultivation model in its different regions to be determined on the basis of comparative advantages.

Generally on the way of providing people with nutritional needs and required raw materials for other economic sectors one of the prerequisites is macro programming, with respect to optimum utilization of production inputs. But towards performing macro programming we shouldn't neglect conversions such as joining most countries to WTO. With considering agricultural crops in collection of world trade agreements, necessity of regarding agricultural production and trade has been enhanced. Hence, there is a need for programming to produce agricultural products in a wide level and supply them in an even wider one (internationally). Comparative advantage as a principle issue in both production and trade programming is widely applied and is of great importance. (Gholibagloo, 2005). In this direction, and regarding intense scarcity of studies around corn, this article has been performed with the purpose of investigating comparative advantage of corn in Kermanshah province with respect to its competitor crops in cultivation pattern.

MATERIALS AND METHODS

One of the theories that have discussed comparative advantage and incentive for reciprocal trade among the countries is Heckscher-ohlin theory. Based on this theory, difference in abundance ratio of production input will cause trade to be established. Based on this theory a country enjoys comparative advantage in producing goods whose production inputs are approximately abundant in the country. Under these conditions each country exports goods that in its production, higher amount of almost abundant factor of the country has been used. Also, it should import goods which are produced by those inputs that are fairly scarce in country. Based on this theory, the enjoyment amount of the country or different regions of the production factors is not the same. In other words, difference in availability of the production factors and the intensity of their application among the countries involved in trade, are among the determinative factors for relative advantage in each country and they are causes for advantageous and reciprocal trade between the two country. In some studies performed by Mehrabi Boshrabadi (2007), Fang *et al.,* (2000), Mohanty and Fang (2002), Jeiran and Joolaie (2005) and Gholibagloo (2005), in order to figure out comparative advantage, policy analysis matrix and comparative advantage indexes have been applied. So in the mentioned methods, the abundance amount of production factors and probable constraints caused by their scarcity are not considered. While regarding restrictions in resources and optimum allocation of restrictive production inputs in determining comparative advantage, besides identifying the most efficient comparative advantages can accurately and in a better manner study the effects of government's agricultural policy in agriculture subsection concerning the different crops. Thus in current research for calculating comparative advantage, linear programming has been applied. Debate of Production comparative advantage based on Heckscher-ohlin theory in the form of linear programming with respect to production system of agricultural crops, crop rotation structure and competitiveness degree of different crops for simultaneous application of production inputs would be investigated in this method. Using this method, besides estimating comparative advantage indexes with respect to special condition of each region, an optimum pattern is demonstrated for production activities. Around this subject, studies performed by Duchinn (2003), Hosseini (2004), Joolaie (2004) and hashemi Bonab (2005), Abedi (2008), Kavoosi Kalashami (2008) and Abedi *et al.,* (2008) can be referred to. They have employed linear programming method to examine the comparative advantage.

Heckscher-ohlin theory shows comparative advantage in a more complete form. This theory can be displayed in the form of a simple linear programming model. So In this study, in order to determine the comparative advantage of corn in Kermanshah Province, linear programming model has been used. Using linear programming method, besides determining the comparative advantages regarding the shadow prices of production factors, available resource range, and amount of their abundances, it is possible to gain an optimized combination of culture in which comparative advantage has also been considered (Hosseini, 2004). General form of theoretical pattern of this study is:

$$\text{Max}Z = \sum_{j=1}^{n} (R_j - C_{1j} - C_{2j}) X_j$$

Subject to:

$$\sum_{j=1}^{n} a_{ij} X_j \le b_i$$

$$R_j \times Y_j - C_{2j} \times Y_j = 1$$

$$X_j \ge 0$$

i=1, 2,..., m
j=1, 2,..., n (1)

in which z is objective function, Rj, C1j, C2j respectively indicate shadow costs of domestic resources and shadow costs of non-tradable inputs per hectare for the jth output. Xj is optimum land for output j, aij required input quantity for each unit of ith output, bi available amount of the ith resource or input, DRCXi domestic resource cost index of jth output, Yj dummy

variables. M and n are the numbers of restrictive resources and chief agricultural crops of each state.

In this model objective is maximizing social profit from agricultural crops of each state which is calculated with respect to shadow prices of inputs and outputs. After calculating social profit for each hectare of agricultural crops, Net Social Profit (NSP) of coefficients of objective function is obtained and objective function is formed. This objective function is maximized regarding the present constraints in understudy patterns. Constraints are: land constraint that has entered the model in order to control cultivated crops within the range of lands bearing the capacity for this kind of culture. The right side amount of this constraint is total amount of cultivated acreage in understudy year. Manure constraint for each state per hectare separately for different crops, required work constraint per hectare in terms of one diurnal person, machinery constraint in terms of the amount of work hours of required machinery per hectare separately for different crops of each state, and water constraint whose technical coefficients are on the basis of need for water concerning every agricultural crop during the agricultural year. Fertilizer constraint in the form of 3 constraints of Phosphate, Nitrate and Potash fertilizers has been considered in this model. Also, poison constraint has been classified in the form of three classes of herbicide, pesticide and fungicide. Usage amounts of each one of these fertilizers and poisons for each crop in each region have been considered as technical coefficient in this model. Budget constraint has been described as desired capital for each agricultural activity which is the sum of annual variable costs of that activity. This constraint indicates how much saving in costs will occur by using optimum cultivation combination. Crop rotation can play an important role in controlling pests, plant diseases, and keeping the soil in its high fertility. Thus, for each state, using data related to crop rotation, an extra constraint named as rotation constraint has been added to the pattern.

Also, for calculating comparative advantage, it's needed to estimate data for shadow price of output, tradable and non-tradable inputs, and shadow exchange rate. Shadow price is actual value of an output or input under free competition conditions and without interference of any factor or factors out of market forces. Hence, in conditions where current prices in market do not represent actual prices, in the direction of attaining logical and true results, based on social and economic criteria that lead to optimum usage of economic and restricted resources, shadow prices, which truly depict factual resource and raw material cost in the plan, should be the basis of calculation. Consequently, on the basis of consumed inputs, production costs are divided into two groups of non-tradable inputs (seed, manure, water, land, and some part of machinery) and tradable inputs (chemical fertilizer, poisons for pests and some part of machinery.

Shadow prices of seed and manure have been regarded similar to their market price. In other words, it is assumed that prices of mentioned cases in competitive market are determined. For the purpose of computing shadow price of water, the highest amount of paid cost has been regarded to current providing resources in the region. In other words, it is the highest exploitation cost of water resources that considerable percentage of farmers makes use of it (Najafi and Mirzaei 2004, Mohammadi 2004). Land renting seems to be the best case for expressing the opportunity expense and shadow price of the land, and in case of lack of culture by the farmer it can be rented to others and according to the considered price one can rent it from water owners to produce agricultural crops (Mohammadi, 2004; Mehrabi, Boshrabadi 2007). So in the current study the average rent for land for each hectare of the considered crops in understudy regions, has been used as the shadow price of land. Also shadow price for labor force has been regarded equal to the average of agricultural wage in understudy regions (Najafi and Mirzaei, 2004).

Machinery shadow price is assumed to be equal to its average cost for one hectare. But machinery has a binary nature. Indeed, some part of it is tradable and the other is domestic.

Thus, with respect to performed studies 64 percent of it has been considered as machinery costs and the other 36 percent as domestic costs (Najafi and Mirzaei, 2004).

Towards computing the shadow price of outputs and tradable inputs, their world prices have been utilized. Since most of the under study crops in this research are either export crops or import substitutes that are consumed domestically, their FOB prices have been inserted. Thus for calculating shadow price of these outputs, its FOB price has been multiplied by the calculated shadow exchange rate and then the costs of transporting the crop from the farm to the border have been subtracted from it. Also, in order to calculate shadow price of imported outputs (wheat, barley, and corn) and tradable inputs (chemical fertilizers, pesticides), their CIF prices have been used, and some part of domestic usage of these inputs are provided by import. So, by adding the transporting cost to CIF price of these crops - from the border to the farm - their shadow prices have been attained.

Shadow rate of foreign exchange is of great importance in computing comparative advantage. In fact, this rate is the basis of gaining acceptable shadow price of tradable outputs and inputs. There are several methods for calculating the shadow rate of foreign exchange. One of the fairly simple and common methods for calculating shadow exchange rate which is widely accepted by a wide range of economists, is equality of purchasing power parity (ppp) (Gardner and Russet, 1998). So in the current study, shadow rate of the exchange, was calculated using equal purchasing power (ppp) theory in absolute manner. The amount of this rate in 2005 has been estimated as 10649 Rls.

Shadow rate of the exchange (absolute ppp) =

$$\frac{P_{Ig}}{P_{Dg}} = \frac{37511332}{352.25} = 10649 \qquad (2)$$

In which P_{Ig}, and P_{Dg}, are the price of one ounce gold in domestic market (Rls), and the price of one ounce gold in world market (dollars), respectively.

Data and information related to production cost, cultivated land, resource stock rotation of the main agricultural crops in each state, have been gathered from ministry of agriculture and agriculture Jihad organization in Kermanshah province. World prices for agricultural crops have been obtained from ministry of commerce, ministry of agriculture, and customs of Islamic Republic of Iran. Transporting cost for determining shadow prices of inputs and outputs, and other required information have been gathered form transporting organization, and related organizations, respectively.

RESULTS

Increase or decrease in the amount of under cultivation lands of different regions should take place regarding the constraints in resources and comparative advantages in producing the crops. So this issue would reveal necessity for optimum cultivation patterns. DRC index Calculated by using linear programming model, in order to investigate comparative advantage of the crops, current and optimum cultivated land of main crops of states of Kermanshah province which are competitor crops for corn, is represented in table 1. In Kermanshah province, wheat, barley, potato and onion are in rotation with corn and other crops mentioned in table 1 are competitors for corn. So in this province, the cultivation pattern has been investigated in 2 scenarios of existence of rotation and lack of rotation.

In Kermanshah province corn is in rotation with wheat and barley crops and competitor for crops mentioned in table 1. Therefore, in states with crops cultivated in rotation with corn, optimum cultivation model has been investigated in two scenarios of existence of rotation and lack of rotation.

Comparing current under cultivation land with optimum one reveals that under cultivation land for some crops in optimum manner has been equal to zero and instead, the production of some other crops have been emphasized. This explains that under the current production conditions, resource allocation is not economical and it has taken place without considering com-

Table 1: Results from linear programming model of Kermanshah Province.

Province	Different scenarios	wheat	barley	corn	Sun flower	tomato	beetroot	potato	cucumber	profit
Gilan Gharb	current	1679	-	725	-	-	-	-	-	1.09E+10
	existence of rotation	1010	-	1010	-	-	-	-	-	1.15E+10
	lack of rotation	0	-	1400	-	-	-	-	-	1.19E+10
	DRC	0.461	-	0.271	-	-	-	-	-	-
Kerman-shah	current	2290	-	5647	148	-	158	-	-	4.99E+10
	existence of rotation	4121	-	4121	0	-	0	-	-	5.00E+10
	lack of rotation	0	-	6706	0	-	0	-	-	5.74E+10
	DRC	0.977	-	0.341	0.383	-	0.444	-	-	-
Hersin	current	4532	20	1331	-	-	-	-	-	1.26E+10
	existence of rotation	2910	0	2910	-	-	-	-	-	2.65E+10
	lack of rotation	0	0	3750	-	-	-	-	-	3.35E+10
	DRC	0.974	1.516	0.378	-	-	-	-	-	-
Kangover	current	5968	-	1671	-	-	977	-	-	2.53E+10
	existence of rotation	3529	-	2476	-	-	1054	-	-	2.63E+10
	lack of rotation	0	-	4073	-	-	783	-	-	2.73E+10
	DRC	0.796	-	0.508	-	-	0.472	-	-	-
Javanrud	current	5559	-	2880	-	-	-	-	-	5.37E+10
	existence of rotation	5559	-	2880	-	-	-	-	-	5.37E+10
	lack of rotation	5559	-	2880	-	-	-	-	-	5.37E+10
	DRC	0.484	-	0.295	-	-	-	-	-	-
SarPol Zahab	current	12513	-	7098	-	275	-	-	1922	2.21E+11
	existence of rotation	14577	-	2153	-	0	-	-	5079	3.73E+11
	lack of rotation	14577	-	2153	-	0	-	-	5079	3.73E+11
	DRC	0.690	-	0.260	-	0.070	-	-	0.050	-
ghasr-shivin	current	-	-	586	-	17	-	609	21	1.67E+10
	lack of rotation	-	-	542	-	94	-	0	592	4.91E+10
	DRC	-	-	0.368	-	0.078	-	0.258	0.045	-
Eslam Abad	current	-	-	3950	-	-	2414	-	-	9.49E+10
	lack of rotation	-	-	3950	-	-	2414	-	-	9.49E+10
	DRC	-	-	0.185	-	-	0.219	-	-	-

Source: author's estimate and Ministry of agricultural Jihad, 2005.

parative advantage.

Regarding results from estimation of indexes of comparative advantage that are shown in table 1, it becomes clear that in case of all states of Kermanshah province, corn bears comparative advantage. Regarding results from estimation of the model in case of rotation, under cultivation land of corn crop in optimum model of the cultivation in respect to the current case has been increased in 37.5% of the states and in case of lack of rotation, it has been increased in 50% of the states of the province. Also, under cultivation land of crops in the current and optimum manner in Javanrud and Eslam Abad states is the same. This reveals optimum resource allocation of the resources in these states. Considering that the aim of the present investigation is to study comparative advantage of corn using linear programming mode, and since linear programming model will maximize social net profit with respect to resource restrictions and comparative advantages of different crops in states, as it's been shown in table 1, is maximum, in case of rotation less under cultivation land has been allocated for this crop in Kermanshah, Sarpolzahab, and Ghasrshivin compared with the current manner. This can be due to scarcity of available resources and presence of rotation in each state.

So, while bearing high comparative advantage for corn in an essential condition for placing it in cultivation pattern, because lack of sufficient condition (scarcity of required resources for its production, low price or extreme production costs related to competitor crops) less under cultivation land has been allocated to this crop in some states in optimum cultivation pattern.

As viewed in table 1, corn under cultivation land and profit from estimating the model in some states are changed depending on rotation manner or its absence. In case of the absence of rotation, under cultivation land of corn crop in states Hersin, Gilan Gharb, Kermanshah and Kangaver is increased. Also, by comparing profit from the model in cases of observing the rotation and/or ignoring it, it can be seen that profit from optimum cultivation pattern in Gilan Gharb, Kermanshah, Hersin and Kangover has been increased in respect to the observance of rotation manner. This matter might have happened due to eliminating the crops in rotation with corn in cultivation pattern and allocating the land to the corn. Because of enjoying lower comparative advantage in production, these crops are not capable of competing with crops which own higher comparative advantage such as corn in the absence of rotation.

In states of Kermanshah province the amount of expandable lands in both absence and presence cases of rent has been examined and results from the study have been showed in tables 2 and 3. At the province level, total amount of expandable lands in both cases were 2485 hectares. Also for states encountering the surplus in land in optimum model because of scarcity of required resources, assuming the resources will be provided, and a model has been estimated. Because of providing restrictive inputs to cultivate crops that are more profitable, the amount of land surplus has been used in this case.

In Kermanshah possibility of increasing the under cultivation land up to 434 hectares in both manners are present and in these cases the acreage of wheat, corn, and sunflower is enhanced.

Due to the lack of available resources mentioned in table 4, in Gilan Gharb 382 hectares of the land have not been cultivated. In case of providing these inputs, the acreage will be expanded. In this case, compared to optimum pattern, wheat and corn acreage is increased.

Also, in Hersin state, in case of providing restrictive inputs, possibility of developing the under cultivation land will be 64 hectares and under cultivation land for wheat and corn will be increased.

In Sarpo Zahab state in both forms 17 hectares of the land is expandable and this is allocated to wheat cultivation.

In Ghasr Shirin also in both forms 31 hectares of the land is expandable. In this form, tomato acreage will be decreased and together with the expandable amount corn acreage will be increased.

In Kangover state in case of providing restricted resources 1557 hectares of the land is expandable, and in optimum model this has been led to increase in under cultivation level of wheat and sugar beet.

Generally, in this province only its 400 hectares out of 2485 expandable hectares will only be

Table 2: Amount of expandable land in different manners in Kermanshah province (hectares).

Region	Surplus cases of optimization mode	existence cases of rent	absence cases of rent
Eslam Abad	0	0.000015	0.000015
Ghasrshivin	0	31	31
Gilan Gharb	382	0	0
Hersin	64	0	0
Kangover	1557	0	0
Kermanshah	0	434	434
SarPolZahab	0	17	17
Total	2003	482.000015	482.000015

Source: Research findings.

Table 3: Understudy cases for the purpose of developing the under cultivation land (hectares).

Region	understudy cases	wheat	barley	Sun flower	cucumber	potato	beetroot	tomato
Kermanshah	Optimum	4121	4121	0	-	-	0	-
	existence cases of rent	4338	4293	45	-	-	0	-
	absence cases of rent	4338	4293	45	-	-	0	-
Gilan Gharb	Optimum	1010	1010	-	-	-	-	-
	providing restrictive inputs	1202	1202	-	-	-	-	-
Hersin	Optimum	2910	0	2910	-	-	-	-
	providing restrictive inputs	2942	0	2942	-	-	-	-
SarPol Zahab	Optimum	14578	2153	-	5079	-	-	0
	existence cases of rent	14595	2151	-	5079	-	-	0
	absence cases of rent	14595	2151	-	5079	-	-	0
ghasrshivin	Optimum	-	542	-	592	0	-	94
	existence cases of rent	-	576	-	592	0	-	91
	absence cases of rent	-	576	-	592	0	-	91
Kangover	Optimum	3529	2476	-	-	-	1054	-
	providing restrictive inputs	4308	0	-	-	-	4308	-

Source: Research findings.

allocated to corn. In case of providing restrictive inputs in Gilan Gharb and Hersin states and in case of expanding under cultivation land in Kermanshah and Ghasreshirin, 192 hectares and 208 hectares of the land are expandable, respectively. So, because of the competitive nature, in case of expanding the under cultivation land, the structure of costs of domestic resources, and consequently comparative advantage of the crops will cause these possibilities for development to be allocated to other crops.

CONCLUSION

Results from this article reveal that under cultivation level of some crops acreage in optimum pattern in all states of Kermanshah province has been equal to zero and instead, producing some other crops has been concentrated. This issue represents that at the present conditions, allocating production resources has been taken place non-economically, and without considering comparative advantage.

In this province grain corn in addition to having comparative advantage, has also taken place for itself in optimum cultivation pattern in all of the states. Also, compared to the current situation, it's under cultivation land in case of rotation and its absence has been increased to 37.5% and 50% in the states of the province, respectively. Comparing optimum cultivation pattern resulted from linear programming model with crops ranking based on comparative advantage indexes shows that restriction and the availability amount to resources lead to transition of comparative advantage in production, from one product to another. Then Comparative advantage indexes can't be appropriate measures for allocating resources and giving priorities by themselves. Therefore, although enjoying high comparative advantage for grain corn is an essential condition for it to be placed in cultivation pattern, due to lack of sufficient condition (unavailability of required resources for its production, low price or high production costs of corn compared to competitor crops), less land have been allocated to this crop in optimum cultivation pattern in states of karmashah, Sar Pol Zahab, and Ghasre Shirin. One of the prominent factors in creating and increasing the comparative advantage, is reduction in production costs. Domestic resources such as labor force and land have high share in total production cost for mentioned crops. So investment towards increasing labor and land productivity can be influential in creating and increasing the comparative advantage.

Table 4: Amount of required inputs for developing the under cultivation land.

Region	water (m^3)	labor (Individual-day)	pesticide (kg)	potas fertilizer (kg)	Nitrate fertilizer (kg)	Phosphate fertilizer (kg)	Machinery (working hours)	Budget (Thousand Rials)
Gilan Gharb	1663055	2028	-	20008	103209	77019	477	507680
Hersin	263930	-	-	174	20966	-	620	340250
Kangover	13922012	167891	5102	-	385844	567448	104917	16453900

Source: Research findings.

Comparing optimum cultivation pattern in 4 examined forms represents that factors like government's supportive policies, crop rotation resource, restriction in resources and exchange rate can be influential in combination and the amount of the optimum cultivation. So government's supportive policies for crops would be arranged in a way so that in each region crops should be in such a way that crop with higher comparative advantage in each region obtain more support from the government.

Comparing profit from estimated models shows that by eliminating the rotation, profit amount has been increased.

This point remarks eliminating crops with low social net revenue from the model, and allocating resources to crops with higher comparative advantages. Consequently, in states with crops in rotation with and competitor for grain corn, that enjoy higher performance, regarding the constraints in resources and enjoying comparative advantage in cultivation model, increasing the under cultivation level of these crops is recommended.

In Kermanshah province only 400 hectares out of 2485 expandable hectares are allocated to corn. In case of providing restrictive inputs, 192 hectares and 208 hectares are expandable in Gilan Gharb and Hersin states in case of providing restrictive inputs, and in Kermanshah and Ghasre Shirin states in case of development in under cultivation level, respectively. Then, if under cultivation land is expanded, because of competitive nature, the structure of cost of local resources and consequently, comparative advantages of the crop will cause these development possibilities to be allocated for cultivation of other crops. In other words, in case of development in under cultivation level, and because of competitive nature, comparative advantage, and structure of costs of domestic resources, possibilities of this development are allocated for cultivation of other crops. In other words, there are much potential for improving resource allocation, production and revenue enhancement through reallocating resources in this province. But, in reallocating the resources, the production ability of the province should be considered. In this direction, investment in affairs like harvesting and cultivating machinery, improved seeds, providing pesticides, and production methods are necessary.

Generally, concerning the corn, policy of self sufficiency in the long run should be reformed in a way that with the least amount of pressure on resources, advantages can be gained for the country. With this opinion, emphasizing the policies of corn sector in a way that causes Iran to be an exporter country in the world market may impose non-compensable damages in the long run. Thus the most suitable strategy for corn production in Iran is the one which guarantees the least imports for the country.

REFERENCES

1- Abedi, S. (2008). Determining the Relative comparative Advantages of corn in Optimal Cropping Pattern in Iran. In: Department of Agriculture Economic, Faculity of Agricultur Economics and Development, University of Tehran.

2- Abedi, S., Peykani, GH. R., and Hosseini, S. S. (2008). Determining Comparative Advantages of Corn in Optimal Cultivation Pattern in khuzestan Province. Iranian Journal of Agricultural Economics and Development Research, 39(1): 85-97.

3- Statistic Data of Crop Production Costs of Iran. (2005). Center for Statistic and Technical Information,

Ministry of Jahad- e- Keshavarzi.
4- Investigation on Marketing of Corn in Iran. (2003). Ministry of Jahad- e- Keshavarzi.
5- Falahi, A., Chizari, AH. (2007). The Study of Comparative Advantage and Protective Policies of Iranian Kiwi Fruit. Paper presented at the 6th Iranian Conference on Agricultural Economics.
6- Forghani, H., Kiani, M. (2004). Study on Cumin Comparative Advantage in Iran and Som other Selected Countris. Eqtesad- I keshavarzi Va Towse's, 13(52): 144-154.
7- Gholibagloo, MR. (2005). Measuring the Impact of State Support Policies in Comparative Advantage. Eqtesad- I keshavarzi Va Towse's, 13(2 (50): 51-80.
8- Hashemi Bonab, S. (2005). Determining the Relative Compartative Advantage of Irrigated and Rain fed Crops in Eastern Azarbaijan Province. In: Department of Agriculture Economic, Faculity of Agricultur Economics and Development, University of Tehran.
9- Hosseini, M. (2003). Investigation Comparative Advantage on Crops in Esfahan province, In: Department of Agriculture Economic,University of Tarbiyat Modares.
10- Hosseini, S., Abedi, S. (2007). The Role of Market Factors and Government Policies on Determining Corn in Iran. Journal of Economics and Agriculture, 1(1): 21-33.
11- Jeyran, A., Joolaie, R. (2005). Red Meat Comparative Advantages and Support Policies Indices. Eqtesad- I keshavarzi Va Towse's, 13(1 (49): 117-140.
12- Joolaie, R. (2005). Mutiregional models and their application in Agriculture: a case study of Fars province. Eqtesad- I keshavarzi Va Towse's, 13(3(51): 87-112.
13- Kavoosi Kalashami, M. (2008). Investigating Comparative advantages of Different Rice Varieties Production in Gilan Provence with Linear Programming Approach. In: Department of Agriculture Economic, Faculity of Agricultur Economics and Development, University of Tehran.
14- Mehrabi Boshrabadi, M. (2007). Investigation of Policies Effects and Comparative Advantage on Crops in Kerman province. Journal of Economics and Agriculture, 1(3): 389-401.
15- Mohammadi, D. (2004). Determination of Comparative Advantage and Problems of Oilseed Crops in Fars Province. Eqtesad- I keshavarzi Va Towse's, 12(3 (47)): 125-152.
16- Najafi, B., Mirzaei, A. (2003). Comparative Advantage Offarm Crops in Fars Province of Iran, Iranian Journal of Trade Studies, 26: 35-50.
17- Salami, H., Pishbahar, A. (2001). Changes of the Pattern of Comparative Advantage of Agricaltural Products in Iran: An Emprical Analysis Based on the Revealed Comparative Advantage Indices. Eqtesad-I keshavarzi Va Towse's, 9(2 (34)), 67-99.
18- Duchin, F. (2003). A Generalized Trade Model Based on Comparative Advantages with m Regions, n Goods, and k Factors. Retrieved from: www. Wiiw. Ac At/PDF/other- seminars- Duchin- paper.
19- Fong, C. B. J., john, C. (1999). Food Self – Sufficiency, Comparative Advantage and Agricultural Trade.:A Polocy analysis Matrix for Chinese Agriculture- working paper 99-wp 223.
20- Gardner, B., Rausser, G. (1998). Agriculture and Macro Economy. Handbook of Elsevier Science, Handbook of Agricultural Economics.
21- Mohanty, S., Fang, C. (2002). Assessing the Competitiveness of India Cotton Production: A Policy Analysis Matrix Approach, Working Paper. 02- wp 301. May 2002.
22- Shahabuddin, Q., Dorosh, P. (2002). Combative Advantages in Bangladesh Crop Production, Retrieved from: www. Cigar org/ ifpri/ divs/mssd/ dp, htm.
23- Tsia, J. (2001). The Comparative Advantage of Taiwan's Major Cut Flowers. Agricultural Economic Journal, 47(6), 265-270.
24- Zhong, F., Zhigang, Xu., Longbo, Fu. (2002). Regional comparative advantage in China's main grain crops, Retrieved from http:// www, Adelaide, Edu. Au/cies/Cerc/gmp1, Pdf.