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Economic Analysis and Determining Expender Input of Greenhouse *Lycopersicon esculentum* in Fars Province

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Abstract: With increasing world population and limitation in extension of agricultural lands, only increasing yield per hectare can be a solution to provide nutrition of world people. Construction of greenhouse is one way to increase yield per area unite. The objective of this study was to determine the economic efficiency based on data envelopment analysis (DAE) in 2008 through the province. Results of efficiency showed of the technical efficiency of the farmers under the constant return to scale exceeds 72% and the allocative efficiency was with average of 95%. However, under variable return to scale, technical efficiency exceeds 83% and the allocative efficiency was with average of 89%.

Key word: Greenhouse *Lycopersicon esculentum* · Fars Province · DAE Method · Translog Function · Efficiency

INTRODUCTION

Construction of green houses of produce of season fruits and flowers and ornamental plants begin from the 17th century in Europe and developed in order to optimize the use of soil and water resources and or employment in recent years [1]. The high rate of population growth and reduce of fertility land area due to increasing town's development and industrial areas, the need for efficient use of existing facilities provides more than before. General increasing of agricultural production in two methods, one through the increased cultivation and another increase crop yield per unit area is possible. Increased area isn't possible in Iran; therefore use of new technologies to increase production per unit area can be attempted. Production on green house tomato production is one example of less area and more production. Tomato with name scientific (*Lycopersicon esculentum*) important products that had used human and is one of the most popular vegetables [2-4].

Fresh consumption and able of processing this crop had the role of important in fast adoption as an important food crop [3]. Acceptability of tomatoes as edible material so that the position achieved was reared in a greenhouse in England in 1880 and after First World War became clear the importance of food and spreading fast around the world.

Now, more than %60 of world greenhouse planting is allocated to this product [4].The most important benefits of Greenhouse cultivation is included increasing of production per unit area, the use of non-cultivated land, Saving water in all seasons and create employment opportunities for rural woman and agricultural graduate [2]. In order to increase tomato production can be used to more inputs, but this method because of the importance of various inputs restrictions, special, land isn't feasible or is not the first priority therefore appears that technical efficiency can desirable, but, if crop had not economic income, if will not attempt to cultivation it. Therefore, allocation and economic efficiency along with technical efficiency should be considered [3-5]. In this context, the economic study of greenhouse products in different regions countries with large working population and reduce unemployment and jobseekers can help significantly to solve this social dilemma. Fars province, with 246 types of greenhouses have important role in this type of culture in Iran, also, in this province, 2.3% of greenhouse tomatoes is produced. The necessity of economic study, this product will be felt more than ever [5-8].

MATERIALS AND METHODS

In the study, data collected from 110 tomato greenhouses in Fars province, by questionnaires in summer 2008. The main questionnaire information were included input and output quantities and prices as well as the cost value of each input items, scale up operation and

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some social economic characteristics of the units. In order to getting of objectives, using of Translog production function analysis and efficiency analysis using the software Enviews5 and Deap.

Efficiency: A production function expresses the relationship between the level of inputs used and level of product obtained from the inputs. This relationship represents the average level of product based on level of inputs. A number of studies, the relative contribution of inputs in production through the production function estimates in level of one input or total inputs used by farmers estimated. For this respect, different from of production functions Cobb - Douglas, Constant Elasticity of Scale (CES) and Translog are used.

One of the explicit assumptions on the production faction is that no difference in terms of efficiency resulting form a certain amount of inputs among firms does not exist. One the frontier production function represents the maximum amount of certain products from maybe inputs. Accordingly, to the function of the relative efficiency of the production frontier can be specified to take advantage of a group through the production observed compared with the ideal level of production (potential or frontier). In general, frontier production function can be expressed as the following models:

$$\text{Inqj= f(Ln x)+vj-uj} \quad (1)$$

Where, q_j the product firm jth, x vector of production factors, v_j random error and u_j also an estimate of technical inefficiency of j_{th} firm in use of inputs. This model assumes that both v_j and u_j with a similar distribution but are independent of each other. Thus, their variance is δ_u^2 and δ_u^2 respectively production function estimated for firm jth is as follows:

$$Ln\hat{q}_j = f(Lnx) - u_j \quad (2)$$

Than an efficient level of production (containing inefficiency) is defined as follows:

$$Lnq_j^* = f(Lnx) \quad (3)$$

Technical efficency defined as follows:

$$LnTE_j = Ln\hat{q}_j - Lnq^* = -u_j \quad (4)$$

So, $Te_j = e^{-u_j}$, jth firm technical efficiency to the enterprise level product corresponding product on the production function frontier based on the level of input.

Mathematical Models of the from DEA: N, Status assumes that production is conceivable. Each State used the amount of different inputs (m) for produce of S various crops. In this case, efficiency ratio of jth state production is calculated following:

$$h_i = \frac{\sum_{r=1}^{s} u_{rj} y_{rj}}{\sum_{i=1}^{m} V_{ij} X_{ij}} \quad (5)$$

In the relation to the above fact is simply the ratio of sum weight of products to sum weight of inputs where x_{ij} is a positive a mount of input ith is the point of production. y_{rj} observed output value of point jth is produced. DEA model is presented by [5] that, u_{rj} and v_{rj} dummy weights form the solution set of the objective function this hypothesis has been rejected by [5-6]. Provided the following restrictions are listed.

Maximize:
$$ho_{v,u} = \frac{\sum_{r=1}^{s} u_{ro} y_{ro}}{\sum_{i=1}^{m} v_{io} x_{io}} \quad (6)$$

$$\frac{\sum_{r=1}^{s} u_{rj} y_{rj}}{\sum_{i=1}^{m} v_{ij} x_{ij}} \le 1; \qquad j = 1, 2, \ldots, j_o, \ldots, n \quad (7)$$

Subject to:
$$-u_{ro} \le o, \quad r = 1, \ldots, s$$
$$-v_{io} \le o, \quad i = 1, \ldots, m \quad (8)$$

Optimum values of u_r^* and u_r^* called virtual rates of transformation or virtual multipliers.

Planning problem described above can convert as a linear programming problem that is solved easily. It can be written as follows:

Maximize:
$$ho_{v,u} = \sum_{r=1}^{s} u_{ro} y_{ro} \quad (9)$$

Subject to:
$$\sum_{i=1}^{m} v_{io} x_{io} = 1 \quad (10)$$

$$\sum_{r=1}^{s} u_{ro} y_{ro} - \sum_{i=1}^{m} v_{io} x_{io} \le o, \quad j = 1, \ldots, n \quad (11)$$

$$-u_{ro} \le o, \quad r = 1, \ldots, s$$
$$-v_{io} \le o, \quad i = 1, \ldots, m \quad (12)$$

The above model of linear programming problem is called CCR model of symmetric. Also, the initial CCR called Envelopment program (EP). Although, the results of CCR is similar to CCR of symmetrical, but often in literature initial CCR related to DEA. This is possibly because the initial CCR have more compatible with Production theory. Initial CCR can be summarized in to the following from:

Minimize: $W_o = w_o$ (13)

$$w_O x_{iO} \geq \sum_{r=1}^{s} \lambda_j x_{ij}, \quad i = 1,...,m \quad (14)$$

Subject to: $$\sum_{r=1}^{s} \lambda_j x_{ij} \geq y_{rO}, \quad r = 1,...,s \quad (15)$$

$$\lambda_j \geq o, \quad i = 1,...,m, \quad o \in \{1,...,n\} \quad (16)$$

Efficiency criteria in this model by the variable w_0 is presented, which is numerical variable, an architect and it can be interpreted according to criteria Farrell distance, optimal answer is simply the minimum amount of w_0 in which the desired w_0 is determined such that the multiplied of input x gives the maximum loss may result (the product, while maintaining the same level as their previous). w_0 always is one or less of one. Variable λ_j is density and is based on the assumption that certainly can a point of produce virtual can create from manufacturing areas under review (as a combination of other parts of the production). λ_j Should be available for all n status of production is calculated on real set. For the efficient units, λ_j equal one, because model cannot be any other combination of units to find a way that the units are more efficient.

Production Functions and Cost Translog: According to the research objective, for determines of relative share of inputs is selected Translog functional form. This function, the first time present by [3]. This form of production function, in order to use of duality theory and translog cost function is widely used to be. General form of the translog production function is as follow:

$$\sum_{i=1}^{n} \sum_{j=1}^{m} \gamma_{ij} Lnx_i Lnx_j \quad (17)$$

$$y = \alpha_O \prod_{i=1}^{n} x_i^{\alpha_i} e^{1/2} \quad (18)$$

Where y output, α_o efficiency, x_i and x_j input quantities i, j and α_i, sγ_{ij} are unknown parameters.

As we know, every production function has a cost function. So therefore the cost function translog is as follows:

$$LnC = \alpha + \alpha_y Lny + \sum_{i=1}^{n} \sigma Lnp_i + \frac{1}{2}\sigma_{yy}(Ln_y)^2$$
$$+ \frac{1}{2}\sum_i \sum_j \sigma_{ij} Lnp_i Lnp_j + \sum \sigma_{yi} Lnp_i Lny_i + \varepsilon_i$$
$$i, j = 1,...,n \quad (19)$$

Of course, many forms as the cost production of Translog is used more on the coefficient of ½ before the interaction effects of the price or price or production capital is located. Translog cost function has many parameters that reduces the elliciency model is estimated. In order to solve this problem, equations system is obtained the cost share of production factors (S_i) and the equations added to the cost function and then whole system is estimated. Considering the lock of impact of farmers on prices of production and inputs, demand function for production factors is obtained from shaferd theorem as follows:

$$\frac{\delta LnC}{\delta LnP_i} = \frac{P_i x_i}{C} = S_i$$
$$S_i = \sigma_i + \sum \sigma_{ij} LnP_i + \sum_{ij} Lny_i \quad (20)$$

Where, C, total cost of production, y_i tomato tree production (kg), p_i price of ith input and S_i share of ith input costs. Substitution elasticity between inputs, calculated the Substitution elasticity Morshima. Using theorem shaferd, substitution elasticity Morshima, resulting from translog cost function can be calculated as follows:

$$\sigma_{rs}^M(w,y) = \frac{r_{ss} + s_r s_s}{s_r} - \frac{r_{ss} + r_s^2 - s_s}{s_s} \quad (21)$$

Amounts of cross elasticity and elasticity of price as follows:

$$E_{rs} = \frac{r_{ss} + s_r \times s_s}{s_r} = \frac{Hr_s}{s_r} \quad (22)$$

$$E_{ss} = \frac{r_{ss} + s_r^2 - s_s}{s_s} = \frac{H_{rr}}{s_s} \quad (23)$$

RESULTS AND DISCUSSION

In this section analyzes the efficiency of various green house tomatoes in two models constant returns to scale and variable returns to scale the order in Tables 1 and 2 are discussed.

Table 1: Results of estimation efficiency of the greenhouse tomato product farmers in 2008, under constant returns to scale

Row	Cultivation (m^2)	Technical efficiency	Allocation efficiency	Economic efficiency	Row	Cultivation (m^2)	Technical efficiency	Allocation efficiency	Economic efficiency
1	2500	0.538	0.994	0.535	28	4000	0.581	0.995	0.578
2	2000	0.8	1	0.8	29	3000	0.73	0.996	0.728
3	2400	0.872	0.871	0.76	30	3200	0.567	0.991	0.562
4	2500	0.769	0.994	0.764	31	3000	0.813	0.99	0.804
5	2500	0.846	0.994	0.841	32	3400	0.638	0.992	0.633
6	2500	0.769	0.994	0.764	33	3000	3.775	0.99	0.767
7	2000	0.7	1	0.7	34	3500	0.709	0.993	0.704
8	1800	0.551	0.999	0.551	35	3000	0.725	0.99	0.818
9	2000	0.84	1	0.84	36	3500	0.764	0.993	0.758
10	2500	0.769	0.994	0.764	37	3500	0.742	0.993	0.736
11	2500	0.769	0.846	0.65	38	3500	0.764	0.993	0.758
12	3000	0.652	0.994	0.65	39	3500	0.849	0.998	0.949
13	2500	0.769	0.994	0.764	40	3500	0.736	0.998	0.735
14	2000	0.94	1	0.94	41	3500	0.795	1	0.705
15	2000	1	1	1	42	1600	0.337	0.725	0.224
16	3000	0.626	0.994	0.624	43	10000	0.75	0.923	0.622
17	2500	0.996	0.845	0.845	44	1000	0.55	0.864	0.492
18	2000	1	1	1	45	4000	0.369	0.983	0.363
19	2500	0.769	0.994	0.764	46	4800	0.62	0.755	0.468
20	2500	0.846	0.994	0.841	47	2400	0.993	0.992	0.992
21	2500	0.769	0.994	0.764	48	500	0.545	0.747	0.407
22	2500	0.865	0.845	0.731	49	7500	0.375	0.934	0.35
23	2500	0.962	0.845	0.813	50	2000	0.563	0.944	0.531
24	2500	0.615	0.994	0.612	51	1000	0.481	0.714	0.343
25	2500	0.492	0.994	0.489	52	5000	0.938	0.867	0.813
26	4200	0.648	0.996	0.645	53	1000	0.789	0.968	0.769
27	3000	0.813	0.99	0.804	Mean	2950	0.726	0.953	0.695

Types of Efficiency Assuming Constant Returns to Scale: Table 1, show types of efficiency including technical efficiency, allocated efficiency and economic efficiency each unit of greenhouse tomatoes in 2008. Technical efficiency of units in the range of 33-100% can be sold that a range of efficiency shows. The average technical efficiency of units is well over %72. Between the greenhouse tomato products in Fars province unite 15 and 18 with 2000 levels (m^2) have technical efficiency 100%. Between the technical efficiency of units only 4 units studied technical efficiency unit are below 50% (the equivalent of 7.5% of them), while the 7 unit had of technical efficiency over 90% (nearly 13%). Finally, 67% of the rest, technical efficiency was between 60-90%. Unlike specialize technical efficiency; allocation efficiency in performance is seen much less volatility. So that between 71 - 100% at the oscillation and 7 units of tomato greenhouses Appropriations allocation efficiency review are 100%.These units have 100% of the with allocation efficiency equal 100% of the high are have technical efficiency more than 70%. 38 of Unites had allocation efficiency more than 90% that is the equivalent of 72% of the total number of units. The average allocation efficiency of the allocation equal 95%. Economic efficiency get of multiplied two efficiency are 0.34-1 ranges.

The Average of Economic Efficiency: Due to vast difference of tomato is 69.5% between the allocution and technical and allocation efficiency and high allocation efficiency in determining of, economic efficiency and technical efficiency have been more decisive. Between unites, in the fifteenth and eighteenth units of economic efficiency similar allocation and technical efficiency as the highest level and economic efficiency estimated 100%. In 2008, this unit has the best efficiency between green house tomato products in Fars province. The lowest level unit, the fifty-first economist's efficiency has been 34%. It should be noted that the efficiency analysis approach was considered institutions. On this basis, we can say lower technical efficiency means that most units you specify the a mount of product using fewer inputs have similar circumstances bus not in the order compound selected from among the least cost of production in puts available

Table 2: Results of estimation performance to take advantage of the greenhouse tomato products in 2009 assuming variable returns to scale

Row	Cultivation (m^2)	Technical efficiency	Allocation efficiency	Economic efficiency	Scale efficiency	Returns to scale
1	2500	0.543	0.991	0.538	0.992	decreasing
2	2000	1	0.802	0.802	0.8	increasing
3	2400	1	0.761	0.761	0.872	increasing
4	2500	0.8	0.956	0.764	0.962	decreasing
5	2500	0.22	0.959	0.882	0.92	decreasing
6	2500	0.8	0.956	0.764	0.962	decreasing
7	2000	1	0.703	0.703	0.7	increasing
8	1800	1	0.557	0.557	0.551	increasing
9	2000	1	0.842	0.842	0.84	increasing
10	2500	0.8	0.956	0.764	0.962	decreasing
11	2500	1	0.652	0.652	0.76	increasing
12	3000	0.667	0.975	0.65	0.978	decreasing
13	2500	0.8	0.956	0.764	0.962	decreasing
14	2000	1	0.941	0.941	0.94	increasing
15	2000	1	1	1	1	fixed
16	3000	0.638	0.978	0.624	0.981	decreasing
17	2500	1	0.863	0.863	1	fixed
18	2000	1	1	1	1	fixed
19	2500	0.8	0.956	0.764	0.962	decreasing
20	2500	0.92	0.959	0.882	0.92	decreasing
21	25000	0.8	0.956	0.764	0.962	decreasing
22	2500	1	0.732	0.732	0.865	increasing
23	2500	1	0.813	0.813	0.962	increasing
24	2500	0.629	0.976	0.613	0.979	decreasing
25	2500	0.5	0.985	0.492	0.985	increasing
26	4200	0.762	0.977	0.745	0.851	decreasing
27	3000	0.967	0.936	0.904	0.841	decreasing
28	4000	0.65	0.968	0.629	0.893	decreasing
29	3000	0.787	0.979	0.77	0.929	decreasing
30	3200	0.598	940	0.562	0.948	decreasing
31	3000	0.967	0.236	0.904	0.841	decreasing
32	3400	0.712	0.948	0.675	0.896	decreasing
33	3000	0.907	0.934	0.847	0.855	decreasing
34	3500	0.829	0.955	0.791	0.856	decreasing
35	3000	0.827	0.933	0.771	0.877	decreasing
36	3500	0.914	0.957	0.875	0.835	decreasing
37	3500	0.88	0.956	0.841	0.843	decreasing
38	3500	0.914	0.957	0.875	0.835	decreasing
39	3500	1	1	1	0.849	decreasing
40	3500	0.829	0.997	0.826	0.888	decreasing
41	3500	0.848	0.938	0.795	0.938	decreasing
42	1600	0.437	0.735	0.321	0.769	decreasing
43	10000	1	0.725	0.725	0.75	decreasing
44	1000	0.593	0.971	0.576	0.228	decreasing
46	4000	0.372	0.992	0.369	0.991	decreasing
46	4800	1	0.519	0.519	0.62	decreasing
47	2400	1	1	1	1	decreasing
48	500	0.792	0.697	0.552	0.668	decreasing
49	7500	0.5	0.729	0.364	0.75	decreasing
50	2000	1	0.531	0.531	0.563	decreasing
51	1000	0.5	0.801	0.401	0.962	decreasing
52	5000	1	0.955	0.955	0.938	decreasing
53	1000	1	1	1	0.789	decreasing
Mean		0.834	0.89	0.737	0.878	decreasing

with difference in efficiency were much less this shows little differences in terms of units selected input combination is used and recommended that is desirable units with low technical units are technically efficient refer [10-13].

Types of Efficiency as Summing Variable Returns to Scale: In table 2, the results of efficiency under variable returns to scale are presented. Under variable returns to scale, technical efficiency and economic efficiency of all units has increased, while the allocation efficiency has been reduced slightly. Which of course, increase the efficiency of units together is different. So that, the average technical efficiency for constant returns to scale from 72 to more than 83% under variable returns to scale has increased. Economic efficiency of the average 69.5 to 73.7% has is increased and the allocation efficiency from the average 89 to 95.3% has declined. Increase in efficiency under variable returns to scale especially in technical efficiency is very high. So that, reduction in allocation efficiency is only about 7%, while the figure on the technical efficiency of a bout 15.2% increase. This value increases caused by the economic efficiency of units under variable returns to scale, around 6% increase.

Efficiency of other types in the table 2 can be seen is the scale efficiency. In fact, their technical efficiency can be two concepts of pure technical efficiency and scale efficiency is divided. Average scale efficiency units of more than 87% of that figure are very high. In the order words, units of measure the efficiency conditions are close to each other and their difference of scale an obstacle to their efficiency is not considered. Another concept based on scale efficiency is obtained return to scale for each unit. About 30% of the units had increased return to scale and more than 7.5% of units had constant return to scale and 62.5% of units had decreasing return to scale.

Important point is that economic efficiency units under decreasing return to scale (74%) more than economic efficiency units under increased return to scale (67.4%) and economic efficiency of two units under constant return to scale estimated 100%. However, this difference in economic efficiency among the units under decreasing return to scale and increasing return to scale is based on difference of technical efficiency. In other words, may move to ward optimal scale change mixed inputs and increase efficiency units.

The Share of Cost Inputs in the Production of Tomatoes Using the Cost Translog Function: According to Table 3, W1 to w6, show the share of labor input costs, pesticide, fertilizer, fuel, seed and other input, respectively. In this result, the share of seeds and transplant costs more than other inputs user in production of green house tomatoes.

The following tables show the results of each share of production costs, including coefficients and t-test. Pattern, one the share of labor has been estimated in table 4, relation of share of labor cost with the price of labor was positive and this relation with other price of inputs was negative. Pattern 2, shows the share of pesticide cost. Relation of share poison cost with the price of poison was positive and this relation with other price of inputs was negative. For example, the share of prices poison with the price of fertilizer was negative, this means that with

Table 3: The share of input costs for tomato production

W1	W2	W3	W4	W5	W6
0.12	0.09	0.23	0.09	0.29	0.11

Source: results research

Table 4: Share of labor force and poison costs in the production of tomatoes

Pattern (1)			Pattern (2)		
Variables	Coefficient	T - test	Variables	Coefficient	T - test
Labor prices	-0.043	-1.22	Labor prices	0.062	14.6
Poison price	0.036	41.45	Poison price	-0.035	-5.82
Fertilizer price	-0.025	-0.99	Fertilizer price	-0.054	-9.41
Fuel price	-0.0062	-5.19	Fuel price	-0.0032	-6.14
Seed and transplant price	0.00352	0.093	Seed and transplant price	-0.0029	-1.41
Price of other inputs	-0.00124	-0.284	Price of other inputs	-0.0032	-2.15
production (tomatoes)	0.0024	0.268	Production (tomatoes)	0.0084	1.21

Source: results research

Table 5: Share of fertilizer and fuel costs in the production of greenhouse tomatoes

Pattern (4)			Pattern (3)		
Variables	Coefficient	T - test	Variables	Coefficient	T - test
Labor prices	-0.0042	-0.265	Labor prices	-0.0321	-0.58
Poison price	-0.015	-1.19	poison price	-0.0018	-10.19
Fertilizer price	0.0062	0.85	Fertilizer price	-0.0069	1377
Fuel price	-0.044	16.35	Fuel price	-0.0159	-12.33
Seed and transplant price	-0.0037	0.59	Seed and transplant price	-0.0045	-9.41
Price of other inputs	-0.0029	-1.69	Price of other inputs	-0.0069	-1.55
Production (tomatoes)	-0.0035	0.812	Production (tomatoes)	-0.0325	0.277

Source: results research.

Table 6: Share of seed and transplant and other inputs cost in the production of greenhouse tomatoes

Pattern (5)			Pattern (6)		
Variables	Coefficient	T - test	Variables	Coefficient	T - test
Labor prices	-0.023	-2.1	Labor prices	0.0029	0.35
Poison price	-0.0127	-5.72	Poison price	-0.0075	-1.126
Fertilizer price	-0.084	-2.18	Fertilizer price	-0.00223	-0.254
Fuel price	-0.545	-8.20	Fuel price	0.0041	2.32
Seed and transplant price	0.059	11.74	Seed and transplant price	-0.014	-0.86
Price of other inputs	-0.042	-4.09	Price of other inputs	0.026	10.045
Production (tomatoes)	0.0021	-0.3	Production (tomatoes)	0.0024	-0.226

Source: results research

Table 7: Elasticity substitution of Marshima between inputs greenhouse tomato production

Input	Labor	Poison	Fertilizer	Fuel	Seed and transplant	Other inputs
Labor	0	0.824	0.81	0.863	0.97	0.931
Poison	0.742	0	0.91	0.724	0.917	0.891
Fertilizer	0.929	0.936	0	0.772	1.041	0.902
Fuel	0.726	0.806	0.884	0	0.91	0.893
Seed and transplant	0.985	0.962	0.862	0.659	0	0.782
Other inputs	0.841	0.924	0.882	0.709	0.862	0

Source: result research

Table 8: Price elasticity and cross elasticity of demand for inputs

Input	Labor	Poison	Fertilizer	Fuel	Seed and transplant	Other inputs
Labor	-0.089	-0.036	-0.81	-0.61	-0.038	-0.658
poison	-0.017	-0.19	-0.062	-0.11	-0.702	-0.135
Fertilizer	-0.12	-0.087	-0.134	-0.634	-0.501	-0.127
Fuel	-0.066	-0.631	-0.595	-0.019	-0.038	-0.125
Seed and transplant	-0.244	-0.706	-0.024	-0.122	-0.114	-0.34
Other inputs	-0.718	-0.018	-0.122	-0.014	-0.062	-0.029

Source: results research

the rising price of fertilizer used fewer poison. Both models have a direct relationship whit the tomatoes produced that shows increasing share of the labor and toxin cost, tomato production increases. The following tables estimate the results of each share of production costs, including tomatoes coefficients and T shows the statistics [13-15].

Model 3 and 4, shows. The share of fertilizer and fuel cost, respectively. Relation of share fertilizer and fuel cost with the price these inputs was direct (positive) and with other price of inputs was indirect (negative). The relation of fertilizer and fuel cost with tomatoes production was direct (positive).

Table 6 shows, pattern 5 for the share of seed and transplant cost and pattern 6 for the share of other inputs cost. Relation of share seed cost with the price of seed and tomatoes production was direct (positive). Relation of share other inputs cost with the price of these inputs was direct (positive). In the other words, with increasing of seed price, the share of seed cost increased, thus, other inputs used in greenhouse tomato production is reduced.

Table 7, shows elasticity substitution of Marshima. According to table 7, effects of price of inputs omitted, so a diagonal matrix elements are zero tension. The results showed that greatest sensitivity is to change in order to seed and transplant and labor and the least sensitive is to fuel price changes [14,15].

Table 8, shows price elasticity and the cross elasticity. All the price of elasticity for inputs has sign negative and agrees theory. In other words, in this study, relation between price of input and the quantity of input was indirect (negative). The price of elasticity estimate lower than one, thus, demand of inputs is inelastic, define, If price of input increased 1%, demand for inputs decreased 1% can be said with the rising price of inputs a larger share of inputs in the diet is less used [6,16] .

Cross elasticity shows complementary or substitute relationship between inputs. Appositive cross-elasticity shows relation of substitution and negative cross-elasticity show relation of complementary of two inputs. Table 8, cross-elasticity of all cases was negative, define, there are complementary relationship between most inputs and this result is quite consistent with economic theory [15-17].

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