



# Feasibility Study of Agricultural Processing Industries Development in Ilam Province, Iran

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## Abstract

The purpose of this study was to study the feasibility of establishing agricultural processing industries in Ilam Province. A mixed research method (Dominant, Less Dominant and two-phase design) was used. A Delphi technique as qualitative research method, and a descriptive-survey method for quantitative phase was applied. Based on the results of the Delphi panel, 65 different types of agricultural processing industries were identified to be appropriate for Ilam Province and were used in designing a questionnaire for the quantitative phase of the study. The statistical population of the quantitative phase comprised all agricultural experts working in the Jihad- Agriculture Organization of Ilam Province (N=85). From among them, and by using the Morgan Table, 70 individuals were selected through stratified random sampling and were studied by the questionnaire. In the quantitative phase, based on the variation ratio (VR), the respondents prioritized the agricultural processing industries for all counties of Ilam Province. Results of Kendall's W test showed that there was agreement among the respondents about the feasibility of establishing agricultural processing industries in this Province.

### Keywords:

agricultural products, feasibility, Ilam Province, prioritization, processing industries

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## INTRODUCTION

Food processing is a large sector that covers activities such as agriculture, horticulture, plantation, animal husbandry, and fisheries. Agro-based processing is defined as a set of techno-economic activities, applied to all the products, originating from agricultural farm, aqua cultural sources, livestock and forests for their conservation, handling and value addition to make them usable as food, fiber, feed, fuel, or industrial raw material (Soni et al., 2013). In all developing countries population growth is becoming predominantly an urban phenomenon, increasing the role of agro- industry in mediating food production and final consumption. Based on World Bank's world development report, agro-industry contribution to total manufacturing is 61% in agriculture-based countries, 42% in countries in transformation, and 37% in urbanized developing countries (Wilkinson & Rocha, 2009).

Agro-based industries play an important role in strengthening industrial and agricultural linkage. Agro-based industries are those that are involved in supplying the farm with agricultural inputs besides handling the products of the farm. Agro-based industries are those industries which have either direct or indirect links with agriculture (Bhosale, 2016). Agro-processing industries can potentially play an important role in reducing poverty and sustainable economic growth. There are primarily two main channels for the development of the agro-processing industries to reduce poverty: The first channel is that the purchase of agricultural products by these industries increases the demand for agricultural products, which in turn improves farmers' income. The second channel is that agro-processing industry factories employ poor farmers, that is, they tend to be located in rural areas where many poor farmers live. Therefore, they can provide job opportunities to household members of farmers themselves in the agricultural off-season (Watanabe et al., 2009).

The facts in Iran show that agricultural factors including water and soil are limited, population growth rate is high and the villages suffer from seasonal or permanent unemployment. These factors have, altogether, resulted in uncontrolled

migration of people from rural areas to urban areas. The industrialization of rural areas as a productive economical sector can be a major step toward alleviating the income gap between urban and rural areas as scholars believe it is one of the most effective factors for the decrees of migration. By their nature, these industries can play an essential role in creating employment and income for rural people, reducing unemployment in villages, and controlling migration. Despite its enormous potentials, Ilam Province has not used all its potentials in rural industrialization yet. These potentials, featured with natural talents and vegetative and woodland coverage, can provide appropriate conditions for the relevant economical activities. The development of these industries may pave the way for the complementary productive activities as the industries for the process and conversion of agricultural products. Accordingly, it is necessary to industrialize rural areas, especially to develop processing industries (Rezaii, 2007). Therefore, the main purpose of the present study was to study the feasibility of establishing agricultural processing industries in Ilam Province.

Moradi et al. (2015) have studied the challenges facing fruit processing industries in Kermansha Province and showed that market constraints, work labor problems, managerial challenges, impact of cash subsidiaries as well as economic sanctions imposed by international forces, lack of coordination between organization serving agricultural industry, extensive paperwork during certificate issuance, lack of support from government bodies, and a lack of strategic planning from fruit processing industries are the most important challenges facing these industries.

In a study on the site selection and prioritization of agricultural processing industries in Golestan Province, Khajeshakohi et al. (2014) showed that the cities of Aliabad, Gorgan, and Ramian were in priority for the establishment of agricultural processing industries. Mohammadi et al. (2012) studied optimum location for tomato processing industries in Fars Province and found that distance from consumption centers was of importance in prioritizing the cities, and accordingly, they evaluated the cities located to the

north of the Province as having better conditions. [Nori et al. \(2013\)](#) used Analytic Hierarchy Process (AHP) to find optimum locations for the deployment of date processing industries in Kazeroun Township and reported that the districts of Khest, Central, Kenartakhteh, and Komarj, Jarrah and Baladeh, Chenarshahijan, as well as Kuhmarah were the best locations for the establishment of date processing industries. [Bozorgmehr et al. \(2013\)](#) studied the approaches for the development of processing industries in the gardens of North Khorasan Province using strategic factors analysis and reported the availability of raw materials as the main strength, the lack of R&D departments in most garden industries as the main weakness, the chance for absorbing foreign investments as the main opportunity, and instability in planning horticultural production by farmers as the main threat of the establishment and development of processing industries in the studied region.

[Zangiabadi et al. \(2011\)](#) showed that the development index was lower for eastern cities of the Isfahan Province and that these cities were in priority for the development. The second level included western and southern cities, forming the second level for development. The last level of development was drawn linearly from North-West to South-East and the final priority was allocated to this level. [Nori and Nilipor Tabatabai \(2007\)](#) by the Delphi technique, prioritized the development of agricultural sector processing industries in Falavarjan County of Isfahan Province. [Dehbashi \(1996\)](#) found that processing industries would reduce unemployment and migration in the Kohgiluyeh Boyer Ahmad Province and would accelerate its movement towards a dynamic economy. [Solimani \(1996\)](#) examined the strengths and limitations of Lorestan Province for the establishment of poultry slaughterhouses including product supply and demand, raw material, the minimum economic capacity.

At the same time, they affect the migration of surplus labor to urban areas. [Kalantari et al. \(2010\)](#) studied the driving and inhibiting forces of the establishment and development of agro-processing industries in North Khorasan Province and found that four factors of government supportive policies,

institutions, the formation of competitive atmosphere, and bank system as the driving forces and that their contribution to the development of industries was higher than inhibiting factors.

In addition, [Wang \(2001\)](#) mentions higher rural investments and job creation, higher mean income, and the extension of agriculture as the results of industrialization in China. [Rozelle \(1994\)](#) found that rural industrialization improves public awareness as its social impact. [Abraham \(2004\)](#) examined rural industrialization pattern in India and concluded that it plays an important role in job and income creation in such a way that experience of different countries shows that rural industrialization entails positive impacts and mobilizes economy ([Wheitz, 2006](#)). Rural industrialization by local resources helps the decentralization of industries and bridges the gap between urban and rural areas to lessen the difference in the lifestyles of these regions ([Walkers, 2007](#)). [Chadwik \(2007\)](#) analyzed rural development process and suggested that along with other economical and social sectors, industry should be adopted as the most important component of all rural integration plans. The nature and pattern of industrialization is a function of raw material and human resources at local and regional levels either in small-scale and/or handicraft industries or in large-scale industries. Rural small-scale industries are among main income sources given their capacity to recruit human resources (since they are labor-intensive); consequently, they can alleviate the income gap at rural level. This sector can create job and income for people who have small or no lands and cannot make a living with farm income ([Skinner et al., 2003](#)). [Karim \(2000\)](#) suggests that job creation, fair distribution of income, lower income gap between rural and urban areas, lower poverty and less migration are the favorable consequences of industrialization. Rural industrialization can play a crucial role in rural development through increasing rural production and productivity, creating new jobs, meeting the essential requirements, and making link with other economical sectors ([Radpear, 2007](#)). [Lanjouw \(2008\)](#) suggests that the creation of dynamic employment and higher income are

the economical results of rural industrialization.

The current study was performed to determine feasibility of establishing agricultural processing industries in Ilam Province.

## MATERIALS AND METHODS

In the present study, due to the nature of the subject, a combination of qualitative and quantitative methods, mixed method, (Dominant – Less Dominant and two-phase design) was used. This study was applied and a descriptive–survey method was used. In qualitative phase views of the Delphi panel obtained and interpreted. The statistical population for the qualitative phase consisted of scholars, managers, and all actors of economical and agricultural sectors, whose opinions were polled for the first phase of the study. At this phase, first the relevant experts, who were professionally qualified by a research panel, were identified. Next, they were corresponded about research objectives and they were invited for collaboration. Then, they were asked to introduce other people for developing the research panel. After corresponding with the second group, they were asked to introduce more individuals. The third group introduced new members for participating in the panel. Accordingly, based on the nature of Delphi technique, the method of sampling used was judgment and purposeful chain ( $n=28$ ). The statistical population of the quantitative phase consisted of all agricultural experts working in the Jihad-Agriculture Organization of Ilam Province ( $N=85$ ). From among them, using the Morgan Table, 70 individuals were selected through the stratified random sampling method. The ques-

tionnaire of research was designed with some open and closed-end questions for the statistical society according to the objectives, review of literature, and the results of interviews with experts in the Delphi phase. It was composed of 65 statements about different kinds of agricultural processing industries designed for the measurement of the feasibility of industrialization of Ilam Province cities. Respondents estimated the feasibility of each industry by rating them from 1 (the most feasibility) to 10 (the least feasibility). The data were quantitatively analyzed with SPSS. The statistics used in the descriptive phase included mean, frequency, variation ratio, valid percent, and standard deviation. At the quantitative phase, the variation ratio was estimated for 65 statements about processing industries feasibility for each township. Next, industries that were in the first ten priorities on the basis of the variation ratio were selected as the feasible. At the end, for assessing amount of ranking agreement among respondents Kendall's W ranks test is used.

## RESULTS

### Ranking of agricultural processing industries for Ilam Township

According to Table 1, experts ranked the production of modern dairy products as the first feasible option for the establishment of agricultural processing industries with the coefficient of variation (VR) of 0.22, red meat and chicken canning as the second option with the VR of 0.23, and meat and meat products storage as the third option with the VR of 0.31.

Table 1  
*Ranking of Agricultural Processing Industries for Ilam Township*

Statement	Mean of rankings*	SD	VR	Rank
Modern dairy products production	2.14	2.11	0.22	1
Red meat and chicken canning	1.55	1.31	0.23	2
Meat and meat products storage	1.38	1.13	0.31	3
Almond and walnut husking and packaging	1.00	0.74	0.34	4
Honey packaging	1.00	0.72	0.37	5
Gum production and packaging	1.00	0.72	0.41	6
Mushroom processing	1.00	0.72	0.41	7
Fish processing, packaging and freezing	3.11	2.01	0.47	8
Poultry slaughterhouse	2.31	1.47	0.50	9
Cheese production	2.44	1.54	0.52	10

\* Ranks: 1 = most feasible, 10 = least feasible

### Ranking of agricultural processing industries for Eyvan Township

As the results in Table 2 shows, cheese production was ranked the first feasible option (VR=0.30) for the development of processing industries in Eyvan Township, pasteurized milk production was ranked the second (VR=0.34), and modern systems of dairy products as the third (VR=0.47).

### Ranking of agricultural processing industries for Abdanan Township

Experts ranked meat and meat products freezing and packaging as the first feasible industry (VR=0.08), curd powder and pasteurized curd production as the second feasible industry (VR=0.12), and manure production from agricultural and livestock waste

as the third feasible industry (VR=0.24) (see Table 3).

### Ranking of agricultural processing industries for Badreh Township

The findings presented in Table 4 showed that biofertilizer production was the most feasible option for the development of agricultural processing industries in Badreh Township (VR=0.31), meat and fish powder production was the second most feasible option (VR=0.36), and skin and intestine products as the third most feasible option (VR=0.47).

### Ranking of agricultural processing industries for Darreh Shahr Township

Results (see Table 5) shows that experts ranked olive processing (VR=0.18) as the most feasible option for the development of agricultural pro-

Table 2  
Ranking of Agricultural Processing Industries for Eyvan Township

Statement	Mean of rankings*	SD	VR	Rank
Cheese production	1.94	1.71	0.30	1
Pasteurized milk production	3.58	2.59	0.34	2
Modern dairy products production	3.90	2.52	0.47	3
Chicken feather hydrolysis	4.15	2.55	0.52	4
Raisin packaging	4.20	2.49	0.57	5
Carbonated yoghurt production	3.27	1.80	0.58	6
Fruits processing and packaging (apple sauce, fruit slices, grape processing)	4.07	2.19	0.61	7
Fruit compote production	3.82	2.06	0.62	8
Fruit storage	1.77	1.46	0.63	9
Fruit and herbal teas production	4.00	2.10	0.64	10

\* Ranks: 1 = most feasible, 10 = least feasible

Table 3  
Ranking of Agricultural Processing Industries for Badreh Township

Statement	Mean of rankings*	SD	VR	Rank
Biofertilizer production	3.34	2.94	0.31	1
Meat and fish powder production	2.32	1.95	0.36	2
Skin and intestine processing production	5.37	3.77	0.47	3
Gum production and packaging	3.97	1.88	0.52	4
Honey packaging	2.68	1.16	0.59	5
Animal fat packaging	5.51	2.36	0.62	6
Gelatin production from bone powder	5.44	2.32	0.62	7
Meat and meat production freezing and packaging	6.58	2.60	0.67	8
Honey beeswax processing and packaging	3.12	1.20	0.68	9
Fish processing, packaging, and freezing	1.25	0.44	0.69	10

\* Ranks: 1 = most feasible, 10 = least feasible

cessing industries in Darreh Shahr with respect to its geographical conditions. They ranked olive oil extraction as the second most feasible option (VR=0.21) and the production of different types of meal as the third most feasible option (VR=0.23).

#### Ranking of agricultural processing industries for Dehloran Township

According to the results of feasibility of establishment of agricultural processing industries in Dehloran presented in Table 6, the production of different types of meal was ranked the first (VR=0.10), dry hay production and packaging was ranked the second (VR=0.19), and olive oil extraction was ranked the third (VR=0.21).

#### Ranking of agricultural processing industries

#### for Sirvan Township

As shown in Table 7, experts believe that cereals packaging and processing is the most feasible processing industry in Sirvan (VR=0.34), paddy rice threshing and packaging is the second most feasible option (VR=0.36), and vegetables drying and packaging is the third most feasible option (VR=0.41).

#### Ranking of agricultural processing industries for Chardavol County

According to the results (see Table 8), cheese production is believed to be the first most feasible industry (VR=0.10) for establishment in Chardavol County, ice-cream production is the second most feasible option (VR=0.12), and cereals packaging and processing is the third most feasible option (VR=0.18).

Table 4

Ranking of Agricultural Processing Industries for Abdanan Township

Statement	Mean of rankings*	SD	VR	Rank
Meat and meat products freezing and packaging	4.12	2.14	0.08	1
Curd powder and pasteurized curd production	3.31	2.30	0.12	2
Production of organic fertilizer from agricultural and livestock wastes	4.07	2.73	0.24	3
Biofertilizer production	4.07	2.73	0.35	4
Poultry slaughterhouse	4.52	2.90	0.46	5
Mushroom processing	3.67	2.35	0.50	6
Red meat and chicken processing, slicing, packaging and freezing	2.45	1.56	0.51	7
Carbonated dough production	4.17	2.58	0.53	8
Fruity, creamy yoghurt production	2.20	1.32	0.57	9
Grape oilseed production	3.51	2.11	0.61	10

\* Ranks: 1 = most feasible, 10 = least feasible

Table 5

Ranking of Agricultural Processing Industries for Darreh Shahr Township

Statement	Mean of rankings*	SD	VR	Rank
Olive processing	4.58	2.90	0.18	1
Olive oil extraction	4.58	3.032	0.21	2
Production of different kinds of meals	2.45	1.40	0.23	3
Dry hay production and packaging	1.87	1.00	0.29	4
Pomegranate paste production	6.30	2.80	0.32	5
Barley and non-alcoholic beer production	3.27	1.16	0.33	6
Production of different kinds of enriched flour	6.35	1.80	0.39	7
Production of malt extract and its byproducts	2.41	0.67	0.40	8
Processing and packaging of different kinds of grains	6.24	1.50	0.43	9
Organic fertilizer production from agricultural and livestock wastes	7.74	1.84	0.50	10

\* Ranks: 1 = most feasible, 10 = least feasible

Table 6  
Ranking of Agricultural Processing Industries for Dehloran Township

Statement	Mean of rankings*	SD	VR	Rank
Production of different kinds of meals	3.32	2.64	0.10	1
Dry hay production and packaging	5.27	3.04	0.19	2
Olive oil extraction	7.34	3.35	0.21	3
Cereals packaging and processing	7.61	3.38	0.26	4
Organic fertilizer production from agricultural and livestock wastes	3.51	1.48	0.28	5
Biofertilizer production	1.44	0.55	0.31	6
Noodles production	2.24	0.85	0.34	7
Onion and potato storage and grains silo	8.17	2.24	0.42	8
Production of different kinds of enriched flour	2.85	0.74	0.51	9
Barley processing and non-alcoholic production	8.55	1.71	0.54	10

\* Ranks: 1 = most feasible, 10 = least feasible

Table 7  
Ranking of Agricultural Processing Industries for Sirvan Township

Statement	Mean of rankings*	SD	VR	Rank
Cereals packaging and processing	2.18	1.70	0.34	1
Paddy rice threshing and packaging	1.00	0.74	0.36	2
Vegetables drying and packaging	2.87	0.75	0.41	3
Vegetables and fruits sorting, packaging, and processing	2.92	1.75	0.46	4
Noodles production	4.32	2.38	0.52	5
Pomegranate paste production	2.47	1.32	0.53	6
Curd powder and pasteurized curd production	5.07	2.98	0.62	7
Grape oilseed production	4.37	1.82	0.62	8
Construction of places for fruit drying	4.37	1.82	0.69	9
Concentrate production	6.88	2.75	0.71	10

\* Ranks: 1 = most feasible, 10 = least feasible

### Ranking of agricultural processing industries for Malekshahi Township

The findings in Table 9 show that, according to the geographical conditions and potentials of Malekshahi, the first most feasible processing industry is red meat and chicken processing, cutting, packaging and freezing (VR=0.31), the second most feasible one is packaging and processing of different fruits (apple sauce and fruits slices) (VR=0.31), and the third most feasible one is fruit compotes production (VR=0.41).

### Ranking of agricultural processing industries for Mehran Township

The findings in Table 10 show that, according to the geographical and potentials

of Mehran, the first most feasible processing industry is livestock, poultry and fish food production (VR=0.09), the second most feasible one is meat freezing and packaging (VR=0.14), and the third most feasible one is the production of different meals (VR=0.18).

For assessing the degree of ranking agreement among respondents, Kendall's W ranks test be used. The findings of this test (see Table 11) showed that there was no significant difference among the assessing rank mean of the respondents about feasibility of establishing agricultural processing industries in townships of Ilam Province. On the other hand, there was agreement among the respondents about this subject.

Table 8

*Ranking of Agricultural Processing Industries for Sarableh Township*

Statement	Mean of rankings*	SD	VR	Rank
Cheese production	4.22	2.59	0.10	1
Ice-cream production	3.65	1.98	0.12	2
Cereals packaging and processing	4.87	2.43	0.18	3
Skin and intestine production	3.71	1.37	0.21	4
Egg packaging	3.94	1.64	0.23	5
Livestock, poultry and fish food production	5.54	1.99	0.24	6
Production of different kinds of meals	4.58	1.64	0.32	7
Dry hay production and packaging	4.27	1.49	0.33	8
Construction of industries slaughterhouses for animals	4.44	1.54	0.42	9
Pomegranate paste production	5.37	1.85	0.48	10

\* Ranks: 1 = most feasible, 10 = least feasible

Table 9

*Ranking of Agricultural Processing Industries for Malekshahi Township*

Statement	Mean of rankings*	SD	VR	Rank
Red meat and chicken processing, slicing, packaging and freezing	2.88	2.88	0.31	1
Fruits packaging and processing (apple sauce, fruits slices)	3.10	2.58	0.31	2
Fruit compotes production	3.87	3.18	0.41	3
Fruits and herbal teas	1.65	1.30	0.43	4
Fruits (apricot, apple, peach) drying and processing	3.02	2.16	0.47	5
Fruit storages	2.80	1.98	0.51	6
Nuts processing and packaging	2.01	1.36	0.52	7
Organic fertilizer production from agricultural and animal wastes	2.74	1.83	0.56	8
Biofertilizers production	1.78	1.11	0.59	9
Processing of slaughterhouse wastes	2.00	3.28	0.60	10

\* Ranks: 1 = most feasible, 10 = least feasible

Table 10

*Ranking of Agricultural Processing Industries for Mehran Township*

Statement	Mean of rankings*	SD	VR	Rank
Production of animal, poultry and fish food	3.14	2.64	0.09	1
Meat and meat products freezing and packaging	4.00	2.74	0.14	2
Production of different kinds of meals	2.31	1.44	0.18	3
Dry hay production and packaging	2.31	1.44	0.26	4
Onion and potato storage and grains silo	2.21	1.24	0.27	5
Chicken feather hydrolysis	5.25	2.78	0.32	6
Egg packaging	5.34	2.81	0.33	7
Concentrate production	1.20	0.57	0.46	8
Construction of industrial animal slaughterhouses	7.02	3.31	0.47	9
Production of different types of enriched flour	2.18	0.92	0.52	10

\* Ranks: 1 = most feasible, 10 = least feasible

## DISCUSSION AND CONCLUSION

It was found that Ilam and Sarableh had a good potential for the production of dairy, meat, and honey products. In addition, Sarableh has a



Table 11  
Results of Kendall's W test for Ilam Province

Township	Ilam	Eyvan	Abdanan	Badreh	Darreh shahr	Dehloran	Sirvan	Chardavol	Malekshahi	Mahran
Kendall's W	0.71	0.82	0.69	0.58	0.64	0.76	0.54	0.68	0.74	0.83

good potential for the production of garden products, especially pomegranate. These results seem reasonable given the geographical conditions and the special potential of Ilam and Sarableh as one of the animal products and honey production centers of Iran. Therefore, the establishment of processing industries related to animal products, honey, and pomegranate is recommended to be considered by policy-makers in these two cities. In Eyvan Township, garden products are of importance in addition to dairy and livestock products. Accordingly, the establishment of relevant processing industries should be considered by policy-makers. Moreover, since Eyvan has a good potential for the production of grains, forage crops, and cereals, especially given their cultivation area and production rate, it is suggested to launch processing industries for such crops as grains, forage crops and cereals in order to use surplus agricultural products. These findings are in agreement with [Khajeshakohi et al. \(2014\)](#) and [Nori and Nilipor Tabatabai \(2007\)](#).

Abdanan, Darreh Shahr, and Dehloran cities have a good potential for the production of animal and garden products including fig, grape, and particularly olive in addition to dairy and meat products due to its favorable climate for these products. Furthermore, Darreh Shahr has a high cultivation area for cash crops and vegetables, especially cucumber; therefore, it is of great importance to consider the establishment of processing industries for the conversion of the surplus product into invaluable industrial products, and policy-makers should consider it in the planning. The findings have revealed that Badreh Township has a very high potential for the production of animal products. Accordingly, it is more feasible to launch animal-related in-

dustries in this township than other processing industries. Furthermore, the geographical conditions and the flowing of a river in this region create a good potential for the production of fish and relevant processing industries. The animal fat of the region is of a great fame. As such, it is necessary to launch industries for its packaging, and policy-makers and officials should consider it in planning.

Sirvan Township has higher potential for rice production and packaging than other cities. Thus, it is very important to deploy processing and packaging industries for the conversion of the surplus product into valuable industrial products. The findings for Malekshahi township have shown that the most feasible industries include red meat and chicken processing, slicing, packaging, and freezing, fruits (including apple sauce and fruits slices) processing and packaging, fruit compotes production, fruit and herbal teas, and drying and processing of fruits (apricot, apple, and peach), respectively. These findings seem reasonable, given the fact that the township has a good potential for the production of animal and garden products. In Mehran, the first, second, and the third most feasible industries were found to be animal, poultry and fish food production, meat products freezing and packaging, and the production of different types of meals, respectively. Moreover, since Mehran has a good potential for the export of agricultural products to neighboring countries, owing to its special geographical and political condition and having a common border with Iraq, and also, the borderline market and free zone, it is recommended that policy-makers should consider it in planning.

The results of Kendall's w test have showed that there was agreement among the respondents

on the feasibility of establishing agricultural processing industries in Ilam Province.

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