

Evaluating Surplus Agricultural Production for Agro-based Industries in Falavarjan Town of Esfahan Province

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Abstract:

Establishment and development of agro-based industries is highly significant as a production process which is supportive of agriculture and is also a strongly potential substitute to absorb and attract the excessive workforces of agriculture in rural areas.

Falavarjan town is considered one of the most strategic industrial and agricultural regions of Esfahan province due to its abundant agricultural productions and its long-term record of industry. This town is a very appropriate location for establishing conversional and complementary units with regard to its surplus production of some agricultural products such as onion, potato, cucumber, leafy and nodal vegetables, rice and fruit.

In this study, first the rate of productions of cultivation, garden and animal husbandry has been investigated; then the amount of waste and fresh-eaten waste of every product and also the shortage and surplus of productions is evaluated separately. In the next stage, with regard to the consumption of the active or developing units of conversional and complementary agricultural industries of the area, and also with respect to the potential capacity of the town, and of course with due attention to the surplus production of the area, those productions with higher process capacity for the development and extension of conversional and complementary industries have been determined. The types of products and the extent of their productivity illustrate that there is an appropriate ground for developing conversional and complementary industries in this area. According to the findings, products such as rice, leafy and nodal vegetables, potato, onion, cucumber, quince, milk and eggs prove to deserve a higher priority of programming for the producers.

Key words: Surplus agricultural productions, agro-based industries, Falavarjan town

Introduction

Agro-based industries as an important chain in agriculture section have a considerable standing not only in agriculture section but also in agricultural progress of the country. Expansion of complementary industries is a necessary condition and an impetus for agriculture section, a proper solution for using agriculture productions better and more efficiently, and a strategy for organizing economical situation and thorough rural development and finally a route to the sustainable development in the whole country level.

In Iran there is a high potentiality for producing different kinds of products in different seasons of the year due to the country's expansiveness and climate variety, but an important part of the products are wasted for different reasons and it can be said that developing complementary and conversional industries is the most important and urgent way to use these products efficiently.

According to item 18 of the Fourth Five-year Program of expansion of the country, based on the support of the development of complementary industries of agriculture so that at least the double increase of the products and the reduction of the waste to 50% would be possible, has been highly confirmed (Agriculture Development Ministry, Agro-based Industries Office, 2005 (1384): 17).

In Falavarjan region, the provision of potentialities, capacities and natural condition has caused the enrichment of agriculture activities and, considering the present agriculture situation, there is necessary potential for developing agro-based industries. Developing agro-based industries also can play on effective role in agriculture section development in Falavarjan.

Considering the above presumptions, the present study is going to answer the question that: which agricultural products of the region have enough production surpluses for developing agro-based industries? For this purpose, the study must first achieve some objectives such as recognizing the present situation of agricultural products and the effective agriculture potentials and abilities for developing complementary and conversional industries of the town and finally identifying the proper approaches for developing agro-based industries.

The present study is applicable in terms of objective and of the data gathering method which has been conducted by integrating descriptive and inference methods. This article after reviewing on literature and methodology of study has proceeded to introduce the region especially agricultural situation, the present agro-based industries and the necessity to develop them.

In what follows the agricultural product surplus of the region which is able to be considered as raw material of agro-based industries has been investigated of course after analyzing agricultural products.

Basic concepts and methodology

Industry includes all the activities which result in physical and chemical alteration of different materials and converting them into new products whether this change has been achieved manually or mechanically in the factories or in the houses (Rahimi, 1983: 2). The process industry is converting raw materials to the products, goods and services which also assure the agro-based industries of agriculture sector are those industries which have direct and indirect relationship with

agriculture section (Bhattacharya, SN 1980:192). According to approved definition in economical commission of government bureau, agro-based industries refer to those industries which proceed to the processing and making plant and animal materials cultivate (garden, fishery, cattle and birds, forest and pasture); processing includes chemical and physical changes, maintenance, packaging and distribution (agriculture development ministry, the office of complementary and conversional industries of agriculture section, (2005:2).

No considerable attention was given to the small and rural industries in developing countries before 1950's. But in the present decade many countries such as china, India, South Korea and Indonesia proceeded to develop agriculture, small and rural industries to deal with unemployment and poverty. In this vein, vast and pervasive studies and researches have also been conducted, some of which are referred to below:

Project studies of agro-based industries of agriculture section and technology development in Bangladesh (Liberson, 2005), study project of agriculture industries in rural districts (UNIDO, 2003), the studies of dispatched bureau of some countries of Apo¹ in the case of rural dietary conversional industries (Edirisinghe, 2001), agro-based industries and rural-urban migration, an attempt to provide urban jobs (Marjit, 1991) are among these studies.

In Iran relatively good studies and researches have been conducted by agriculture development organization in the field of agro-based industries in recent years, the above studies have also been conducted by university centers. Among existing studies in this field, we can refer to the following ones: the thirteenth volume of agriculture development comprehensive plan of Esfahan province (Iran comprehensive counseling engineers, 2001), the seventeenth volume of comprehensive studies of agriculture development and revival and northern Balochestan natural resources (Varzboom counseling engineers, 1997) comprehensive studies of revival and development of agriculture and natural resources of Kavir Siahkoh aquifer territories and Rig Zarrin and Khour Biabanak areas (First degree counseling engineers, 1999) comprehensive studies of agriculture revival and development and natural resources of Zaiandeh Rud aquifer territory of Jazmoorian (counseling engineers of agriculture and district construction, 1991), the thirteenth volume of comprehensive studies of agriculture development and revival and natural resources of northern aquifer territory of Karoon river (First counseling engineers, 1988), feasibility and location finding studies of processing industries of garden products in Kermanshah province (Babajani, 2004), optimal location finding of conversional industries and its role in rural development of Semirof Sofla district (Farahmandian, 2000) and a study of establishing industrial complex and agro-based industries of agriculture section

¹- Asian Productivity Organization

in Khomeini Shahr province (Ghasemian, 2005).

In the case of study methodology, this article has also used the situation of data and accessible statistical resource which can be considered as a process of a collection of model and methods by considering review literature and research activities which are enforced in executive organizations right now. Among new performed works / tasks in this field on which study is based is the study of provision of industrial complex agro-based industries of agriculture section in the city of Khomeini Shahr which has been prepared by Esfahan province rural agricultural industry management of agriculture development in 2005. In this study the main variables are as follows:

X= the amount of production (tons)

A= Ordinary waste percentage

Wx= the amount of waste

P= population

Cp= ordinary consumption per person

C= the amount of consumption (eating as fresh)

Y= production surplus

Se= the amount of consumption in existing industries (existing processing capacity)

Sp= the amount of production usable in industries (processable production)

Data analysis is performed in several steps as follow:

A) Formation of data table (the amount of production , cultivation, surface and product function)

B) Calculating the amount of waste

C) Calculating the amount of fresh eating

D) Calculating the production surplus.

E) Determining the processable production

Introducing the region under study

Falavarjan Town with centrality of Falavarjan town with an area of 319 square meters is one of the small towns in Esfahan province central section. The population of this town, based on the estimation of Iran statistics center in 2004, has been 221762 people (country planning and management organization, 19; 2004. In this town, 40.1 percent of the population lives in rural areas and 21.7 percent of those having jobs are active in agriculture section. Zayandeh Rud River passes through the center of the town with the direction of south-east/north-west. More than 80 percent of Falavarjan area has been occupied by a belt of cultivable land. In Falavarjan plains both cultivation and keeping gardens are possible but traditionally the cultivation activities are more than keeping groves and orchards. In the country, the agricultural activities merely depend on irrigation and there is no dry Farming cultivation.

Falavarjan Township has had 19524 Hectares of agricultural Lands in 2003-2004 which has covered 60.1 percent of the area of the town. From the total agricultural lands of Falavarjan 75.2% is allocated to annual agricultural land, 6.9 % to permanent products (gardens) and 17.9 percent to the fallow lands.

The average function of agricultural annual products and gardens of the town shows higher figures comparing to average function in the province. Among annual agricultural products, potato, tomato and cucumber have had a higher function and onion a lower one. In garden products, among annual agriculture

products, potato, tomato and cucumber have had a higher function and onion a lower one. In orchard products, the pear, the cherry and the black cherry show higher function than average and peach a lower one; the cherry and black cherry show a higher function than average and the peach a lower one (Table 1).

Table 1: cultivation area and the function of agricultural and orchard products of Falavarjan Town and Esfahan province (2003-2004)

product		Cultivation area in province (hectare)	Cultivation area in township (hectare)	Percentage of Cultivation area in the town (hectare)	Province function (in kg)	town function (in kg)	
Producing annual cultivation products (2003- 2004)	Cereals	Wheat	107380	2000	1.9	4817	5150
		barely	44486	800	1.8	5281	4700
		Rice	15150	4800	31.6	5133	5700
	Patch Products	cucumber	2172	220	10.1	31988	44886
	vegetables	potato	22599	1800	8	24744	45000
		onion	4160	1200	28.8	62713	62000
		tomato	1454	100	6.9	31709	44720
		leafy and nodal	4599	1079	23.5	36814	45300
	Herbivorous plants	alfalfa	26479	1000	3.8	10470	11000
		clover	4901	1500	30	35000	40000
Grassy popcorn		16823	100	.6	51687	54000	
Oily seeds	colza	1638	85	5	1971	2317	
Producing orchard products	Having Kernel	Black cherry	819.3	25	3	4841.3	5000
		cherry	1160.3	450	38.8	5243	6000
		peach	924	130	14	3567	2250
	Having seeds	apple	19017	80	.4	15217	7500
		pear	1169	100	8.6	6981.3	12000
		quince	1147	210	18.3	10226.5	7200
	others	walnut	4960	130	2.6	1553.5	1500

Reference: agriculture development center of Falavarjan Town and the researcher's calculation

Falavarjan has had a long history in animal husbandry and has been an important center of the province in this field and its special geographical situation and favorable climatic conditions has had very suitable and favorable conditions. The possibility of cultivating grass is of the most important capacities of the province (Aboulghassemi,

2000: 97). The animal situation of the town has been provided in Table 2. Falavarjan with favorable geographical situation and the presence of plentiful underground water and of Zayandeh Rud River is a favorable zone to grow fish but at present time, there is no considerable activity in this field (Khaniya, 2001: 57).

Table 2: the Number and kinds of animals in the town in comparison with those of the province in 2004

The king of domestic animal	No. of province domestic animal (head, person, animal unit)	No. of township domestic animal (head, person, animal unit)	No. of province domestic animal to the province (%)
Sheep and lamb	2413340	44566	1.8
Goat and Goat kid	1036250	23937	2.3
Noble cow	90860	7987	8.8
Half breed cow	241100	24110	10
Original cow	93280	3214	3.4
Camel	5490	30	0.5
تک سیمان	57400	1664	2.9
Domestic animal unit	6282463	315608	5

Reference: agriculture development center of Falavarjan , domestic affairs administration

A review of what happens to the agriculture products of the region is necessary to recognize the conditions and the plight of the region's agricultural economy and the urgency of developing agro-based industries of the region.

Among important products of the region, the surplus wheat of the producer's need is sold out to the rural cooperative companies and is shipped to the silos from there. The extra barely surplus is also sold to the government based on the announced price and or to the private sector by the day value/ amount.

Rice producers separate some of their nice husk required for the year and sell out the rest to the brokers and owners of rice beating factories of the region at the determined price. They convert the rice husk in the rice beating factories and sell out the resulting rice in or outside the region.

Almost all the produced potatoes are sold out to the local brokers and they are shipped by them to the main markets of the province or outside it. The leafy and nodal vegetables are shipped to Esfahan markets by farmers themselves and sold out there. And some of the products are sold out to the brokers; the yield is collected inside the region and then shipped to the province outside markets (Tehran, Ahvaz) and even in some cases to foreign countries.

The produced onion, especially the one which is cultivated in autumn, is sold to the rural cooperative companies' onion or to the private purchasers. Every year some of the onions are bought by rural cooperative companies or by the private sectors and sold out in other provinces of the country (First degree (rank) engineers, 1995:92-3). As we see agriculture products of the region are distributed in different and unstructured ways

every year and consequently; region and the farmers of the region have the lowest share of it.

Processing capacity of existing industries

Falavarjan, in spite of having relatively rich agriculture and always been one of the agriculture centers of Esfahan province, it is very poor in terms of agricultural productions and agro-based industries. As shown in table 3, this region has a few active old industries and some new plans to be executed which are very poor considering the potentialities of the region.

In Falavarjan, existing industries in terms of beating rice includes most of the agro-based industries consisting 14 active plants in beating rice and one plant for white rice. Among other existing industries, one plant is

for producing flour and cake and one is for packaging and preserving the potato.

Industries in the process of development, showing 10 to 80 % physical growth, include one beating rice plant with high capacity, one plant of pickles by capacity of providing jobs for 20 persons, one plant for potato powder, one plant for onion powder and, in case of permanent products (orchard), just one under development plan or project for grading and packaging the fruits.

The current industries in the town for producing milk are as follows: one active plant of cheese with the capacity of 1000 tons and employment of 11 people and one newly-development plan to produce pasteurized Yogurt with the capacity of 4000 tons. There are no industries in the region to produce eggs.

Table 3: Conversional and Complement Industries existing in Falavarjan Township in 1384

Product	Existing industries	No. of unit	Production capacity	Present situation
wheat	1- flout	1	2090	Active
	2- cake	1	1000	Active
Paddy rice	1- beating rice	14	7370	Active
	2- beating rice	1	4200	Under development
	3- whitened flour	1	1500	Active
Cucumber	1- pickles	1	500	Under development
Potato	1- packaging and storing	1	5000	Active
	2- Potato powder	1	1500	Under development
Onion	1- Onion powder	1	100	Under development
Tomato	1- tomato sauce	1	100	Under development

Reference: agriculture development center of the province and top administration of Esfahan province mine and industries (2005)

Analysis and the results

A) Productions and the function of agriculture products

Based on information of statistical office of Esfahan province agriculture development and Falavarjan, in the case of cultivation area, the amount of productions and function of agriculture, domesticated animals, and orchards in cultivation year of 2004-2005, shown in Table 1 and 2, the production situation of this town has been categorized in terms of amount, function and importance and its standing in the province into the following: cultivation products. Cultivation products can be investigated under several subcategories. In Falavarjan, there are three products of wheat, barley and rice in the cereals group; the functional average of these three products is higher than the province average. Among them, rice has occupied the vastest area under cultivation, compared to other province agricultural products. This area by itself has yielded 32 percent of the rice production.

Kitchen-garden products

of the town include just cucumber. The area under cucumber cultivation involves 10.1 percent of the total under-cultivation area of this product in the whole province.

The main vegetables products

in this town include the potato, onion, and leafy and nodal vegetables. The province's main agriculture production is the potato which

involves a quarter of cultivation and garden productions of the province, 24.1 percent in 1382-1383. The area under potato cultivation is 11.2 percent of total province under cultivation of area and its production amount is 14.5 percent of total province production. Based on table 1, the area under onion is equal to 7.5 of total area cultivation of the province. The amount of onion production had devoted itself 22.1 percent of province's under cultivation productions and it can be said about one quarter of agriculture productions of province and is in the place after potato production.

Garden productions

in this province include two groups of kernel fruits (black cherry, cherry, and peach) and grainy fruits (apple, pear and quince) and other cases such as walnut. The most important garden products of the province according to table 1 is cherry, the production amount of which is equal to 2400 tons and comprises 14.2 percent of province garden productions. The recommended program of garden management of Esfahan province agriculture development in relation to development program in Falavarjan province is adding to the area under cultivation of products such as quince, black cherry and cherry for 200, 25 and 20 hectares respectively.

Domestic animal-products:

domestic animal or dairy productions include the following: Red meat, milk, chicken meat,

eggs and honey. The amount of milk production in the province in 1382-1383 alone has been 82.4 percent of domestic animal productions.

A) Calculating the amount of waste

In this step considering the amount of production and usual percentage of any of the products' waste (column 1, and 3 of table 4), the amount of waste of agriculture, garden and domestic animal waste of the province has been calculated by the equation:

$w_x = a \cdot x$ (The amount of waste= the amount of production \times Waste percentage)

And its results have been inserted in column 4 of the table 4.

According to the preferred calculations, different amounts of the productions which can be out in processing cycle and provide the province effective and various productions are wasted as follows: 1368 tons rice produced in the province, 2962.5 tons cucumber, 1880 tons potato, 11160 tons onion, 12055.8 tons leafy and nodal vegetables, 120 tons cherry, 18 tons pear and also 2213 tons milk and 259 tons eggs.

B) Calculating the amount of fresh eating

To determine the amount of fresh eating or, in other words, the amount of consumption of productions in the region, the following equation is used:

$c = p \cdot c_p$ (The amount of consumption= population \times per capita consumption)

In this equation the average per capita consumption of basic products has been calculated based on agriculture development organization data (column 5 from table 4) and the province population based on estimation of Iran statistics center for the year 1383 which announced the population as 221762 people (country planning and management organization, 1383, p 17), the result of the calculation has been offered in column 6 of table 4.

C) Calculating production surplus

Calculating production surplus has been calculated by following equation by considering the amount of production, the amount of wastes and the amount of consumption:

$$Y = x - w_x - c = (1 - a)x - c$$

(Production surplus = (The amount of waste + the amount of consumption) – The amount of production)

The amount of products surplus of the province has been presented in column 7 of table 4.

D) Processable production

In this step, considering the products having production surplus and the process capacity of existing industries in the region, whether active plants and or under development, are determined (column 7 and 8 of table 4) by using the following equation,

$SP = Y - S_p$ (The processing capacity of existing industries - Production surpluses = Processable production)

The province agriculture productions, which are programmable for devoting agro-based industries, and also the amount of

existing products to be used in new industries cycle have been determined and their results are shown in table 4.

Table 4: productions, wastes, per capita consumption, processing capacity of existing industries and processable productions in Falavarjan (1382-1383).

Product		Production amount	Percentage of province production to township	Waste Percentage	Amount of waste	Per capita consumption (kg)	Eating fresh	Production surplus	Processing capacity of exiting industries (tons)	Processable production (tons)	
		1	2	3	4	5	6	7	8	9	
Producing anal cultivation products 82-83(2003-2004)	Cereals	Wheat	10300	2	10	1030	220	48787.6	-39517.6	3090	---
		Barely	3760	2	---	---	1	221.8	3538.2	---	---
		Rice	27360	32	5	1368	29	6431	19561	13070	6491
	Patch products	Cucumber	9875	14.2	30	2962.5	16	3548.2	33643	500	28643
		Vegetables	Potato	81000	14.5	20	11880	48	10644.6	36875.4	6500
	Onion		74400	28.5	15	11160	17.1	3792.1	58447.9	100	58347.9
	Tomato		4427	9.7	15	670.8	31.3	6941.1	-3140	---	---
	Leafy and nodal		48223	28.7	25	12055.8	31.5	6958.1	29181.7	100	2818.7
	Herbivorous plants	Alfalfa	11000	4	---	---	---	---	---	---	---
		Clover	60000	35	---	---	---	---	---	---	---
Grassy popcorn		5400	0.6	---	---	---	---	---	---	---	
Oily seeds	197	6.1	---	---	16.5	3481.7	-3285	---	---		
Producing garden products	Having kernel	Black cherry	75	2.41	5	3.75	.6	133	-61.75	Generally one unit with the capacity of -3000 tons (plan under development)	491
		Cherry	2400	45.9	5	120	2.5	554.4	1725.6		
		Peach	90	4.32	10	9	2.9	643.1	-562.1		
	Having seeds	Apple	562.5	.27	5	28.3	24	5322.3	-4788.1		
		Pear	1200	15	15	180	2.1	465.7	554.3		
		Quince	1368	16.5	5	68.4	.4	88.7	1210.9		
	Others	Walnut	135	.04	4	5.4	2.3	510	-380.4		
Producing anima products	Milk	44261	8.43	5	2213	90	19958.6	22089.4	5000	17089.4	
	Red meat	2337	5.71	35	818	12	2661	-1142	49000	---	
	Chicken	1915	2.1	35	670.25	13.5	2993.8	-1749	7340	---	
	Eggs	5176	11.5	5	259	8.5	188.5	3032	---	3032	
	Honey	5	.2	---	---	.4	88.7	-83.7	---	---	
Fishery	Aquifer us production	40	1.73	40	16	5.8	1286.2	-1252.2	---	---	

Reference: Statistical unit of Esfahan of province mine and industries (1384) and Esfahan province agriculture development (1382-1383) calculations.

Based on these calculations the following products all having a relatively high figure in production surpluses are suitable for optimum exploitation in agro-based industries in the province, these products are: rice, cucumber, potato, onion, leafy and nodal vegetables. In this case of garden products the products such as cherry, pear, and quince have

enough potential to develop related industries after reducing existing industries' capacity from garden products. Milk production in the province provides the possibility of developing dairy industries in the region. Processable products and the amount of production surplus have been shown in the figure 1.

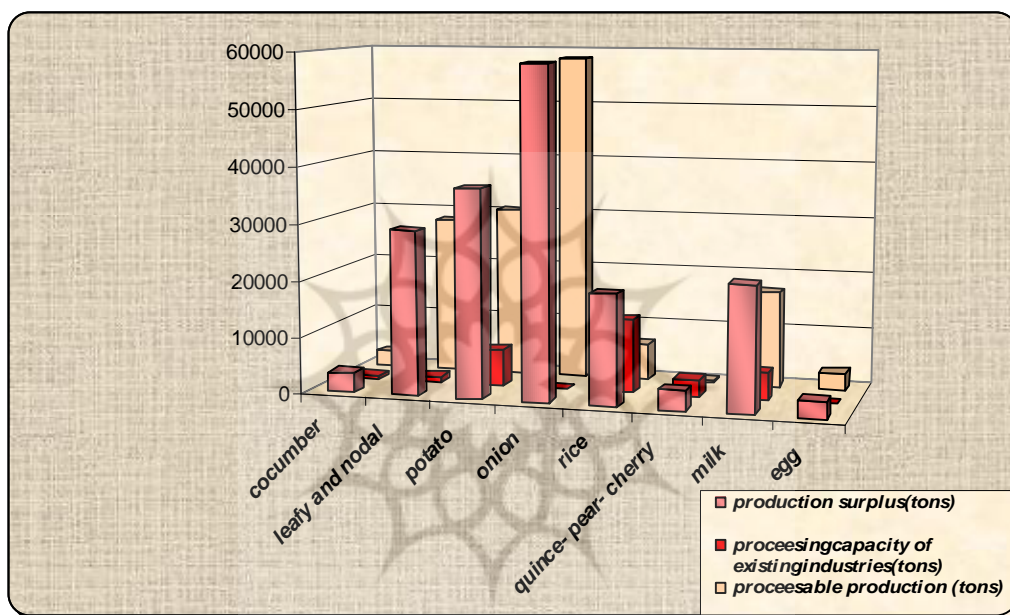


Figure1. Production surpluses, processable capacity of existing industries and processable production of main products of the province (1384)

Agro-based industries proportional to township productions

The situation of region's agriculture productions and the productions having processable capacity has been raised in

previous discussions. In this part, it seems it is necessary to mention those proportional industries with these products which have been recommended based on scientific resources and reports of related organizations. A list of these industries has been presented in table 5.

Table 5: recommended agro-based industries in Falavarjan

Item	Group	Product	Recommended industries
1	Cereals	Paddy rice	Small rice, rice flour, paddy rice, whitened and half beat rice, rice cleaning , drying rice and rice packaging
2	Patchy products	Cucumber	Pickles , sour cucumber and packaging
3	Vegetables	Potato	Potato and side products (meal. Puree , powder, slice , peels, chips, and potato granule, French fries) and animal complementary waste powder
4		Onion	Onion powder, Onion slice, hot Onion , Onion pickle, dried Onion sorting and packaging Onion powder
5		Leafy and nodal vegetables	Producing fast foods fro vegetables, vegetables conserve. Dry vegetables packaged frost vegetables puree, slice Vegetables paste and grading and Vegetables packaging
6	Garden Products	(quince, pear , cherry)	Protection against fruits decay as syrup, making compote, fruit conserve, as jam, fruit jelly, juice from concentrate and fruits and dry fruits powder fruits freezing , grading and fruits packaging and jam packaging
7	Domestic animal products	Milk	Dairy products (milk cream, different kinds of cheese , ice cream , yogurt , butter, dried whenand ...)and packaging of Dairy products
8		egg	Eggs powder (complete powder, whitened powder, yolk powder and egg shell powder) and packaging of eggs products

Conclusion

Falavarjan Town has a high environmental potential for producing different agriculture products and has a suitable geographical situation to develop agro-based industries. This town, in spite of having various agriculture products, high production surplus and generous wastes of agriculture products, is poor in terms of agro- based industries, so it seems necessary to develop such industries in the region.

The study findings state that main agriculture productions of Falavarjan, having production surplus (table 4), include rice, leafy and nodal vegetables, cucumber, potato, onion,

quince, pear, cherry, milk and eggs. In previous pages, after calculating the amount of waste, per capita consumption and processing consumption in existing industries and for these products, the amount of processable productions which can be programmable have been determined (Figure 1). Kinds of products and their processable productions show that is a good basis to develop agro-based industries in the region.

Developing these industries can have a remarkable effect on preventing migration from villages to the cities, negative social consequences of unemployment, reaching to sustainable development, increasing farmers'

income, providing new job opportunities reaching to economical sustainable development in the region, enhancing living standards of region's villagers and etc...

According to the performed studies and calculations, the following recommendation can be offered:

- In Falavarjan planning, enough attention is given to the environmental and population potentials and it is recommended to use such products as rice, leafy and nodal vegetables, potato, onion and cucumber in processing industries of agriculture products, quince, pear and black cherry in processing industries of garden products and milk and eggs in domestic animal products processing industries as shown in table 5.

- Increasing and developing silos to store and maintain products are necessary. Also considering the importance of packaging, it is important to increase the activity range of such packaging centers.

- It is recommended that in location finding investigation for agriculture products, garden and domestic animal processing industries, the role of agro-based industries in rural development of township, the amount of reducing agriculture products waste in cultivation, maintaining and harvesting stages and processing are considered.

Generally the existing industries in agriculture section are not sufficient to cover all agriculture products of Falavarjan Town and there is still a long way to reach complete equality of these industries and productions and optimum use of agriculture productions and prevent wastage of resources in this section.

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