ISLAMIC REPUBLIC OF IRAN
MINISTRY OF JIHAD-E-AGRICULTURE
JIHAD-E-AGRICULTURE ORGANIZATION
OF SOUTH KHORASSAN PROVINCE

ISLAMIC REPUBLIC OF IRAN

PROJECT FOR STUDY ON SMALL FARMING AND RURAL DEVELOPMENT PLAN FOR POVERTY REDUCTION IN SOUTH KHORASSAN

FINAL REPORT

MARCH 2013

JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)
NTC INTERNATIONAL CO., LTD.
CTI ENGINEERING
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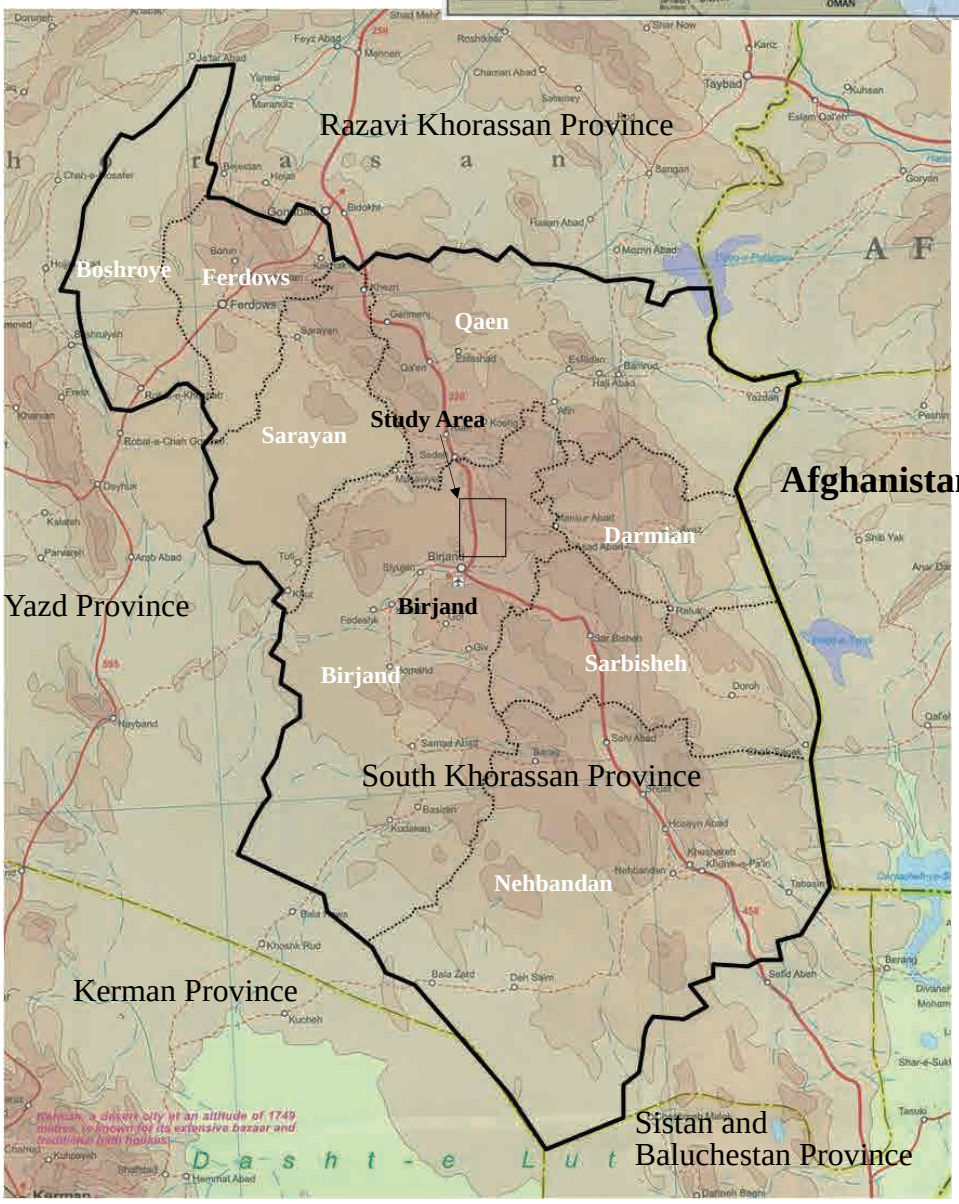
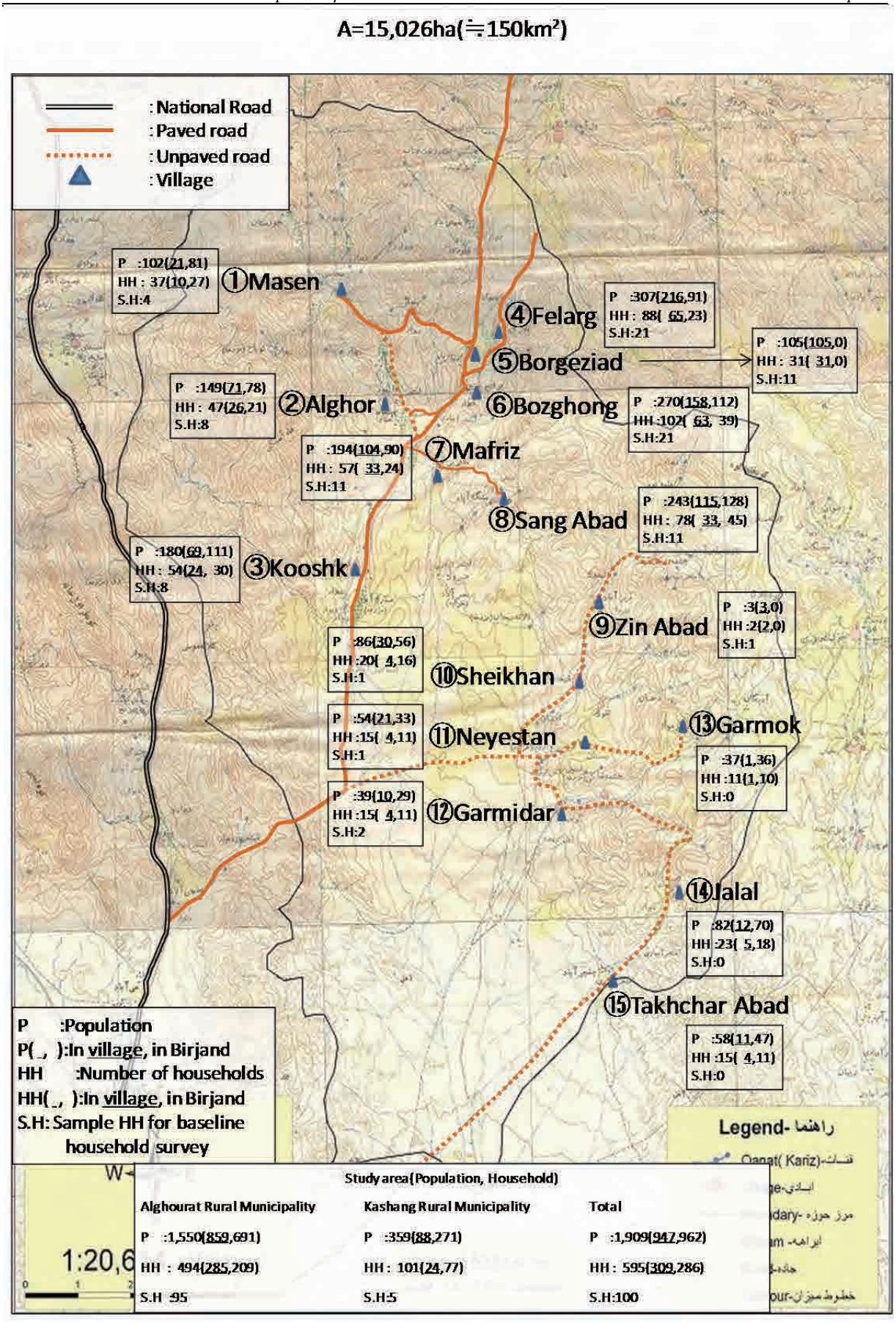
Map of Iran



Map of Study Area (South Khorassan Province)



Map of Villages

Photo Gallery

1. Characteristics of the Study Area

Alghourat Rural Municipality
(Felarg village [front] and Borgeziad village [back])

Kahshang Rural Municipality
(Jalal village)

Agricultural field
(Alghor village)

Qanat pond
(Neysetan village)

Vertical shaft of qanat

Qanat exit

2. Current Irrigation Methods

Water allocation 1

Water allocation 2

Division gate

Basin irrigation

Parallel canals

3. Specialty Products of the Study Area

Harvest of barberries

Indoor drying of barberries

Machine for cleaning up barberries

Final cleanup of barberries by hands

Cleanup of jujube

Barberries and jujube sold in a dried products shop

4. Trial of Water Saving Irrigation

Water tank installed by the owner of the field
(V=7～8m^3)

Water distribution tank for drip irrigation test
(V=6m^3)

Drip pipelines for barberries

Tensiometers installed for barberries

Sampling for soil moisture content test

Intake rate measuring test

5. Pilot Project for Improvement of Agriculture and Livestock Techniques

Net-house

Cultivation of tomato

Vinyl tunnel cultivation in winter (clockwise from left-back, spinach, lettuce, basil, and leek)

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Chickens one month after hatching

6. Pilot Project of Distribution and Marketing

Market survey in retail shop in Birjand

Market survey outside the Province (Zahedan)

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Training on processing lavashak 2

Practice on packaging

Packaged products

Wednesday market in Birjand, crowded by shoppers

Trial sales in Wednesday market

7. Pilot Project of Income Source Diversification and Livelihood Improvement Activities

Training on managing account book for rural women's fund

Visit by MOJA's Deputy of Rural Women Affairs Bureau

Training on cloth weaving

Produced towels

Practice on bee keeping

Honey extraction

Practice on sewing

Produced blouse

Oyster mushroom cultivation

Harvested oyster mushroom

Executive Summary

1. Introduction

(1) Background of the Study

In Iran, migration of population from rural to urban areas, caused by a significant economic gap between these two areas, has been a national-level problem. It is especially the case in South Khorassan Province, located in the eastern part of the country and newly established in 2004 by the administrative division of former Khorassan Province into three parts. In this Province, the rural area has been exhausted, because of stagnating agriculture due to long-lasting drought and decline in traditional home manufacturing such as carpet weaving, while opportunities to earn non-agricultural income are very limited. These factors have led an ongoing outflow of rural population into urban areas, and resulting depopulation and high-aging in the rural area. In rural areas, household economy used to largely rely on low-price commodities subsidized by the government and different types of supports from charity organizations (while, since 2011, direct cash transfer through the government subsidies reform has been an important source of income for rural households). Such situations have been observed not only in South Khorassan Province but across the country. To prevent a further concentration of population in the urban areas and alleviate the burden on the government for taking a variety of measures to reducing poverty, it is essential to increase income of small-scale farmers, who are the great majority of rural residents.

Facing such a situation, the Government of Iran requested the Government of Japan to undertake a "study-type technical cooperation for rural development planning," to assist South Khorassan Province in formulating, towards solving the above-described problems, a development plan to reduce the economic gap between urban and rural areas and contribute to improvement of the poverty among small-scale farmers. In response to this request, Japan International Cooperation Agency (JICA) carried out a detailed study on project preparation in November 2009, broadly agreed with the Government of Iran on the objectives of the cooperation, its contents, and inputs necessary for implementation of the Study, and signed on the Minutes of Meeting (M/M) with Jihad-e-Agriculture Organization (JAO) of South Khorassan Province. In March 2010, JICA concluded the Scope of Work (S/W) with JAO.

(2) Objectives of the Study

- Formulate a Master Plan for sustainable livelihoods improvement of small-scale farmers in the targeted area after the verification in pilot projects with farmers' participation; and
- Carry out capacity development of counterpart personnel and relevant organizations, through formulation of the Master Plan and implementation of the pilot projects.

(3) Study Area

The Study covered about 15,026 ha of Alghourat-Takhchar Abad area (Markooh watershed basin) of Birjand Township in South Khorassan Province.

(4) Schedule of the Study

The Study was composed of a baseline survey and two phases and implemented for about 34 months, commencing from June 2010 and ending in March 2013:

- Baseline Survey: June 2010 to September 2010
- Phase I: October 2010 to December 2010 (Conceptualizing a draft Master Plan)
- Phase II: June 2011 to March 2013 (Implementing pilot projects and finalizing the Master Plan)

(5) Counterpart Organizations

Ministry of Jihad-e-Agriculture (hereinafter referred to as "MOJA") and JAO of South Khorassan Province were the counterpart agencies (hereafter C/P) to the Study Team.

2. Outline of Agriculture and Policy of Iran

(1) Outline of Agriculture

Agriculture is a key sector in the economy of Iran. In 2007, it accounted for 13.9% of the GDP. The share of agriculture in total employment was 22% in 2005. According to the Iran's Central Bank, this sector shared 20% of Iran's non-oil export in 2004. The major export items were pistachio (US$ 823 million), raisins (US$ 108 million), and saffron (US$ 97 million) in 2005.

The country covers a total area of about 165 million km^2 (about 4.4 times bigger than Japan). In 2007, about 13 million ha (about 8% of the land area) were cultivated. Of this area, 10 million ha consisted of annual crops and 2.6 million ha of perennial crops.

By far the most important irrigated crop is wheat (almost 40% of the total irrigated area), followed by fodder (15%), barley (9.4%), rice (9%), and vegetables (7.5%). Wheat is also the most important rainfed crop. In 2007, around 43% of the area under wheat cultivation was irrigated and the 57% was rainfed.

Annual rainfall in Iran ranges from less than 50 mm in the desert area to 2,275 mm in Rasht (capital city of Gilan Province) located near to the Caspian Sea. The average annual rainfall of the country is 228 mm and approximately 90% land area of the country is arid or semi-arid. The major constraint, therefore, is the availability of water for agriculture development.

(2) Overview of National Agricultural Policy

The Five-Year National Economic, Social and Cultural Development Plan is a part of "Vision 2025" and guides the agriculture sector of Iran. Currently, the fifth five-year plan is implemented for the period of 2010-2014.

Main goals of agricultural sector in the Fifth Five-Year Development Plan are as follows:

- Growth of agricultural value added;
- Increasing productivity of production factors (total, manpower, capital) in economic growth;
- Increasing the self-sufficiency rate;
- Increasing crop water productivity per cubic meter;
- Increasing the production of agricultural products;
- Self-sufficiency and sustainable production of staple crops;
- Improving the living standards of the rural and tribal population;
- Retention and expansion of job opportunities in agriculture.

3. Outline of the Study Area

(1) Overview of Economy of the Study Area

In the Study area as well as neighboring areas in South Khorassan Province, villages are formed around small- to medium-scale qanats. Major economic activities have included traditional agriculture, practiced in the valley using qanats as its water source, and carpet weaving at the household level. However, water discharge of qanats has been significantly declining, due to effects of continuous drought in recent years and also because some of qanats have become old and abandoned. Valuable agricultural lands have been continuously damaged by flood, caused by the desolation of

vegetation in the watershed. These factors have significantly undermined agriculture in the area. In addition, carpet industry was in decline in 1980s. Many farmers who lost their income source migrated to cities.

Under such a situation, the Study area is now evaluated as among the poorest areas in Iran. Characteristics of the Study area are presented below.

(2) Specification of the Study Area

- Area: 15,026 ha (Alghourat-Takhchar Abad area)
- Number of villages: 15
- Population: 1,909 (living in the village: 947; living outside the village: 962)
- Number of households: 595 (living in the village: 309; living outside the village: 286)
- Income source: agriculture, household-level industry related to agriculture, wage labor, and financial support from Government and/or other associations

(a) Meteorology

The meteorological data observed in Birjand show that average annual rainfall is 158 mm in the rainy season beginning in November and ending in April, and 10 mm in the dry season beginning in May and ending in October. Relative humidity ranges from 20 % to 30% in the dry season.

(b) Population

The population of South Khorassan Province and Birjand city are both in an increasing trend:

Table 1. Change in Population of South Khorassan Province and Birjand City

Year / Location	1976	1986	1996	2006	2012
Province	274,016	508,070	535,481	636,420	705,901
Birjand City	46,943	81,798	127,608	166,138	194,636

The average rate of annual population increase of Birjand city between 1996 and 2006 was 2.7%, while that of South Khorassan Province was 1.7%. In 2006, 26% of the population of South Khorassan Province lived in Birjand city. Considering the situation of development of Birjand city in recent years, it is expected that the increasing trend of its population will continue.

According to the Population Census, the population living in the Study area in 2006 was 977. According to the result of the baseline survey conducted in 2010, the registered population of the Study Area was 1,909, of which 947 lived in the villages. It is found that the population changes depending on the seasons: the minimum level of population in the village in a year is recorded during winter (January to March), whereas during summer (July to September), the population level is maximum.

(c) Size of Households

Among the families selected for the household survey, the minimum size of household is 1 person while the maximum size of it is 14 persons. The average family size is 3.93 persons, while the most frequent family size is 2 persons. But, as mentioned above that many family members live in Birjand or other cities, the number of family members who actually live in the village may be less than these figures.

(d) Income and Expenditure among Farmers

Average farm household income in the Study area (29,244 thousand Rls/year, in 2009) is only about 57% of average income in the urban areas of South Khorassan Province (51,160 thousand

Rls/year, in 2007). Also, compared to the rural area of the whole country or that of South Khorassan Province, the share of agriculture in the total income is higher in the Study area, reaching 42%. Expenditure in the Study area is characterized by its high Engel's coefficient (55%) (Refer to Chap. 4, Table 4.8).

According to JAO, the legal minimum wage of Iran in 2009 was 31,560 thousand Rls/year (or 2,630 thousand Rls/month). Therefore, the average annual income of the Study area was about 7% lower than the legal minimum wage. Moreover, in the Study area, many households with low income and few households with high income coexist.

Barberry is produced by almost all the households practicing agriculture, while jujube is produced by 77% of them. These are the major agricultural products accounting for 81% of agricultural income in total. On the other hand, only about one-fourth of the households earn income from livestock. In the Study area, opportunities to earn non-agricultural income are very limited. Among the 96 households interviewed in the household survey, 75 earned non-agricultural income, of which only 48 were engaged in paid work or other business activities (the non-agricultural income of the remaining 28 households consisted of supports from aid organizations). More than one-third of these 48 households earned income by working in construction, in and outside the Study area. In addition, through the ongoing governmental subsidies reform, since December 2010, Iranian citizens have been receiving a cash transfer of 455 thousand Rls per capita per month. This amounts to 21,840 thousand Rls a year, for a family of four members, which is the average household size in the Study area. A household survey conducted in 2012 found that the cash transfer accounted for on average 41% of the household's annual income. Therefore, this cash transfer has become a significantly important income source for the farmers in the Study area.

(e) Land Ownership

According to the household survey, 79 households used agricultural land, and its mean area was 1.45 ha, while the median was 0.40 ha (Refer to Chap. 4, Table 4.17).

While small-scale farmers with a planted area of less than 1 ha account for about 60% of the 79 households, their total planted area accounts for only 11% of the total planted area of the 79 households. In the whole South Khorassan Province, 42% of farmers own land of less than 1 ha. This indicates that the ratio of small-scale farmers is high in the Study area. (Refer to Chap. 4, Table 4.18)

(f) Agricultural Land Use

According to the estimation using Google Earth, the total agricultural land area of the 15 villages was estimated to be 178 ha, of which 73 ha for barberries, 44 ha for orchards and 61 ha for upland crops. (Refer to Chap. 4, Table 4.19) The villages with a large area of barberry cultivation were Felarg, Jalal and Bozghong, the villages with a large area of orchard cultivation were Kooshk and Felarg, and the villages with a large area of upland crop cultivation were Kooshk, Felarg and Alghor.

(g) Farm Management Strategies

Facing the continuing drought and increase in the living costs, farmers have been turning their farm management strategies from focusing on food crops for self-consumption, such as wheat and barley, to focusing more on cash crops such as barberries and jujube. In other words, to adapt to the recent year's changes in natural, social and economical environments, while farmers (mainly men) have been increasingly engaged in non-agricultural jobs, at the same time they have been putting more importance on barberries and jujube, crops that are high in land productivity, have high drought tolerance, and are able to be managed by extensive farming. Especially, the planted area of barberries has been in an increase, although at a slow pace, as this crop is easily increased or renewed by farmers themselves with their technical level.

In summary, the Study area is characterized by: (1) outflow of population to urban areas, because of stagnating agriculture due to the drought and decline in traditional carpet weaving; (2) low income (about 57% of the average income in the urban areas of South Khorassan Province); (3) high ratio of agricultural income in the total income of agricultural households (about 40%); (4) high dependency of agricultural income on the major crops (barberry and jujube); (5) small-scale farm management (average 1.45ha/household); and (6) increasing involvement in economic activities other than agriculture.

The present Study targets small-scale farmers who are "poor in arid areas" and aims to prescribe measures to improve the situation as a Master Plan. Arid rural areas make up most of Iran. And it is considered that much of the above-described economic situations in the Study area are common situations that small-scale farmers living in arid rural areas of the country are generally facing. Therefore, the problem of "poverty in arid areas" is a problem of rural areas nationwide. From such a perspective, based on the circumstances in which small-scale farmers in the Study area live, more general characteristics of "poverty in arid areas" are extracted below. Through it, it will be clarified that the Master Plan proposed by the present Study can contribute to the improvement of livelihoods of small-scale farmers in rural areas across the country that are similar to the Study area.

4. Poverty in the Arid Area

(1) Three Constraints Typical to Arid Poor Areas

In today's world, the rural area is rarely superior to the urban area in terms of economy, and it is common to find more low-income people in the rural area than in the urban area. Iran is not an exception: as shown in Table 4.8 in Chapter 4, the ratio of average per-household income in the rural area to average per-household income in the urban area is 55% in the whole country and 48% in South Khorassan Province. This means that a significant economic disparity exists between the urban and rural areas. Therefore, "poverty in the arid area" can be interpreted as "poverty in the arid *rural* area." Small-scale farmers in this "poverty in the arid rural area" are facing three major constraints, namely water, land, and labor.

(1) Constraints with Regard to Water Resource:

The Study area entirely depends on qanat for water for agriculture. Small-scale farmers generally have limited access to water sources other than those having public characteristics, such as qanats and springs. The recent years' reduction in qanat discharge is becoming a question of life or death in areas that highly depend on qanats while not having alternative water sources, such as the Study area. Thus, small-scale farmers are most affected by the drought and diminishing discharge of qanats.

(2) Constraints with Regard to Land

In 2010, in the Study area, 63% of farmers are estimated to be cultivating 1 ha or less of land. Moreover, in mountainous areas like the Study area, significant expansion of agricultural land cannot be expected in the future. It is not possible for such small-scale farmers facing the land constraint to sustain their livelihoods only by agriculture. Therefore, engaging in non-agriculture jobs is indispensable.

(3) Constraints with Regard to Labor Force

The rate of population increase in Birjand city has been higher than the rate of population increase in the whole province for the last several decades; and during the same period, the population of the Study area continuously declined. Also, according to the results of the household survey implemented in the Study area, population aging between 30 and 60, who are supposed to contribute the most to the area's economy, accounts for only about 28% of the whole population. In addition, the average number of household members is as low as 3.9. These indicate that the constraint with regard to labor force exists both at the whole Study area's level

and at the household level.

In addition to the above-described constraints, there are cases in which limited employment opportunities, as observed in the Study area, is one of the reasons creating economic gap between urban and rural areas. The surveys have found out that in the Study area, the most common employment opportunities are to work as unstable and seasonal agricultural or construction laborers. It has been also found out that the income from these employment opportunities is quite lower than the income obtained from employment in the educational or public sectors, in which a part of the population in the Study area is engaged.

(2) Towards Poverty Alleviation

From these discussions, it is clear that both agricultural and non-agricultural incomes should be increased to alleviate the poverty in the arid rural area.

Increase in agricultural income is generally realized through: (1) improvement in productivity; (2) expansion of planted area; and (3) increase in selling price. As for (1) improvement in productivity, it would be achievable in the Study area, although long-term research and extension activities are required with regard to crop varieties and cultivation methods. As for (2) expansion of planted area, it has been just mentioned above that increase in area is difficult in the Study area. However, although it is difficult to expand the agricultural land per-se, it would be possible to increase the planted area, by improving the irrigation methods to save water, which would allow to convey water to the lands that are not currently cultivated due to lack of water. Finally, as for (3) increase in selling price, there is a potential to achieve higher selling prices of existing products, through processing and better marketing these products, thus increasing their value added.

For increasing non-agricultural income, new income sources should replace or be added to the current unstable and low-income employment opportunities.

Considering the constraints with regard to labor force, it is necessary to address these challenges in a way that encourages involvement of elders, youngsters, and women who are not currently participating in economic activities.

The Master Plan of the present Study proposes development strategies and concrete projects that take these issues into consideration.

5. Master Plan

(1) Introduction

A draft Master Plan was formulated through the SWOT analysis, based on the analysis of the current situations of the area and analysis of needs of the residents, and discussion with C/Ps, etc. It was modified and finalized through implementation of the PPs with participation of the residents and analysis of the results and the lessons learned (Refer to Chap. 7 for the detail).

(2) Objectives and Target Area

The Master Plan presents the measures of agriculture and rural supports for livelihood improvement of small-scale farmers in the Alghourat-Takhchar Abad area (15,026 ha) of Birjand Township in South Khorassan Province. In addition, it is noted that the contents of the Master Plan will be applicable in other areas of the Province.

(3) Duration of the Master Plan

The Master Plan consists of program strategies, which show mid-term development directions, and five-year plans (projects), which are implemented early based on the program strategies.

(4) Framework of Master Plan

Framework of the Master Plan is composed of, the vision which indicates a picture (goal) in the area after the implementation of the Master Plan, the necessary basic concepts (approaches) to realize the vision, necessary programs to achieve the basic concepts, and necessary projects based on the program strategies.

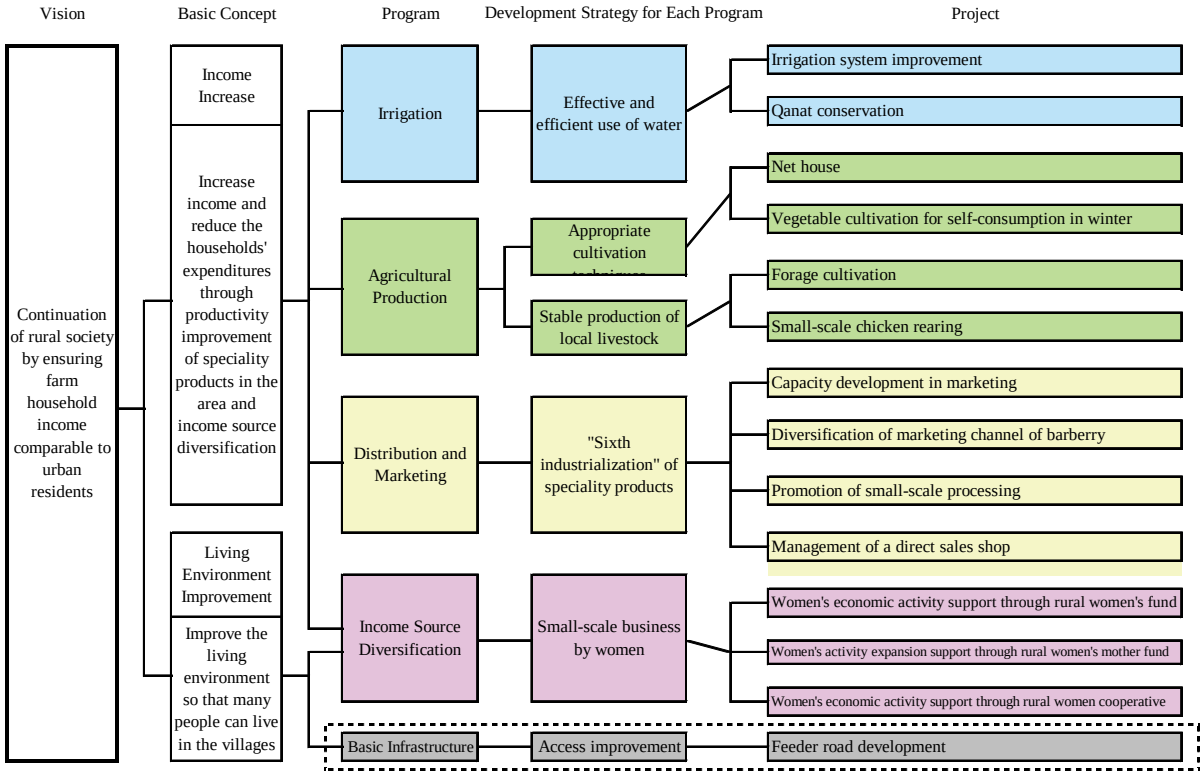

Figure 1. Framework of Master Plan

(5) Vision and Basic Concepts

Farmers in the Study area are mainly small-scale farmers. Furthermore, increase in part time farmers, aging of residents and younger generation's leaving from agriculture have been observed. Therefore, the measures to reduce the outflow of the residents need to be urgently implemented. The outflow of residents is a social phenomenon originated from social and economical gap between urban and rural areas. The Master Plan is positioned as a model of measures to reducing the gap between urban and rural areas.

To maintain the rural life in the future, despite the continuing drought and decrease in qanat water, and to keep the role of the area as production area of the specialty products, such as barberries and jujube, vision of the Master Plan is set as:

Continuation of rural society by ensuring farm household income comparable to urban residents

To achieve the above vision, the basic concepts below are set.

- Income is increased by improvement of productivity of specialty products in the area and diversification of income sources.
- Living condition of the residents is improved and many people can live in the villages at ease.

(6) Programs

Program for Irrigation System Improvement

This program aims to stabilize and improve the productivity of agriculture in the area, through establishing an irrigated agriculture that uses water effectively and efficiently, introducing a water-saving and small-scale irrigation system that is suitable for the area's limited water resource and geographic conditions. In addition, another project aims to reinforce maintenance and conservation of qanats, which is water source for agriculture and livelihoods in the area.

Barberry is well known all over the country as the principal products of the area. This product is highly marketable at the domestic market, and the productivity per unit area and per unit of water is high. Therefore, the cultivation of barberry shall be continued as a main cash crop of the area, and the cultivation area shall be partly increased by the introduction of water saving irrigation and crop conversion.

Program for Crop and Livestock Productivity Improvement

This program aims at improving the productivity and expanding the production of food crops for self-consumption, to reduce the Engel's coefficient of the households, and at the same time improving the household's income, through diversifying the source of agricultural income. These will be done in ways suitable for the situations of the Study area, where there are constraints in water, land, and labor. The program also aims at improving the living conditions of residents, through consumption of vegetables and animal proteins that they will produce.

Program for Distribution and Marketing Improvement

This program aims at diversification of sales channels of products, led by farmers themselves, replacing the current style of sales depending on brokers. First, it tries to develop farmers' capacity on conducting market survey and understanding of market needs, as a basis for developing commodities and improving sales methods. Second, it tries to increase value-added and improve agricultural income, through different activities from production, processing, distribution and sales of specialty products, based on the needs understood in the market survey.

Program for Income Source Diversification

This program aims to diversify income source, through supporting women's small-scale economic activities. Since women are not as socially mobilized as men, many stay in the rural area. Also, women do not have as much economic power and educational opportunities as men do. Therefore, for the development of rural areas, it would be effective to draw a strategy for supporting women. And it is important that women's capacity be developed through this process. Hence, for diversifying income sources, the program supports small-scale economic activities by women, increasing opportunities for them to improve their techniques.

Program for Basic Infrastructure

This program aims at developing access roads to the villages in Kahshang area, as in the Study area, these roads are not yet paved.

(7) Implementation Plan

Master Plan will be implemented for five years from 2013 to 2017 (Refer to Chap. 5, Table 5.44).

(8) Project Cost

The total cost for implementing the Master Plan is estimated as 34,622,865 thousand Rls, for five years. The Project for feeder road development accounts for 68% of the total cost.

(9) Expected Outcomes

The implementation of the Master Plan is expected to bring various outcomes with regard to its basic concepts of income increase and improvement of living environment, as well as secondary outcomes such as strengthened relationship between JAO and the residents in the Study area and alleviated burden of agricultural works (Refer to Chap. 5, Table 5.46).

(10) Impacts on Economy of the Study Area

Results of analysis indicate that, for each project, except for the project for capacity development in marketing, farmers' benefits will exceed farmers' costs, for a total of ten years (Refer to Chap. 5, Table 5.48). This means that projects are attractive for farmers to invest. Similarly, the total farmers' net benefits will exceed the total government payment, for the same period. In other words, the net benefits (benefits minus costs) that farmers will receive from participating in the projects will be more than the expenditures that the government will have to make for implementing the projects. This means that the projects are attractive for the government to invest, as a measure to support the rural area.

As mentioned above, through the subsidy policy reform that began during the Study period, every Iranian citizen is currently receiving 455 thousand Rls/month, which has become an important source of income for agricultural households in the Study area. In general, while direct cash transfer from the government to farmers generates short-term effects, the government is required to secure the budget for this support every year, as long as the government wants to continue it. On the other hand, the rural support through implementation of the projects accompany not only economical benefit but also a variety of side-effects, such as capacity development of small-scale farmers through technical trainings, development of infrastructures, and reinforcement of local organizations. Therefore, the rural support through implementation of the projects is expected to produce medium- to long-term effects, and lead to reduction in the government expenditures in the future. Therefore, it is considered that, if the Master Plan is implemented, surely in the Study area, but also in other areas of the Province, or even in other provinces, it will contribute to a long-term development of the target areas and alleviation of the burden on the government for taking a variety of measures to reducing poverty.

(11) Impacts on Economy of Small-scale Agricultural Households

Annual incomes of the model agricultural household after implementing different combinations of the projects in the Master Plan were estimated. If the model agricultural household will participate in all the projects, the annual income of the household would reach 91,540 thousand Rls, which are at the same level as the annual income in the urban area. Even in case of more realistic combinations of the projects (Chap. 5, Table 5.55), the annual income will exceed 80,000 thousand Rls. Thus, it can be concluded that the annual income of an average household in the Study area can increase up to the level of annual income in the urban area through the proposed Master Plan. However, the situations that households in the Study area face are not homogenous. When implementing the Master Plan, it is important to carefully explain the projects to the participating households, in terms of technical and economic aspects, and assist the participants to select a tailor-made combination of the projects that are suitable to the situation of each household.

Moreover, it is necessary to pay attention to different types of risks that are out of farmers' control but could undermine the effects of the projects, such as further decline in water discharge of qanats due to lasting droughts, pests and diseases outbreaks, and increase in input prices. Analyses found out that effects of some of the proposed projects will be negatively impacted to a large extent, if

the costs go up due to reasons such as increase in prices of equipment and materials or the benefits go down due to reasons such as decrease in selling prices (Refer to Chap. 5 for the detail). Therefore, when implementing the Master Plan, it would be needed to closely monitor the possibilities for the above-mentioned risks to become real, as well as their significance if they are to become real.

6. Toward Practical Use of the Master Plan in Similar Areas

The Master Plan proposed in this report was formulated for the Alghourat-Takhchar Abad area, but it was prepared so that it can be applicable to similar areas in South Khorassan Province.

The Master Plan consists of four main programs (irrigation, agricultural production, distribution and marketing, and income source diversification), and a number of small-scale projects are designed under umbrella of each program. Implementation of multiple numbers of these small-scale projects is expected to yield synergistic effects, although the projects can also be implemented individually. For diffusion and extension of the four main programs of the Master Plan, it is desirable to provide supports having a future concept, as presented in the Figure below, especially with regard to a series of activities from production to processing and sales (sixth industrialization).

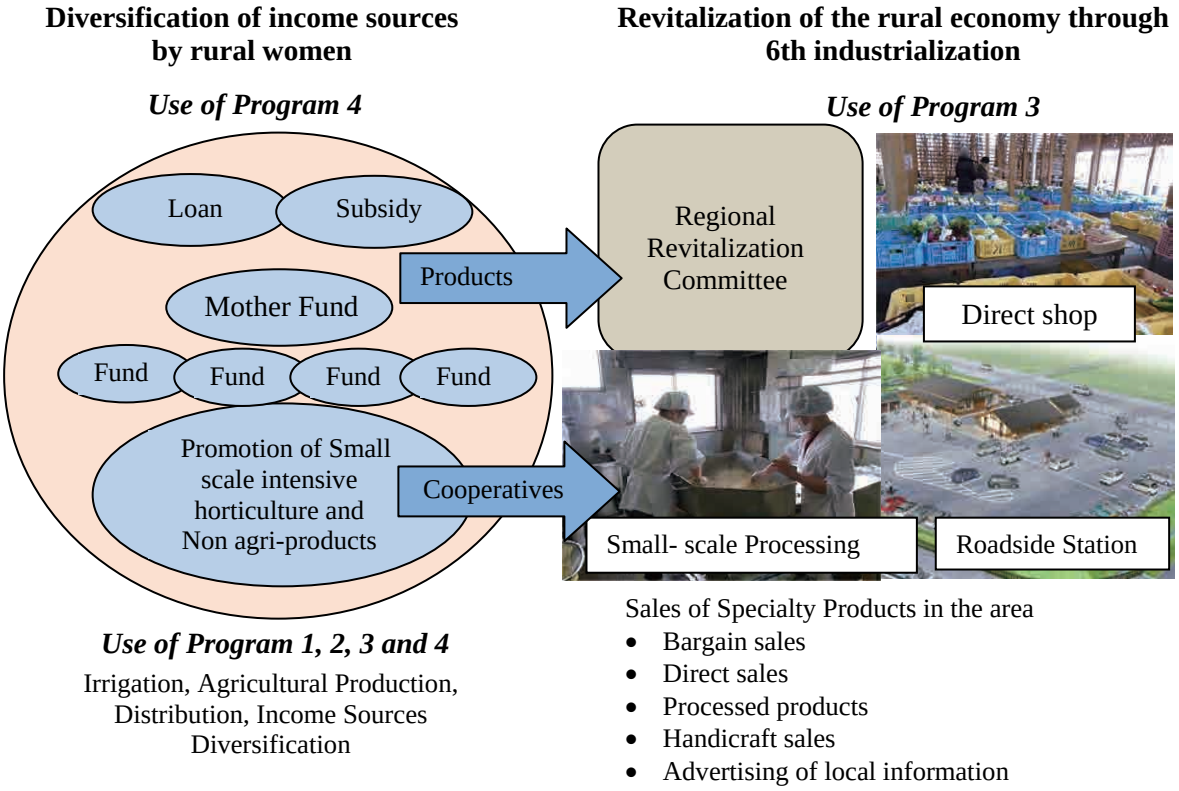

Figure 2. Future Concept for the Diffusion and Extension of the Master Plan

7. Implementation of the Pilot Project

(1) Objectives

Objectives of implementing PPs were to contribute to finalization of the Master Plan, by verifying the validity and effectiveness of a part of the proposed projects in the draft Master Plan as measures for poverty reduction, and extracting lessons learned for project implementation in the future, both in the Study area and other areas in the Province.

(2) Overview of PP Implementation

The PPs were implemented by sub-contracting with local organizations, so that the periods of Study team's absence would be covered. Management and monitoring were done in collaboration with Study team and concerned personnel of JAO, including C/Ps. Both parties made efforts to share with each other knowledge and information, such as methodologies for project implementation and technical expertise. The PPs were carried out from September 2011 to January 2012 and from June 2012 to October 2012. Main activities of the PPs were as follows (Refer to Chap. 7 for the detail):

Table 2. Main Activities of Pilot Projects

Name of pilot project	Target	Main activities
1. Pilot Project for improvement of agriculture and livestock techniques	Farmers	Verification of water saving efficiency
		Improvement of vegetable cultivation techniques
		Improvement of forage production
		Extension of small livestock rearing
2. Pilot Project of distribution and marketing (fruits)	Farmers	Participatory market survey
		Trial making of commodities
		Seminar for sale promotion activities
		Seminar for fruit cultivation techniques
3. Pilot Project of income source diversification and livelihood improvement activities	Rural Women	Seminar for organization
		Extension of mushroom cultivation
		Extension of handicraft production activity
		Extension of packaging techniques for agricultural products

(3) Items Verified through the PPs, Results, and Feedback to the Master Plan

Items verified through each PP, its results, and feedback to the Master Plan are summarized below (Refer to Chap. 7 for the detail).

Trial of Water Saving Irrigation

In the Study area, cash crops such as barberries and jujube are grown in small fields on the mountain slopes. Basin irrigation with a 12 days interval is applied to almost all of these fields. Considering the ongoing decrease in discharge of qanat water, this PP examined methods for effective water-saving irrigation.

The results of the irrigation trial indicate, among others, that: (1) several models of water-saving irrigation system can be applied in the Study area, according to the location of the water source and the field; (2) among such models, low-cost drip irrigation system, using only gravity pressure, is in the highest priority; and (3) with introduction of drip irrigation, water-saving irrigation with an interval of four to seven days can be applied to barberry. These results contributed to the formulation of plan for introducing water-saving irrigation, in Program for irrigation system improvement in the Master Plan.

Pilot Project for Improvement of Agriculture and Livestock Techniques

In the Study area, while barberries and jujube are the major agricultural products, growing vegetables or raising livestock is stagnating, and residents are buying these agricultural products to consume. Therefore, the ratio of food expenses in the household budgets is high. Under such a situation, this PP examined if income can be increased and food expenses can be reduced, by improving cultivation techniques, including introduction of simple facilities, and promoting raising small livestock animals.

The results of the PP indicate, among others, that: (1) net-house cultivation and small-scale chicken raising do not require complicated techniques, and therefore can be practiced by elders and women. These activities can contribute to create jobs in the rural area, increase income, and secure a source of good quality protein; (2) vegetable cultivation in net-house is highly effective for saving

water, with an expected high yield; (3) it is needed to continuously enlighten farmers on the importance of saving water; (4) in winter, when the climate is unfriendly for vegetables to grow, it is recommendable to use a simple small-scale non-heating vinyl house, which has a high heat-retaining property; (5) it is necessary to select agricultural techniques that can easily be practiced by small-scale farmers, including women and elders; and (6) women are highly interested in growing fresh vegetables, including herbs, inside the house during winter. These results contributed to determine the details of activities and inputs for each project, in Program for crop and livestock productivity improvement.

Pilot Project for Distribution and Marketing

In the Study area, specialty products such as barberries and jujube are almost exclusively sold to brokers. They are mostly price-makers, while farmers are price-takers. Under such a situation, it was considered to be desirable to diversify the sales channel. This PP examined its potential, by trying packaging, processing, and selling agricultural products to retailers in and outside the Province as well as in the Wednesday market.

Trying to sell products by themselves for the first time, participating farmers understood the importance of capturing customers' needs for a successful sales activities and also importance of creating trust with retailers, if they want to sell products to them. They also understood that it is critical to improve sales techniques, including how to make their products look more attractive, and that selling to brokers is one of the good marketing channels, which is low-cost and labor-saving.

The results of the PP indicate, among others, that: (1) in the Wednesday market, farmers can sell their products by themselves at higher prices than prices at which they sell to brokers; (2) value-added of agricultural products can be increased, by processing low quality or unused materials in a workshop that meets hygiene standards; and (3) in case of selling to the retail shops, selling in bulk has more demand than that of simply packaged products. These results contributed to determine the details of activities and target sales volumes in each marketing channel, in Program for distribution and marketing improvement.

Pilot Project for Income Source Diversification and Livelihood Improvement

In the Study area, agriculture is mainly a part-time economic activity, where men are involved in other paid works. Women who stay in the villages mostly do not have opportunities for economic activities, other than supporting men in agriculture. Also, women's groups for economic activities do not exist. Under such a situation, this PP examined the potential for diversification of income source in the Study area, through women's economic activities, with rural women's fund as its introductory activity.

The results of the PP indicate, among others, that: (1) the rural women's fund is highly effective as an entry activity in villages not having experience of economic activities in group; (2) cloth weaving and beekeeping are priority activities; (3) sewing contributes to livelihood improvement at the household level; (4) women can be disappointed and lose their interests, if they fail at the beginning of activities. Therefore, a particular support at this stage should be considered; (5) women realized their individual growth through the group activities. In the Master Plan, group's growth should also be stimulated at the same time; and (6) women are very busy from September to October for barberry and jujube harvest. Therefore, activities should not be planned for this period. These results contributed to determine the details of activities, timing of implementation, and priority sub-projects, in Program for income source diversification.

8. Conclusions and Recommendations

Conclusions

(a) This Master Plan was formulated based on the basic concepts of "increasing the income by

improving the productivity in regional specialty products and diversifying income sources" and "improving the living environment for residents so that more people can live with peace of mind." When this Master Plan is implemented, it is expected that, depending on the combination of the projects, the income of small-scale farmers in the Study area increases up to the level of income of urban residents in South Khorassan Province. Moreover, it is expected that the Master Plan generates more than three times higher economic benefits to participating farmers than the government expenditure for its implementation. Currently, the governmental direct cash transfer through the ongoing subsidy policy reform is an important source of income for the agricultural households in the Study area, accounting for as much as 41% of their annual income. Under such a situation, it is expected that improvement of human, physical, and social capitals in the Study area through implementation of the Master Plan will lead, in the medium- to long-term, that participating farmers no longer need any assistance, thus contributing to reduction in the government expenditures. Therefore, the Master Plan is highly effective as a rural support measure.

(b) Outflow of population from rural to urban areas, caused by the economic gap between these two areas, and resulting high-aging and depopulation of rural areas that are currently ongoing, are urgent challenges to tackle, not only in South Khorassan Province but across the country. Moreover, the situations that the Study area is facing are likely to have many similarities to the general situations of arid rural areas in Iran. Therefore, although the Master Plan was formulated setting the limited area in Birjand Township of South Khorassan Province as a model, it can be widely applied in other areas of the Province and even in other provinces, and contribute to a long-term development of the target areas and alleviation of the burden on the government for taking a variety of measures to reducing poverty.

(c) However, it should be noted that the above-described effects of the Master Plan can be expected under conditions that there is no major change in external factors and the Master Plan is implemented as it was planned. There are various risks that could cause troubles in its implementation and thus prevent the full achievement of its positive effects, such as climate and natural disaster risks, biological and environmental risks, and market risks. For some of the proposed projects, their effects may be negatively impacted to a large extent, if the costs go up or the benefits go down, from their pre-estimated values in the plan. Therefore, it would be needed to closely monitor the possibilities for the above-mentioned risks to become real, as well as their significance if they are to become real.

(d) The Study area has barberry, jujube, honey and other items as specialty products. Looking more widely at South Khorassan Province, the list extends to saffron, pomegranate, apricot, pistachio, dates, sugar beet, cotton and a diverse range of other specialty products. In the Study area, in particular, although there are constraints on irrigation, fruits grown in the area are evaluated having high sugar contents. South Khorassan Province has the potential to enhance the added value of these types of agricultural products and fruits by processing, packaging and selling them.

(e) Farmers in the Study area and in South Khorassan Province have more non-agricultural income than agricultural income, most of them being involved in both farming and other jobs. The population is aging and young people are moving away from farming. Considering the labor constraints, to increase the farmers' incomes based on farming-related activities, it is important to promote fruit trees suitable for labor-saving management, such as barberries and jujube, and small-scale intensive horticulture (with introduction of simple skills) that can be performed by rural women, retired people, and elders. In particular, promoting small-scale economic activities by rural women, who have previously had little involvement in economic activities, is essential for future stability of the operation of small-scale farms.

(f) As water volumes in qanats tend to decline, it is necessary at the field level to raise the efficiency of water usage and practice water-saving irrigation as much as possible. To that end, JAO would need to continuously conduct extension activities so that farmers have incentives to introduce

water-saving irrigation. As examined in the Study, where there is enough slope, drip irrigation using natural pressure is appropriate to be introduced to save water, with a priority in orchard cultivation.

(g) The small-scale net house cultivation of vegetables implemented in the PP was observed to save approximately 50% of water volume, compared to the current system of 12 to 14 days of irrigation rotation. It was also demonstrated that a much increase in yield can be anticipated. The scale and nature of the facilities for net house cultivation can be varied, depending on whether the farmers intend to use them to boost their incomes or to cultivate for their own consumption. Moreover, it can be used in both mountainous and flat areas, as well as both in rural and urban areas.

(h) In the PP, sales by farmers at Wednesday markets, trial production of processed goods, marketing, and a market survey of potential for selling to retailers were conducted. The results clearly indicated the potential for enhancing the added value of agricultural products and diversifying sales channels. Therefore, the distribution and marketing program of the Master Plan aims to enhance the farming income "by extending the current specialty products into a sixth industrialization (combining through production - processing - distribution - sales) on the basis of customer needs."

(i) In areas that have no or little experience on group activities or economic activities by women, "rural women's fund" is extremely effective as an entry-level activity.

(j) The PP confirmed that the Study area has a high potential for small-scale household-level industries, such as weaving, small-scale poultry farming, and beekeeping by women. It also confirmed that such activities create jobs at the village level.

Recommendations

(a) This Master Plan shows measures to reduce the gap between urban and rural areas, through increasing farm household income and employment opportunities in the villages and regions, taking the Study area as a model. Reducing the gap between urban and rural areas is an issue which the Iranian Government considers as the most important. The several villages in the Study area have been already faced with a crisis of extinction. If the villages are left as they are with no actions taken, their extinctions will proceed, and national valuable social capitals, such as farm lands and qanats, will be abandoned. It would be a national loss. Therefore, it would be appropriate for MOJA to allocate budgets, reserved for reducing the gap between urban and rural areas, to the implementation of projects targeting rural areas, such as the Study area. As a part of such measures, MOJA is invited to implement the Master Plan without delay and establish a successful model for reducing the gap between urban and rural areas.

(b) As of October 2012, preparations were under way in the Study area for the "formation of a new women's cooperative" to continue and extend the PP activities implemented during the Study period, and the "construction of a direct sales shop or farmers' market," using the Japanese government's grassroots grant aid system. Such movements and continued PP activities could be advanced, together with the implementation of the Master Plan, so that the Master Plan achieves its expected outcomes and impacts. It is valid to promptly establish the JAO project office that the Master Plan proposes as its implementation organization, and at the same time to further strengthen the personnel. To put the Master Plan into effect on time, MOJA and JAO are invited to take budgetary and other necessary measures.

(c) In the rural area of South Khorassan Province, including the Study area, qanats are the most important infrastructure that forms the social and economic basis of the residents. While rehabilitation of qanats was out of scope of the Study, for the Master Plan to achieve its planned goals, qanats need to be appropriately maintained. Therefore, MOJA and JAO are invited to make

an effort to strengthen the administrative structure for qanat maintenance, based on the suggestions made in Project for qanat conservation, and take necessary budgetary measures for a series of activities from capacity development of concerned personnel to implementation of projects.

(d) The Master Plan aims to stabilize and improve incomes of small-scale farmers, who are the great majority of farmers in Iran, by employing little capital and using their limited land, water resources, and workforce. Although the Study selected the small study area as a model, the Master Plan presents measures for addressing issues existing throughout the country. Also, the Master Plan can be tailored in each program or as combinations of projects. Therefore, the same methods can be applied to the governmental support for rural areas in the whole country. Thus, it is recommended that the Master Plan be applied not only to the arid regions, such as the Study area, but also throughout the rural areas of Iran. In application of the Master Plan, both general and region-specific risks that may cause to decrease its effects need to be taken into careful consideration.

(e) Iran produces a wide range of agricultural products in its diverse regions, having four seasons and ranging from arid to rainy zones, and from flat to mountainous areas. The Study has indicated that increasing the added value of specialty products and extending farming to a “sixth industrialization” can be extremely effective measures for improving the livelihoods of small-scale farmers. It is recommended that MOJA develop, in the whole country or in specific provinces, a “One Village, One Product Movement,” focusing on local agricultural or specialty products. The “One Village, One Product Movement” contributes to developing agriculture-related industries, and not just production.

ISLAMIC REPUBLIC OF IRAN
PROJECT FOR STUDY ON SMALL FARMING AND RURAL DEVELOPMENT PLAN FOR POVERTY REDUCTION IN SOUTH KHORASSAN

FINAL REPORT

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APPENDIXES

List of Abbreviations

Abbreviation	Name
C/P	Counterpart Personnel
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
GPS	Global Positioning System
JAO	Jihad-e-Agriculture Organization
M/M	Minutes of Meeting
MP	Master Plan
MOJA	Ministry of Jihad-e-Agriculture
NGO	Non Governmental Organization
JICA	Japan International Cooperation Agency
OJT	On-the-Job Training
PP	Pilot Project
SC	Steering Committee
S/W	Scope of Work

Scales and measures are based on the metric system

Exchange Rates

1 USD = 91.04 JPY = 13,006 Rls (Iranian Rials)
(1 Rls = 0.007 JPY)
[Based on JICA's official exchange rates for February 2013]

Chapter 1 Introduction

1.1 Background of the Study

The Islamic Republic of Iran (hereafter referred as "Iran"), rich in natural resources including oil and natural gas, is in a good economic condition. Iran's gross domestic product (GDP) in 2007 was amounted to about US$ 283 billion, and GDP per capita was stood at about US$ 3,990.

However, the average annual income of rural households is about 60% of that of urban households. The Iran's Gini coefficient, which indicates the level of inequality of income distribution, is at a high level of 0.43. Hence, the income gap between small scale farmers and factory employees of oil-related sectors is a critical issue in Iran. The Fourth Five-Year Economic, Social and Cultural Development Plan of the Islamic Republic of Iran 2005-2009 emphasized on improving the standard of living and reducing poverty in rural areas so as to secure social equitability.

In South Khorassan Province, located in the eastern part of the country, the rural livelihood depends on agriculture, using water supplied by qanat. Due to frequent occurrence of drought from the year 2000 up to now, the small scale farmers' life has been unstable. Small land holding causes inefficient farm practices and the low level of farm technologies lead to low agricultural productivity. Since opportunities are limited for earning income from marketing or adding value to agricultural products or for being engaged in off-farm activities, the income level of South Khorassan Province is at the lowest among all provinces in Iran. In rural areas, household economy used to largely rely on low-price commodities subsidized by the government and different types of supports from charity organizations (while, since 2011, direct cash transfer through the government subsidies reform has been an important source of income for rural households).

In South Khorassan Province, an increasing number of farmers are practicing agriculture on a part-time basis or even quitting it, for obtaining non-agricultural income. This is causing an outflow of population from rural areas, resulting in depopulation and high-aging. Impacts of this phenomenon are not limited within the Province, but migrating people are beading to large cities, such as Tehran. This is creating a range of complicated challenges, including increase in the population at the poverty level in the urban area. In both Fourth and Fifth Five-Year Economic, Social and Cultural Development Plans, reducing the gap between the urban and rural areas, which is a cause of outflow of population from rural areas, has been raised as an urgent issue to tackle. This indicates that the issue of outflow of population from rural areas is not a problem limited to South Khorassan Province, but a national-level problem. Under these circumstances, to prevent a further concentration of population in the urban area and alleviate the burden on the government for taking a variety of measures to reducing poverty, it is essential to increase income of small-scale farmers, who are the great majority of rural residents.

Facing such a situation, the Government of Iran requested the Government of Japan to undertake a "study-type technical cooperation for rural development planning," to assist South Khorassan Province in formulating, towards solving the above-described problems, a development plan to reduce the economic gap between urban and rural areas and contribute to improvement of the poverty among small-scale farmers. In response to this request, Japan International Cooperation Agency (JICA) carried out a detailed study on project preparation in November 2009, broadly agreed with the Government of Iran on the objectives of the cooperation, its contents, and inputs necessary for implementation of the study, and signed on the Minutes of Meeting (M/M) with Jihad-e-Agriculture Organization (JAO) of South Khorassan Province. In March 2010, JICA concluded the Scope of Work (S/W) with JAO.

1.2 Objectives of the Study

According to the Minutes of Meeting and the Scope of Work (S/W) agreed upon between JAO and JICA, the objectives of the Study were as follows:

(a) Formulate a Master Plan for sustainable livelihoods improvement of small scale farmers in the targeted area after the verification in pilot projects with farmers' participation; and

(b) Carry out capacity development of counterpart personnel and relevant organizations, through formulation of the Master Plan and implementation of the pilot projects.

In addition, there are depopulation and aging of the residence through the outflow of the population in the Study area. Since the problems such as depopulation and aging exist in various places in Iran, the problem are national issues. Although the Study area is a small area in South Khorassan Province, the Study area is taken as a model and the countermeasures to solve the problems are considered and mentioned in the Master Plan.

1.3 Study Area

The Study covered about 15,026 ha of Alghourat-Takhchar Abad area (Markooh watershed basin) of Birjand Township in South Khorassan Province.

1.4 Schedule of the Study

The Study was composed of a baseline survey and two phases and implemented for about 34 months, commencing from June 2010 and ending in March 2013:

Baseline Survey: June 2010 to September 2010

Phase I: October 2010 to December 2010 (Conceptualizing a draft Master Plan)

Phase II: June 2011 to March 2013 (Implementing pilot projects and finalizing the Master Plan)

1.5 Counterpart Organizations and Steering Committee

Ministry of Jihad-e-Agriculture (hereinafter referred to as "MOJA") and JAO of South Khorassan Province were the counterpart agencies (hereafter C/P) to the Study Team. A Steering Committee (hereafter SC) was formulated, with representatives of Bureau of Specialized Organization & Economic and International Cooperation of MOJA and JAO of South Khorassan Province as its leading members.

Chapter 2 The General Agricultural Situation and Policy in Iran

2.1 The General Agricultural Situation in Iran

Agriculture is a key sector in the economy of Iran. In 2007, it accounted for 13.9% of the GDP. The share of agriculture in total employment was 22% in 2005. According to the Iran's Central Bank, this sector shared 20% of Iran's non-oil export in 2004. The major export items were pistachio (US$ 823 million), raisins (US$ 108 million), and saffron (US$ 97 million) in 2005.

The country covers a total area of about 165 million km^2 (about 4.4 times bigger than Japan). In 2007, about 13 million ha (about 8% of the land area) were cultivated. Of this area, 10 million ha consisted of annual crops and 2.6 million ha of perennial crops.

By far the most important irrigated crop is wheat (almost 40% of the total irrigated area), followed by fodder (15%), barley (9.4%), rice (9%), and vegetables (7.5%). Wheat is also the most important rainfed crop. In 2007, around 43% of the area under wheat cultivation was irrigated and the 57% was rainfed.

Annual rainfall in Iran ranges from less than 50 mm in the desert area to 2,275 mm in Rasht (capital city of Gilan Province) located near to the Caspian Sea. The average annual rainfall of the country is 228 mm and approximately 90% land area of the country is arid or semi-arid. The major constraint, therefore, is the availability of water for agriculture development.

The wide range of climatic diversity in the country, along with irrigation, make it possible to cultivate a diverse variety of crops, including cereals (wheat, barley, rice and maize (corn)), fruits (dates, figs, pomegranates, melons and grapes), vegetables, cotton, sugar beets and sugarcane, pistachios, nuts, olives, spices e.g. saffron, raisin, tea, tobacco, barberries and medicinal herbs. Thanks to the diverse natural conditions, Iranian agriculture produces many specialty products in the world market as showing in Table 2.1.

Table 2.1 World Rankings of Iranian Agricultural Products

World ranking	Commodity
1st	Pistachio, Barberry (Zereshk), Saffron, Stone fruits, Berries
2nd	Dates, Apricots
3rd	Watermelons, Cherry, Apple, Fig, Gherkin
4th	Almond, Walnuts

Note: Underlined are specialty products in South Khorassan Province.
Source: FAO

On average, about 30% of the gross value of agricultural production is attributed to livestock production, which provides a main source of income for small-scale farmers. Livestock's by-products such as hides, intestines, hair and related products are a part of the country's main exports. The most common species of farm animals are sheep and goats (small ruminant animals). These livestock animals are mostly raised with natural pasture and a little supplemental feed.

As mentioned above, the agriculture sector plays an important role in economy, employment, and food self-sufficiency of the country. Sustained growth of agriculture sector, therefore, is essential for the growth and development of the overall economy of the country and also for more equitable distribution of incomes in the rural agriculture sector.

2.2 National Agricultural Policy

2.2.1 Overview of National Agricultural Policy

As a 20-year outlook for the country's development, "Vision 2025" sets out strategies that have the

highest priorities for Iran. Vision 2025 depicts social, economic and cultural outlook of the nation in horizon of year 2025.

According to Vision 2025, the important task of food security is bestowed to agriculture sector. Besides food security, agriculture sector is given a range of other responsibilities, including rehabilitation of natural resources, rural development, contribution to economic competitiveness and non-oil exports, enhancement of productivity, reliance on domestic resources for food security, and increasing living standards and income of the rural population.

The Five-Year National Economic, Social and Cultural Development Plan is a part of "Vision 2025" and guides the agriculture sector of Iran. Currently, the fifth five-year plan is implemented for the period of 2010-2014.

Main goals of agricultural sector in the Fifth Five-Year Development Plan are as follows:

(a) Growth of agricultural value added;

(b) Increasing productivity of production factors (total, manpower, capital) in economic growth;

(c) Increasing the self-sufficiency rate;

(d) Increasing crop water productivity per cubic meter;

(e) Increasing the production of agricultural products;

(f) Self-sufficiency and sustainable production of staple crops;

(g) Improving the living standards of the rural and tribal population;

(h) Retention and expansion of job opportunities in agriculture.

2.2.2 Direction of Agricultural Sector

Agricultural Planning, Economic and Rural Development Research Institute, MOJA's body in charge of the Five-Year Plan, was consulted for the future direction of the agricultural sector (June 27, 2010). The major findings were as follows:

(a) In the Fifth Five-Year Plan, subsidies are to be greatly reduced.

- Currently, there are too many kinds of subsidies in existence such as the ones for seeds, agricultural chemicals, and fertilizers. These are not to remain after the Fourth Five-Year Plan.
- Subsidies in the agricultural sector are to be all abolished or largely modified within five years. The Fifth Five-Year Plan focuses on increase in production and productivity, sustainability, environmental conservation, and resource management (forest and soil).

(b) To achieve the goals described above, different agricultural projects are implemented.

- Development of agricultural infrastructures, such as resource conservation, saving of irrigation water, diffusion of greenhouses, and improvement of farm field, agricultural roads, and drain canals.
- Reinforcement of soft-components, such as on-farm management, rural development, farmers' rehabilitation (education and training), use of private sectors (extension and research), investment on agriculture, enhancement of implementation structure of agricultural policies (roles of central and provincial governments), and reduction in the government's burden.

2.2.3 Subsidies System Reform[1]

The Iranian government enforced the Targeted Subsidies Reform Act in December, 2010. This is a subsidies system reform to eliminate previous governmental subsidies for living and industrial materials, such as food and energy, within 5 year period in order to increase their price up to Persian Gulf free on board (FOB) price. In addition, the government started a system to unconditionally transfer cash to all Iranian citizens in principle. The aim of this reform is to distribute the saved governmental budget to renew refineries and explore new energy sources.

Before this, the Iranian government injected US$ 100 billion to the above-described subsidies, out of its national budget (about US$ 368 billion in 2010 fiscal year). After the enforcement of the act, for example, the price of gasoline was increased from 1,000Rls/litter to 4,000Rls/litter up to 60 litters for ordinary vehicles, and from 4,000Rls/litter to 7,000Rls/litter above 60 litters.

As for the cash transfer system, each person receives 455,000Rls per month. The payment happens once in 2 months and the cash is transferred into a bank account. In fact, this system was planned to transfer more cash for low income groups, but all people received same amount when it was enforced. Nevertheless, people may be regrouped into 10 categories of income level instead of that of 5 categories at present; and the government may no longer transfer for high income groups in future.

[1] Reference: Asahi Shimbun (2010) "Iran, the price of gasoline for 4 times, enforcement of subsidies cut law "
Sankei news (2010) "Start to gradually abolish subsidies, Iranian President says"
Hassanzadeh E. (2012), "Recent Developments in Iran's Energy Subsidy Reforms", Policy brief, 2012 Oct. International Institute for Sustainable Development.
Tabatabai H. (2010) "IRAN: Economic reforms usher in a de facto basic income ",
http://wtr000.blogspot.jp/2010/11/blog-post_25.html (as of 2012/12/27)

Chapter 3 Current Situation of South Khorassan Province

3.1 General

South Khorassan is a new province, previously being part of Khorassan Province that was divided into three provinces in 2004. South Khorassan Province is located in east of Iran, bordering Afghanistan. The province consisted of 8 townships: Birjand, Qaen, Sarayan, Nehbandan, Darmian, Sarbisheh, Ferdows, and Boshroyeh. However, following the change in administrative boundaries carried out at the end of the Study period, as of February 2013, it has 10 townships.

South Khorassan Province covers an area of 95,385km^2. The population in 2006 was around 0.6 million, of which about 160,000 (26%) resided in Birjand city. Consisting of mountains, valleys, plains, and deserts, South Khorassan enjoys diverse climates and varying annual rainfall in its different areas.

Birjand, the capital city of South Khorassan Province, is located in the central part of the province. This city is placed at the height of 1,480 meters from the sea level. From the climatic point of view, because of its proximity to desert, it has an arid climate, with a large difference in temperature between summer and winter.

In spite of proximity to hot and sizzling desert and witnessing to successive droughts, agriculture has a great importance in the province. Major agriculture products of Birjand include barberry, saffron, jujube, almond, and walnut, for which the region is known as famous production area in the world.

The Birjand has an important role in the economy and employment in this region due to presence of rich mines such as of granite and marble and existence of cement or other factories. Birjand, as an industrial center of South Khorassan Province, is experiencing a fast development, thus, attracting many workers from adjacent cities and provinces.

Carpet produced in Birjand is famous and known internationally as "Mood Carpet." Most of the rugs are woven in the villages around Birjand. Therefore, the handicraft manufacturing is a very important income source for rural villagers.

As described here, although it is surrounded by deserts, Birjand is one of the economically important cities in the eastern part of Iran.

3.2 Employment

The employment situation of the whole country and South Khorassan Province are shown in Table 3.1. Main industries of South Khorassan Province are agriculture and manual industry. These two industries together make up more than 60% of the employment (40% in agriculture and 22% in manual industry). Their shares are bigger compared to the national average (23% in agriculture and 18% in manual industry).

Especially, the percentage of agriculture is much higher, which indicates that agriculture is the most important sector in the economy of South Khorassan Province. The second biggest sector for employment is manual industry where carpet is a main product.

Table 3.1 Share of Employment by Sector (1996 Census)

Unit: %

	Agriculture*	Manufacturing	Construction	Commerce**	Public worker***	Education	Others
South Khorassan	40	22	6	5	13	7	8
Whole country	23	18	11	18	11	7	13

*: Agriculture, hunting, and forestry; **: Wholesale and retail trade; ***: Public administration and defense etc.
Source: Iran Statistical Year Book 2005

Average unemployment rates are shown in Table 3.2. Although the unemployment rate of the province is lower than that of the whole country, the unemployment rate among young people (age 15-24) is higher in the province than in the whole country. The reason seems to be that there are not many new employment opportunities in the province because the agriculture is major industry and other industries are yet to develop.

Table 3.2 Unemployment Rate

Unit: %

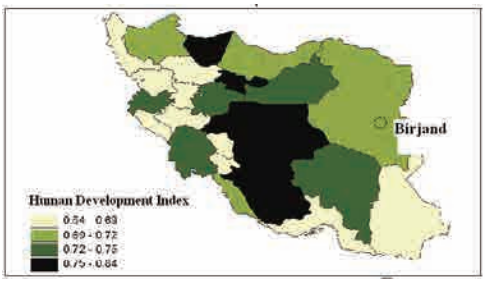
	Economic Participation rate	Unemployment rate	Unemployment rate (15-24)
South Khorassan	40.4	9.7	25.6
Whole country	41.3	11.5	23.2

Source: Statistical Year Book 2005

3.3 Poverty Statement

3.3.1 Human Poverty Index

Recent data on poverty in Iran at the province level are rarely available. Human Development Index (HDI) of each province in 1996 is shown in Fig. 3.1. The HDI in Iran differs remarkably depending on the provinces: while some province marks an HDI of higher than 0.8, a level generally found in developed countries, the HDI of former Khorassan Province (as of 1996) was as low as 0.698.



Source: Human Development Report of the Islamic Republic of Iran, 1999

Fig. 3.1 Human Development Index by Province

With regard to the Human Poverty Index (see Table 3.3), the former Khorassan Province marked higher values than the national standards in terms of the literacy rate, but lower values in terms of elements related to the economy and the rate of people not expected to survive 40 years old. Especially, in terms of the percentage of population found below poverty lines, the rank of the province was as low as 21st among 26. Therefore, the former Khorassan Province was among the provinces having highest economic poverty rates. In addition, while the rank of the expenditures made by the lowest-income 20% families is 23rd in the whole country, the rank of the expenditures made by the top 20% wealthy families is 14th. Therefore, it is clear that a wide gap between the rich and the poor is a key characteristic of this province.

Such situations could be attributed to that there were many small-scale farmers in Khorassan Province, and the productivity, which is influenced by the amount of rainfall, was low and unstable. This trend might have been further reinforced because of the drought in recent years.

Table 3.3 Human Poverty Index in Former Khorassan Province

	HPI	People not expected to survive to age 40 (%)	Adult illiteracy rate (%)	People without access to		Real consumption expenditure per capita (1,000Rls)		Population below income poverty line (%)	
				safe water (%)	sanitation (%)	Poorest 20%	Richest 20%	$1 a day (1987 PPP$)	National poverty line
Khorassan	23.1	13.8	26.1	5.8	45.3	277	3,721	6.3	19.6
Ranking (*)	12	22	7	13	19	23	14	21	21

Source: Budget and Planning Organization, 1999, "First National Report on Human Development Index"
(*) Among 26 provinces

3.3.2 Indicators of Income and Expense

Indicators related to the income and expenditure in South Khorassan Province are arranged in Table 3.4.

Engel's coefficient in the rural area is as about twice as that in the urban area. In general, with an Engel's coefficient of 50%, people can just manage to obtain enough food and cloths. Since the coefficient in the rural area is 45%, it indicates that they perhaps could, but with difficulty, sustain their lives.

With regard to the total expenditure, the expenditure in the rural area is less than half of that in the urban area. However, the expenditure on food items in the rural area is 72% to 84% of that in the urban area. Therefore, there is no much difference on the food expenditures between the urban and rural areas.

With regard to the difference between income and expenditure, both in the urban and rural areas, the expenditure exceeds the income. In the rural area, the share of agriculture in the total income is as low as of 23% (in 2007). This situation implies that in the rural area, it is difficult to live only with the agricultural income.

Table 3.4 Indicators of Income and Expenditure Situations in South Khorassan Province

	2005	2006	2007
Engel's coefficient (Urban) (%)	29	26	26
Engel's coefficient (Rural) (%)	45	45	45
Ratio of rural expenditure to the urban (%)	53	49	42
Ratio of rural food expenditure to the urban (%)	84	84	72
Ratio of expenditure / income (Urban)	1.2	1.1	1.2
Ratio of expenditure / income (Rural)	1.2	1.2	1.0
Share of agr. income in total rural income (%)	35	29	23

Source: Prepared by the Study team, based on Annual Yearbook of South Khorassan Province 2007

Also, according to the interview conducted in the Study area, the vegetables cultivated by farmers for self-consumption were not enough in most cases, and many farmers were forced to purchase vegetables from city. The government implemented a food aid program for farmers for distribution of wheat flour (8 kg/month/person). This aid appeared to be an important factor which encouraged the farmers to stay in the villages.

3.3.3 Literacy Rates

Table 3.5 shows literacy rates among men and women in South Khorassan Province and the whole country. The literacy rate in the province was lower than the average of the whole country. Also, the literacy rate among women was about 10% lower than the literacy rate among men.

Table 3.5 Literacy Rates

	Male	Female	Total
South Khorassan	85.7	76.2	81.1
Whole Country	88.7	80.3	84.6

Source: Iran Statistical Year Book 1385

3.4 Agricultural Land Holding and Land Use

Table 3.6 presents agricultural land holdings and land use in South Khorassan Province. The total area of South Khorassan Province is about 95,000 km^2, of which 50,000 ha, accounting for 0.5%, are cultivated. This area shares 1.2% of the planted area of the whole country. Average size of land holdings in the province is 4.0 ha, which is almost 20% smaller than the average of the whole country (5.1 ha).

Table 3.6 Land Holding and Agricultural Land Use in 2003

		Average land holding (ha)	Land holding (%)		Land use (%)			Average planted area (ha)
			% of HH	% of area	Annual crop	Orchard	Fallow	
South Khorassan Province	Below 1 ha	0.3	42	3	44	23	33	0.2
	1-5 ha	2.3	36	21	45	10	46	1.3
	5-10 ha	8.7	20	43	41	7	52	4.2
	20-50 ha	27.5	2	15	34	6	60	11.1
	Above 50 ha	108.8	1	18	28	6	66	36.6
	Average	4.0	-	-	38	8	54	1.8
Whole country		5.1	-	-	66	8	26	3.8

Source: Iran Statistical Year Book 1384, Statistics Yearbook of South Khorassan, 1387

As shown in the table, in South Khorassan Province, farmers holding land of less than 5 ha make up 78% of the total. Since the same ratio for the whole country was 66%, it shows the characteristic of South Khorassan Province regarding presence of many small scale farmers. Especially, in the province, farmers holding less than 1 ha of land reach at 42%. As it is said that between 7 ha and 9 ha of land is necessary to maintain a household in Iran, it would be very difficult for most of the farmers in the country to maintain their households with agricultural income alone.

A characteristic of farm land use in South Khorassan is that fallow rate is as high as 54 %, which is almost double of the average of the whole country. The average planted area per household, therefore, is only 1.8 ha, which is less than a half of the whole country. The larger the land holding area is, the higher the fallow rate is.

Average planted area among the farmers holding less than 1 ha of land is very small i.e. only 0.2 ha.

In terms of land use for different crops, a characteristic of South Khorassan is that the share of annual crop area is lower than that of the whole country. Also, there is a trend that the share of annual crop area is larger when the land holding size is smaller.

Areas of irrigated and rainfed agricultural lands per household in South Khorassan Province are shown in Table 3.7. In the Province, the fallow rate is high not only for rainfed lands but also for irrigated lands. Average planted areas per household of annual and perennial crops in irrigated farm are as small as 0.9ha and 0.2ha, respectively.

Table 3.7 Irrigated and Rainfed per Household Agricultural Land Use in South Khorassan

		Land use			Total
		Annual crop	Orchard	Fallow	
Irrigated	(ha)	0.9	0.2	1.0	2.1
		(43%)	(9%)	(48%)	(100%)
Rainfed	(ha)	0.6	0.1	1.2	1.9
		(33%)	(6%)	(61%)	(100%)
Total	(ha)	1.5	0.3	2.2	4.0
		(38%)	(8%)	(54%)	(100%)

Source: Iran Statistical Year Book 2005

Agricultural land use in Birjand Township is shown in Table 3.8. Compared to the South Khorassan Province as a whole, land allocation rates among annual crop, orchard, and fallow are almost the same, while area cultivated by irrigation is smaller.

Table 3.8 Irrigated and Rainfed per Household Agricultural Land Use in Birjand Township in 2002

		Land use			Total
		Annual crop	Orchard	Fallow	
Irrigated	(ha)	0.6	0.2	0.7	1.6
		(39%)	(15%)	(46%)	(100%)
Rainfed	(ha)	0.8	0.2	1.1	2.1
		(37%)	(9%)	(54%)	(100%)
Total	(ha)	1.4	0.4	1.9	3.7
		(38%)	(12%)	(51%)	(100%)

Source: Statistics Yearbook of South Khorassan, 2008

3.5 Agriculture

3.5.1 Annual Crop

The shares of planted area among annual crops in South Khorassan Province are shown in Table 3.9. Many varieties of crops are cultivated in the Province. By far the most widespread crops in both irrigated and rainfed areas are cereals, sharing about 46% of the total irrigated area. Of the cereals, wheat is the most important crop (about 29%), followed by barley (about 17%).

Table 3.9 Share of Planted Area among Annual Crops in South Khorassan Province (2007-08)

Unit: %

	Irrigation	Rainfed
Wheat	28.6	86.8
Barley	17.2	0.6
Pulses	0.6	0.0
Cotton	11.7	0.0
Sugar beet	1.4	0.0
Other industrial crop	2.5	0.0
Vegetables	1.4	0.0
Melon	2.3	0.0
Water melon	2.0	12.6
Other gourd	0.3	0.0
Alfalfa	4.0	0.0
Other fodder	10.5	0.0
Other	17.5	0.0
Total	100	100

Note: Pulses: chickpea, lens, etc., Other industrial crop: tobacco, corn, soya, oilseed crops, etc., Vegetable: potato, onion, tomato, etc., Other gourd: cucumber, etc., Other fodder: clover, etc.
Source: Statistical Year Book 2007-08

Crop cultivation in the province is roughly classified into two types: winter and summer crops. The annual crop calendar begins with wheat planting. Winter crops start in September with the growing of wheat and barley. Summer crops start in April with the growing of crops such as vegetables, fodders, sugar beets and spring wheat. As for fertilizers, manure is mainly applied for the crops.

As mentioned above, rainfed cropping has been relatively a large part of agriculture in South Khorassan Province. However, it was significantly affected by the drought continuing since around 1997/98, especially the short rainfall of 2007/08. As the table below shows, the ratio of rainfed cropping in the total annual crop area in 2007/08 dropped to 0.4%, where the national average was 42%. Since then, the poor performance of rainfed cropping due to drought is continuing until today.

Table 3.10 Area of Annual Crop in 2007/08

	Irrigation (%)	Rainfed (%)	Total (ha)
South Khorassan	99.6	0.4	140,553
Whole Country	57.6	42.4	10,150,944

Source: Statistical Year Book 2007-08

Planted area, production quantity, and yield of different crops in the province in 2007/08 are shown in the table below. The province's shares of crop production in the country are high for cotton (12%) and melon (5%), although the shares of other crops are less than several percent. Annual crops are produced mainly for self-consumption. Cash crops such as cotton and sugar beet are rarely cultivated in the Study area.

Table 3.11 Area, Production and Yield in South Khorassan Province in 2007/08

	Irrigation			Rainfed			Share of production in the country (%)
	Area (ha)	Production (ton)	Yield (ton/ha)	Area (ha)	Production (ton)	Yield (ton/ha)	
Wheat	39,994	95,530	2.4	539	135	0.2	1.2
Barley	24,105	56,634	2.3	4	3	0.6	3.7
Pulses	844	1,016	-	0	0	-	0.3
Cotton	16,346	35,203	2.1	0	0	0.0	11.9
Sugar beet	1,919	46,109	24.0	0	0	0.0	2.5
Other industrial crop	3,560	3,369	-	0	0	-	-
Vegetables	1,940	24,160	-	0	0	-	0.2
Melon	3,250	68,183	21.0	0	0	0.0	5.1
Water melon	2,832	52,709	18.6	78	104	1.3	2.1
Other gourd	368	4,873	-	0	0	-	-
Alfalfa	5,650	29,230	5.2	0	0	0.0	0.6
Other fodder	14,643	295,406	-	0	0	-	-
Other	24,435	5,576	-	0	0	-	-
Total	139,886			621			

Source: Statistical Year Book 2007-08

Ratios of planted area by crop in Birjand Township are shown in Table 3.12. Wheat was by far the most expanded, followed by fodder crops and barely. The share of fodder crop, such as alfalfa, is high because livestock is important in the township.

Table 3.12 Main Crop Planted Area in Birjand Township (2007-08)

Crop	Percent of planted area (%)		
	Irrigated	Rainfed	Total
Wheat	48	95	63
Barely	11	4	9
Cotton	10	0	7
Other industrial crops	1	0	1
Vegetables	2	0	1
Summer vegetables	5	1	3
Forage crops	17	0	12
Saffron	3	0	2
Others	3	0	2
Total	100	100	100

Source: JAO Birjand Township

Crop yield of Birjand Township, South Khorassan Province, and the whole country are compared in Table 3.13. The yields of all the crops, other than gourds, are lower in South Khorassan Province compared to the national average. Especially, the yields of vegetables in the province and the township are much lower. Reflecting the climatic conditions, yields in rainfed lands are much lower than those in irrigated lands.

Table 3.13 Comparison of Crop Yield among Birjand Township, South Khorassan Province, and Whole Country

Unit: ton/ha

		Wheat	Barley	Cotton	Sugar beet	Potato	Tomato	Melon	Water melon	Alfalfa
Birjand	Irrigation	2.3	2.1	2.2	21.3	14.8	15.6	17.8	16.1	5.5
	Rainfed	0.002	-	-	-	-	-	-	1.3	-
South Khorassan	Irrigation	2.4	2.3	2.1	24.0	15.1	13.6	21.0	18.6	5.2
	Rainfed	0.2	0.6	-	-	-	-	-	1.3	-
Whole Country	Irrigation	2.9	2.3	33.9	33.9	26.7	36.8	18.4	17.3	8.4
	Rainfed	0.5	0.5	-	-	4.9	14.6	7.5	9.0	1.7

Source: Statistical Year Book 2007-08, JAO Birjand Township 2007-08

3.5.2 Saffron

Saffron production in South Khorassan Province and the whole country is shown in Table 3.14. Iran is the biggest worldwide producer of saffron, sharing about 65% of the world production. Saffron (Crocus sativus), a perennial herb, is widely used as a spice, ingredient in food industry, medicine, cosmetics, perfume, and also for textile dying.

Table 3.14 Saffron Production in 2008

	Farming area (ha)		Amount of production (kg)	Yield (kg/ha)	Number of Saffron farm fields		
	Productive	Non-Productive			Less than 1 ha	Between 1 to 2 ha	More than 2 ha
South Khorassan	12,880	606	10,384	0.8	21,912	1,824	471
Whole country	58,473	3,463	37,900	0.6	99,275	3,047	968
Share (%)	22	18	27		-	-	-

Note: Due to the frost in 2007, the yields of saffron presented in the table are lower than the average yields in normal years, both for the whole country and the province.
Source: National Statistic Year Book in 2008

Since saffron generally grows well in clayey or sandy soils, under a strong sunshine, adapting to cold and dry climate, the eastern part of Iran is suitable for its cultivation. The Khorassan region including South Khorassan Province is well known for its production; sharing 90% of saffron production in Iran.

In 2008, South Khorassan Province produced 27% of the total production of saffron in Iran, and the yield was higher than that of national average. Saffron is mainly cultivated on a small scale with a farm field of less than 1 ha. Saffron is an important cash crop in South Khorassan Province and has been an important revenue generating product for small-scale farmers in the province. This crop has a specific character such as low water demand, ease of transportation, low requirement for expensive machinery, and high labor requirement at the time of harvesting, which in turns creates job opportunities for local people.

According to MOJA, in Birjand Township, saffron is produced on 339 ha of land (3% of the total planted area in South Khorassan Province). Therefore, the township's share of the planted area of saffron in the province is very low.

It is shown that saffron is a low nutrient demand plant and requires a modest amount of nutrients. High application of fertilizers, in particular nitrogen fertilizer, promotes vegetative growth but lowers the yield. Soil is ploughed in autumn or winter, and it is desirable to apply animal manure of 20 to 100 tons per hectare. Chemical fertilizers are also applied after the first irrigation in early autumn and also at the time of first weeding.

As shown in Fig. 3.2, the harvest of saffron crop begins with picking of the blossoms and separating the stigmas. Picking flowers starts as soon as they start to appear in the field, because the quality of saffron decreases if they are left unpicked for a longer period. In the Khorassan region, picking

flowers are generally done in October to November, but can differ according to the climate variability and time of first irrigation. Flowers are picked up early in the morning before sunrise.

Yield of saffron depends on climatic and edaphic conditions and also management practices such as planting methods, weeding control, and size of corm at planting. Yield in the first year is low and increases in the following years. Maximum yield is obtained in the fourth and fifth years.

The stigmas thus collected are placed in a dried room for five to seven days in order to dry them. Generally, drying is done in factories which meet international standards such as ISO and HACCP (Hazard Analysis and Critical Control Point). Drying is the most important part of the saffron production process. The drying process activates the chemical compounds, which release aroma, color, and flavor. It is a delicate procedure which requires skills and experiences.

Saffron flower	Picking of the blossoms	Separating the stigmas

Fig. 3.2 Cultivation and Harvesting of Saffron

3.5.3 Perennial Crop

Major perennial crops in South Khorassan Province are listed in Table 3.15. In South Khorassan Province, various perennial crops are cultivated which constitute the largest source of agricultural income of farmers. In general, perennial crops are divided into two groups, nuts and fruits.

Main nuts include almond, pistachio and walnut. Their production in this province occupies about 7 %, 2%, and 1% share in Iran, respectively.

Main fruits include barberry, grape vine, pomegranate, apricot and jujube. In particular, production of barberry and jujube are accounted for 99% and 94% of the total production in Iran, respectively. Production of other crops is less than 1% of total production of Iran.

Table 3.15 Perennial Crop Production in South Khorassan Province in 2008

Product Name	Planted area (with the count of Mixed & Diffuse trees) (ha)									Production (ton)			Yield (kg/ha)	
	Non-Fruitful			Fruitful			Total			Irriga-tion	Rain-fed	Total	Irriga-tion	Rain-fed
	Irrigation	Rainfed	Total	Irrigation	Rainfed	Total	Irrigation	Rainfed	Total					
Almond	430	1,250	1,680	3,575	7,442	11,016	4,005	8,692	12,697	5,263	3,259	8,523	1,472	438
Barberry	2,704	0	2,704	8,417	0	8,417	11,120	0	11,120	9,157	0	9,157	1,088	0
Pistachio	5,387	0	5,387	5,215	0	5,215	10,602	0	10,602	3,990	0	3,990	765	0
Grape	260	79	338	1,926	1,309	3,235	2,186	1,388	3,573	7,891	1,826	9,717	4,097	1,395
Pomegranate	3,094	0	3,094	381	0	381	3,475	0	3,475	1,531	0	1,531	4,019	0
Walnut	59	0	59	903	0	903	962	0	962	2,974	0	2,974	3,293	0.0
Apricot	65	0	65	791	0	791	856	0	856	3,418	0	3,418	4,320	0.0
Jujube	76	0	76	702	0	702	778	0	778	1,710	0	1,710	2,437	0.0
Total	12,075	1,329	13,403	21,910	8,751	30,660	33,985	10,079	44,064	-	-	-	-	-

Source: National Statistic Year Book in 2008

The planted area, production and yield of perennial crops in Birjand Township are shown in Table

3.16. Birjand Township is a major producing area of specialty products of the South Khorassan Province, including jujube (57% of the Province), walnut (48%), barberry (47%), and almond (22%).

Among these specialty products, their yields in Birjand are higher than the average of this Province, except that of almond. Therefore, the above three crops are said to be suitable ones to Birjand Township.

Table 3.16 Perennial Crop Production in Birjand Township (2007/08)

	Planted area (ha)	Share (%)	Irrigation (ha)	Rainfed (ha)	Production (ton)	Yield of Matured Tree (kg/ha)		
						Irrigation	Rainfed	Average
Barberry	3,885	36	-	-	4,324	-	-	1,322
Almond	3,150	29	520	2,630	1,863	2,206	435	705
Grape	1,122	10	343	779	1,396	3,345	572	1,488
Jujube	384	4	-	-	974	-	-	3,336
Walnut	342	3	-	-	1,439	-	-	6,150
Pistachio	325	3	-	-	305	-	-	1,245
Fig	277	3	87	190	409	4,690	535	1,920

Source: JAO Birjand Township

3.5.4 Livestock

In South Khorassan Province, goat (1,500 thousand heads), sheep (970 thousand heads), cow (90 thousand heads), and camel (20 thousand heads) are bred as its main livestock. Goat and sheep are bred in a small scale by individual farmers. These animals are an important source of their income. Sheep's wool is also important raw material for weaving carpet, an important handicraft activity in the Province.

Table 3.17 Number of Livestock in 2008

Unit: 1,000 heads

	Goat	Sheep	Cow	Camel
South Khorassan	1,502	972	88	21
Whole Country	25,807	52,219	8,109	153
Share (%)	5.8	1.9	1.1	13.8

Source: MOJA

3.6 Processing and Distribution of Agriculture and Livestock Products

3.6.1 Processed Products

(1) Processed Agriculture Products

In case of processed agriculture products, pickles of cucumber and garlic, many kinds of fruits juice etc. are produced and sold by companies. Barberry, an actively produced fruit in South Khorassan Province, is also processed to juice by companies and sold after packaging. On the other hand, dried barberry, citrus, jujube, fig etc. are also sold in South Khorassan Province. These dried products are distributed and sold after being processed by farm households generally. Jujube, one of the major products, is dried under shade of trees for about half a month. The products without shrinkage or wrinkles are evaluated as higher quality products.

(2) Processed Livestock Products

In case of processed livestock products, mainly dairy products such as cheese, butter, yoghurt etc. are sold in shops of Birjand city. These products are mostly produced and packed by companies. There are few products which are produced and directly sold by farmers. However, kashuk, which is a local dried product made from yoghurt, is sold in shops and markets without packing.

3.6.2 Distribution and Sale

(1) Agriculture Products

Estimated demands for major crops are shown in the table below. The demands were estimated based on food supply quantities per capita in FAOSTAT and population of South Khorassan Province (636,420 people in 2006, Statistical Center of Iran). The estimation shows that wheat satisfied the demand and barley is produced more than the demand. However, demand for other agriculture products are over to the production quantities in South Khorassan Province. This result of estimation indicates that most agriculture products are brought from outside of South Khorassan Province.

Table 3.18 Estimated Demands for Major Crops in South Khorassan Province

	Food Supply Quantity (kg/capita/yr)	Demand (ton)	Production (ton)	Difference between Production and Demand (ton)
Wheat	151.8	96,609	95,665	-943
Barley	0.5	318	56,637	56,318
Potato	47.3	30,103	8,066	-22,036
Pulses	7.1	4,519	1,016	-3,502
Tomato	58.4	37,167	7,849	-29,317
Onion	23.7	15,083	4,044	-11,039
Apple	29.5	18,774	1,366	-17,408
Grape	27.8	17,692	9,717	-7,975

Source: Food Supply Quantity: FAOSTAT, FAO (2006); Production: National Agricultural Statistics Vol.1. 2007-2008, MOJA

Including the products produced in South Khorassan Province, most sellers in the markets in Birjand city buy the products from brokers and sell in the markets. There are very few sellers who buy products directly from farmers. There are also very few farmers who sell their products directly to consumers. However, a few farmers sell herbs and dried jujube in the market on a small scale.

Dried barberry, dried jujube and saffron which are major products in South Khorassan Province are generally dried by farmers and sold. In case of saffron, the products are sorted according to size, color and scent before sale. In case of dried barberry, there are workshops which clear barberries, and farmers or retailers pay the commission to the workshops to clean their products. Sales price of dried barberry is different depending on the quality (color, size, etc.). Therefore, the dried barberry is sorted according to the quality and sold in shops. The channels found are 1) farmers take their products directly to shops, 2) brokers who come to village and buy the products from farmers and sell to shops, 3) farmers directly sell their products to consumers in markets.

(2) Livestock Products

In South Khorassan Province, chickens are slaughtered, processed and packaged one-by-one in slaughterhouses and distributed to individual retailers. A whole chicken is packed and distributed to shops; there is very little chicken meat taken apart or frozen. In case of eggs, producers generally pack eggs into special trays and distribute them to shops.

In case of sheep and cattle, there are mainly two distribution channels. One is distribution from farmers to directly shops and another one is distribution from farmers to shops through brokers. Shops commission slaughter to abattoirs. After the slaughter, the meats are brought to the shops. Shops cut the meat according to requests of buyers and sell the meats by weight.

3.6.3 Quality, Packing and Transportation

(1) Agriculture Products

Most agriculture products in markets and shops are piled up or put in big boxes for sale. On the other hand, pre-packed or pre-divided items on sale are very few. For transportation, these products are only packed in large boxes or sacks. Therefore, the products may be damaged on transportation or display. However, there are several ways of transportation and display according to the products. Some fruits are packed with cushions to avoid damage from shocks during transportation. However, larger products like melons and water-melon are loaded on trucks without any packing for transportation. Most vegetables like tomato, cucumber, eggplant, carrot, potato, onion and other leaf vegetables are packed in wooden boxes, corrugated cartons or large sucks without cushions and transported.

In case of vegetables and fruits, the products are generally not sorted according to the quality like size, color, shape, scars etc. in the market and shops. Each product is piled up or put in big boxes. Buyers select products which they want and pay by weight. Therefore, the unit price is not based on the quality but weight. However, some products are sorted and several heaps are made according to the quality, although the products are still sold by weight. In any case, buyers frequently stir the heap of products to select better products which they want to buy.

Dried products like dried jujube and dried barberry are sold through brokers or directly to shops. Generally products are not packed when the shops buy the products. Therefore, the shops sell the products after packing or sell without packing.

As mentioned above, major selling products in the Study area are dried jujube and dried barberry. Wastes in these products are removed by farmers, and then the products are put in sucks are sold to brokers.

(2) Livestock Products

As mentioned above, chicken meat is packed one by one and kept in refrigerators for selling. However, other types of meat are cut in shops for sale to buyers. Packed meat except chicken is not common, and meat cut according to buyers request is generally put into vinyl bags for selling. Livestock is slaughtered in abattoirs with inspection and then taken to shops. Shops usually have refrigerators, and the hygiene and quality of meat are kept in good condition.

3.6.4 Price

Prices obtained in the markets and shops in Birjand city are shown below.

Table 3.19 Price of Agriculture Products in Birjand City in July 2010

Items	Price		Notes
Tomato	5,000	Rls/kg	Product of Isfahan Province
	2,000	Rls/kg	Product of Golestan Province
Onion	3,000	Rls/kg	
Herbs	8,000	Rls/kg	Product of South Khorassan Province
Water-melon	1,700	Rls/kg	Product of South Khorassan Province
Melon	3,000 - 4,000	Rls/kg	Product of South Khorassan Province
Date	15,000	Rls/kg	Product of Sistan and Baluchestan Province
Grape	6,000	Rls/tray	
	10,000	Rls/kg	
Walnut	50,000	Rls/kg	
Sour cherry	15,000	Rls/kg	
Banana	7,500	Rls/kg	Product of Chaharmahal and Bakhtiari Province
Flesh almond	15,000	Rls/kg	Product of South Khorassan Province
Cherry	30,000	Rls/kg	
Saffron	20,000	Rls/0.5g	Price in retail shop (in a small bottle)
	100,000	Rls/4.6g	Price in retail shop (in a small bottle)
Dry barberry	85,000	Rls/kg	Price in retail shop
Dry jujube	30,000	Rls/kg	Product of South Khorassan Province (price in market)
	70,000 - 80,000	Rls/kg	Price in retail shop
Dry plum	160,000	Rls/kg	Price in retail shop
Dry mulberry	80,000	Rls/kg	Price in retail shop
Dry fig	100,000	Rls/kg	Price in retail shop
Dry almond	90,000	Rls/kg	Price in retail shop
Barberry syrup	25,000	Rls/720g bottle	Price in retail shop

Chapter 4 Outline of the Study Area

(1) Location of the Study Area and Overview of its Economy

The Study area is located at 25km north of Birjand (distance to the center of the Study area). It is a closed watershed, dominated in the three directions (north, east and west) by mountains ranging about 2,300-2,400m high. Its area is 15,026ha (150km^2). It is a mountainous area, located 1,700-2,400m above sea level, where its mean gradient is about 1.8 % (0.7/39.1 km).

In the Study area, major economic activities have included traditional agriculture, practiced in the valley using qanats as its water source, and carpet weaving at the household level. However, water discharge of qanats has been significantly declining, due to effects of continuous drought in recent years and also because some of qanats have become old and abandoned. Valuable agricultural lands have been continuously damaged by flood, caused by the desolation of vegetation in the watershed. These factors have significantly undermined agriculture in the area. In addition, carpet industry was in decline in 1980s. Many farmers who lost their income source migrated to cities. As a result, depopulation of villages was accelerated, and the Study area is now evaluated as among the poorest areas in Iran.

(2) Specification of the Study Area

- Area: 15,026ha (Alghourat-Takhchar Abad area)
- Number of villages: 15
- Population: 1,909 (living in the village: 947; living outside the village: 962)
- Number of households: 595 (living in the village: 309; living outside the village: 286)
- Income source: agriculture, household-level industry related to agriculture, wage labor, and financial support from Government and/or other associations

4.1 Administrative Boundary

The Study area is located in Alghourat and Kahshang Dehestans, Markazi (Central) Bakhsh, Birjand Shahrestan, South Khorassan Ostan.

There are 15 villages (Deh) in the Study area as shown below. There are other abandoned villages in the area, although the details about these villages are unknown. Therefore, only the villages existing today were included in the target villages of the present Study.

Table 4.1 Villages in the Study Area by Rural Municipality

No.	Alghourat Rural Municipality	No.	Kahshang Rural Municipality
1	Masen	9.	Zin Abad
2	Alghor	10.	Sheikhan
3	Kooshk	11.	Neyestan
4	Felarg	12.	Garmidar
5	Borgeziad	13.	Garmok
6	Bozghong	14.	Jalal
7	Mafriz	15.	Takhchar Abad
8	Sang Abad		

Note: The numbers of each village are firstly arranged by Rural Municipality and water shed. Then, they are arranged from North to South order. Hereinafter, these numbers are used as the village numbers.

4.2 Natural Conditions

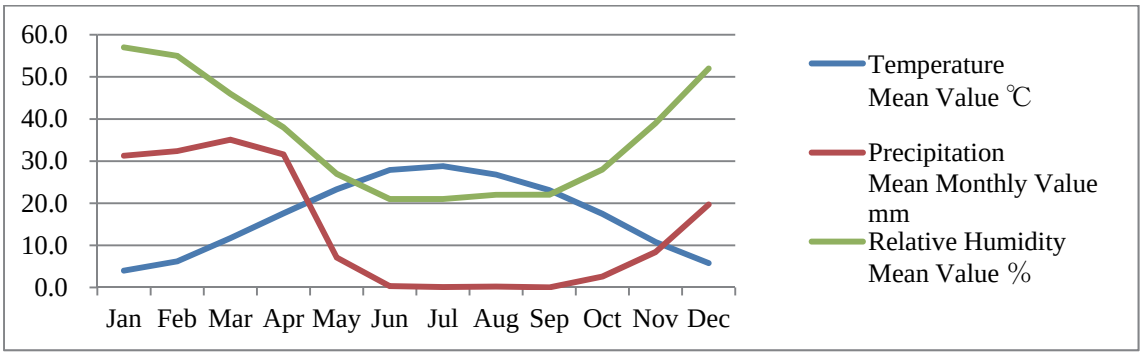
4.2.1 Meteorology

There is no record available for the meteorology of the Study area. The meteorological data observed in Birjand show that average annual rainfall is 158 mm in the rainy season beginning in November and ending in April, and 10 mm in the dry season beginning in May and ending in October. Relative humidity ranges from 20 % to 30% in the dry season. The meteorological data observed by the Islamic Republic of Iran Meteorological Organization and compiled in accordance with the World Meteorological Organization rules are shown in Table 4.2, of which average temperature, precipitation and relative humidity are presented in Fig. 4.1.

Table 4.2 Average Meteorological Data of Birjand City (1961-1990)

Statistics	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Temperature Mean Value	℃	4.0	6.2	11.7	17.6	23.3	27.9	28.8	26.8	23.1	17.5	10.8	5.8	16.96
High Temperature Mean Daily Value	℃	11.0	13.1	18.8	24.7	30.6	35.2	35.6	34.3	31.7	26.6	19.7	13.4	24.56
Low Temperature Mean Daily Value	℃	−2.3	−0.3	4.4	9.6	13.9	17.9	19.7	17.1	12.1	7.3	2.2	−1.2	8.37
Precipitation Mean Monthly Value	mm	31.3	32.4	35.1	31.6	7.1	0.3	0.1	0.2	0.0	2.6	8.4	19.7	14.07
Relative Humidity Mean Value	%	57.0	55.0	46.0	38.0	27.0	21.0	21.0	22.0	22.0	28.0	39.0	52.0	35.67
Relative Humidity Mean Daily Maximum Value	%	76.0	76.0	69.0	59.0	43.0	32.0	31.0	34.0	35.0	43.0	58.0	72.0	52.33
Relative Humidity Mean Daily Minimum Value	%	38.0	35.0	28.0	23.0	17.0	14.0	14.0	14.0	14.0	17.0	24.0	33.0	22.58

Source: The National Oceanic and Atmospheric Administration, U.S.A. (NOAA)



Birjand, Iran, Latitude: 32°52′N, Longitude: 059°12′E, EL: 1491m, Station: IR40809
Source: The National Oceanic and Atmospheric Administration, U.S.A. (NOAA)

Fig. 4.1 Average Meteorological Data of Birjand City (1961-1990)

4.2.2 Hydrology and Geology

(a) The qanat discharges groundwater which has been stored in the permeable layer as well as aquifer laid on the impermeable layer of the underground. Some qanats discharge surface water of springs which are not considered as either reliable or stable water sources. The geological structure influences the formation of the water source of the qanat. As shown in Fig. 4.2, the 13 villages out of 15 excluding Kooshk and Takhchar Abad are located on the zone of igneous rocks consisted of andesite containing dacite. The zone of igneous rocks forming almost a straight line stretching from the northwest to the south on the east side of the study area occupies about half the entire area and is classified as intermediate or silicic acidic or less alkali rocks. The Kooshk village is located on the terrace and fans of sedimentary gravel layer underneath the existing wadi. On the other hand, Takhchar Abad having no wadi is located on the geologically different terrace and fans of sedimentary gravel layer that had been hypothetically pushed down by strong geological forces from the upper area. From the viewpoint of geological structure mentioned

above two types of mechanisms would be applied to the study area for producing groundwater sources for qanats. Rainfall falling on the mountain and descending the slope infiltrates into the permeable zone of soil. A part of the runoff is stored in the aquifer laid on the impermeable layer after going through the permeable zone of soil and reaching there. The qanat discharges groundwater stored in the permeable layer of soil as well as the aquifer. This mechanism of replenishing groundwater supply would be applied to the 13 villages and the Takhchar Abad. A different mechanism of replenishing water supply to the underground water would be applied to the case of the Kooshk. The qanat collects groundwater flow which is recharged by flood infiltrating into the permeable layer of soil, and rainfall stored in the permeable layer of soil under wadi as well as in the aquifer underneath. In the above two mechanisms, when the qanat gets groundwater from the aquifer on the impermeable layer, it may be able to discharge water continuously in a reliable and stable state. If the qanat depends on the groundwater stored in the permeable layer of soil, the discharge of water may be affected by seasonal or natural conditions.

(b) The discharge of water from the qanat has been reportedly decreased due to less precipitation in recent years. Water from the qanat in Kooshk village was examined under the method of tritium analysis in order to know the age of water which helped to understand how long groundwater took to go through the hydrological cycle. The results are that about 80% of the groundwater is about 60 years old, and the remaining 20% is younger than 60 years old. Accumulation of main part of groundwater started in the aquifer about 60 years ago, and about 20 % of water started after the old water had been stored. The result of the test implies that water discharge from the qanat has been stored in the aquifer for a long period after rainfall passed through the permeable layer of soil and reached the aquifer. It is frequently said that water discharge from the qanat increases as it rains. This phenomenon suggests that rainfall infiltrating into the permeable layer of soil outflows relatively fast within a short period. It is desirable to carry out geological boring test in order to obtain data and information on the geological structure in detail, such as, a geological column, the depth, thickness and area of aquifer and permeable layer. JAO does not have enough geological data and information except geological map. JAO is required to have geological data and information by undertaking geological survey and test so as to be able to maintain qanats and their water sources in good condition.

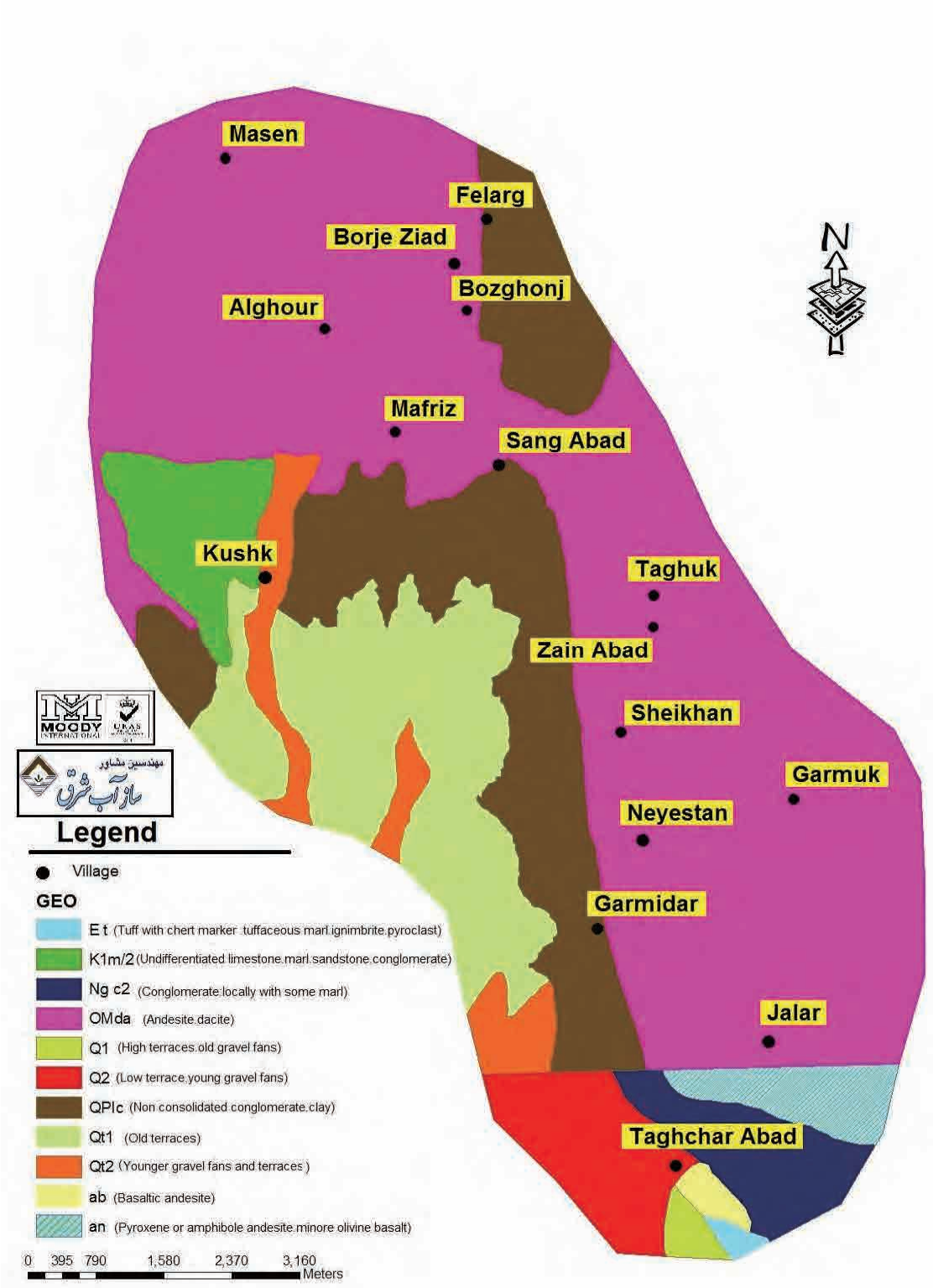


Fig. 4.2 Geological Map

4.3 Socio-economy

4.3.1 Population

The change of population of South Khorassan province and Birjand city is shown in the table below:

Table 4.3 Change of Population of South Khorassan Province and Birjand City

Location \ Year	1976	1986	1996	2006	2012
Province	274,016	508,070	535,481	636,420	705,901
Birjand City	46,943	81,798	127,608	166,138	194,636

Source: Iran Statistical Year Book 2008, South Khorassan Statistical Year Book 2007
Note: The figures for 2012 were estimated by the Study team, based on the rates of population increase between 1996 and 2006.

The population is in an increasing trend both for South Khorassan Province and Birjand city.

The average rate of annual population increase of Birjand city between 1996 and 2006 was 2.7%, while that of South Khorassan Province was 1.7%.

In 2006, 26% of the population of South Khorassan Province lived in Birjand city. Considering the situation of development of Birjand city in recent years, it is expected that the increasing trend of its population will continue.

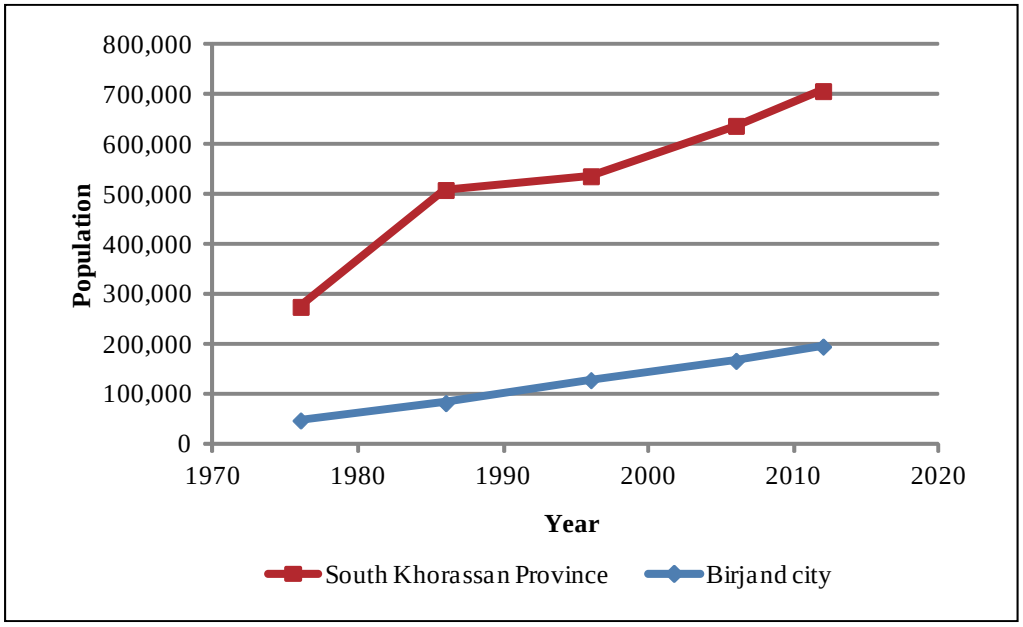


Fig. 4.3 Change of Population of South Khorassan Province and Birjand City

Table 4.4 Change of Population of the Study Area

Year / Village	1966※1	1976※1	1986※2	2006※3
1. Masen	(56)－	64	(56)－	48
2. Alghor	88	103	(84)－	64
3. Kooshk	138	(111)－	125	71
4. Felarg	165	225	(194)－	193
5. Borgeziad	92	114	129	119
6. Bozghong	(189)－	193	(189)－	185
7. Mafriz	146	131	127	88
8. Sang Abad	(67)－	47	(67)－	87
Alghourat Rural Municipality	(941)629	(988)877	(971)381	855
9. Zin Abad	(11)－	19	(11)－	3
10. Sheikhan	23	24	20	30
11. Neyestan	21	23	24	25
12. Garmidar	(37)－	40	33	39
13. Garmok	49	9	(21)－	5
14. Jalal	73	52	33	12
15. Takhchar Abad	(13)－	18	(13)－	8
Kahshang Rural Municipality	(227)166	185	(155)110	122
Total	(1,168)795	(1,173)1,062	(1,126)491	977

*1: Population status (Iran Statistic Centre, 1967-1982)
*2: Population status (Iran Statistic Centre, 1987)
*3: http://www.amar.org.ir/nofoos1385/default-737.aspx (2010)
Note: Where data were missing, average values of years where the data were available were put in parenthesis as approximate values.

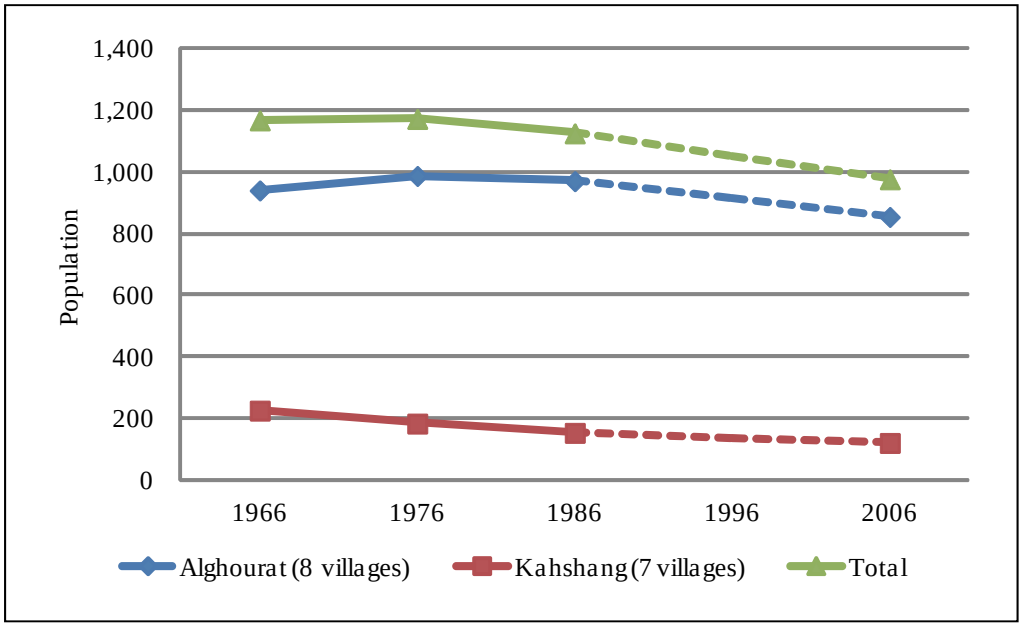


Fig. 4.4 Change of Population of the Study Area (including estimate value)

(a) According to the above-presented statistics, the population living in the Study area in 2006 was 977. According to the result of the baseline survey conducted in 2010, the registered population of the Study Area was 1,909, of which 947 lived in the villages.

(b) It is found that the minimum level of population in the village in a year is recorded during winter (January to March) whereas during summer (July to September), the population level is maximum.

4.3.2 Population Structure

The sample 103 families, selected for the household survey that was carried out as a part of the baseline survey conducted in 2010, had 405 members in total (197 men and 208 women). In addition, the largest population categories when people were categorized by age by every 5 years were those of between 20 and 24 years old and those of over 60 years old (each accounting for 17.0 %), and the third was those of between 15 and 19 years old (12.2 %). However, many young people have migrated to Birjand or other cities for the study or work; therefore, the actual rate of elders over 60 years old may be higher than the above-reported figure.

Table 4.5 Population Structure by Age Category of Every 5 Years among 103 Households Selected for Household Survey

Age category	Men	Women	Total	Men (%)	Women (%)	Total (%)
0～4	6	11	17	3.0%	5.3%	4.2%
5～9	13	8	21	6.6%	3.8%	5.2%
10～14	15	9	24	7.6%	4.3%	5.9%
15～19	24	26	50	12.2%	12.5%	12.3%
20～24	33	36	69	16.8%	17.3%	17.0%
25～29	24	17	41	12.2%	8.2%	10.1%
30～34	9	13	22	4.6%	6.3%	5.4%
35～39	8	12	20	4.1%	5.8%	4.9%
40～44	6	12	18	3.0%	5.8%	4.4%
45～49	5	9	14	2.5%	4.3%	3.5%
50～54	10	19	29	5.1%	9.1%	7.2%
55～59	9	2	11	4.6%	1.0%	2.7%
60～	35	34	69	17.8%	16.3%	17.0%
Total	197	208	405	48.6%	51.4%	100.0%

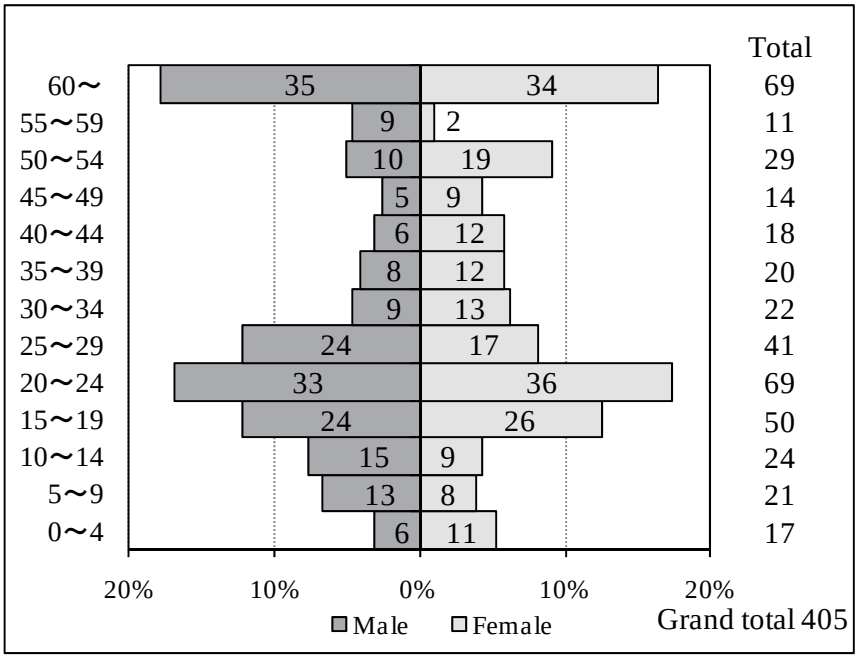


Fig. 4.5 Population Pyramid of 103 Households Selected for Household Survey

4.3.3 Size of Households

Among the families selected for the household survey, the minimum size of household is 1 person while the maximum size of it is 14 persons. The average family size is 3.93 persons, while the most

frequent family size is 2 persons. But, as mentioned above that many family members live in Birjand or other cities, the actual family members who live in the village may be less than this.

Statistical data	Score
Average	3.93
Mode	2.00
Maximum	14.00
Minimum	1.00

4.3.4 Social and Residents' Organizations

(1) Social Organization

In the Study area, there are Rural Management Organization Councils at the village level. The objective of this council is to encourage the villagers to participate in the physical and social activities of the village and to make and arrange plans for collaborative works. There are some villages where this council has been dissolved due to migration of residents to the town.

Other than this council, there is an Islamic council as well. This organization is independent from administrative authority. The council aims to respond to the residents' needs and plays a role as a bridge between administration and villagers.

(2) Residents' Organization

Villagers themselves have formed various organizations or groups for special occasions and activities. The list below shows such organizations and groups, existing in the villages of the Study area. A feature is that many of them are religion-based groups.

Table 4.6 Existing Organizations and Groups

Village	Sector	Organization Group	Registration at Dep. of Coop.	Function
Masen	Religion	Hosseini Religious group	Registered	Funeral, religious events
Felarg	Agriculture	Rural Cooperative	Registered	Agriculture
Borgeziad	Religion	Abol fazli Religious group	Registered	Funeral
Bozghong	Religion	Religious Group	Registered	Funeral, religious events
Mafriz	Religion	Religious group	Registered	Funeral, religious events
Jalal	Religion	Quran Course	Registered	Koran course

Basic information on the rural cooperative based in Felarg (presented in the table above) is as follows:

Name	Location	Members	Established year	Registration	Main activities	Book keeping	Remarks
Ghaem Rural Cooperative	Felarg	1,651 (900 men & 751 women)	1963	1973 (After creation of dep. of cooperative)	Procurement and sales of agricultural inputs, commodities, and fuel	Yes	Independent, but advised by the dep. of cooperative

This cooperative is established by residents themselves; however, the cooperative is managed by the department of cooperative where it is registered. The residents of 28 villages, including 8 villages of the Study Area, have been enrolled.

The main activities are to procure agricultural inputs (seeds, fertilizers, and insecticide etc.) and commodities, and to sell them at Kiosks managed by the cooperative.

Financial management has been orderly practiced by the double-entry accounting.

4.3.5 Change of Roles of Men and Women

Basically, Iranian society is a patriarchal society:

A man is the head of household, and almost all work is carried out under his accountability. Therefore, nearly all major decisions and family members' work are done with the man's authority.

All property and assets belonging to the family usually belong to the man. For example, opening a bank account, purchase and sale of furniture are done by the man while a little is done by the woman.

In addition, the Study team found that the men worked on agricultural activities and irrigation while the women worked on it together with men as well as all the household work parallel within a day. The men do not carry out any household work; the women play more roles than the men.

Despite this, nowadays housewives are playing a highlighted role in comparison to the past. For example, many of them who have higher literacy and education have assumed formal and informal jobs outside of their house. Particularly the role of women of household, where the men spend much of their time outside of the village, from days to months, are more important in this regard. In that household, they do take full tasks of agricultural production and management.

The roles of rural women in villages on family decision-making and planning have been being improved comparing to the past years, and this is facilitating the presence of women in different social- economical activities.

4.3.6 Assets of Household

The most important asset is house building among the sample households. For example, some households have separate rooms for livestock facilities, food storage, and fodder etc. next to their house, while relatively poorer households store almost all agriculture- and livestock raising-related tools in their residential space.

Other assets of household are motor bikes, bicycles, TV sets, and radio; mobile phones have been owned as assets in recent years. Few households own agricultural equipment.

Table 4.7 Assets of Sample Households

Assets \ Village	Masen	Alghor	Kooshk	Felarg	Borgeziad	Bozghong	Mafriz	Sang Abad	Zin Abad	Sheikhan	Neyestan	Garmidar	Garmok	Jalal	Takhchar Abad	Total
(Samples)	4	8	8	21	11	21	11	11	1	1	1	2	1	1	1	103
Plough sets	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Carts	0	0	1	5	0	0	1	0	0	0	0	0	0	0	0	7
Wheel-barrows	1	5	3	5	4	4	3	5	2	1	0	1	3	1	1	39
Borehole	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spray-pumps	0	1	0	2	0	1	0	0	0	0	0	0	0	0	0	4
Diesel pumps	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	2
Water tanks	0	0	1	3	1	1	2	0	0	0	0	0	0	0	1	9
Beehives	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trailers	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Grinders	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Hand hoe	6	11	19	32	17	23	18	27	5	4	1	5	3	1	2	174
Vehicles	0	0	1	2	1	0	1	0	0	0	0	0	0	0	0	5
Tractor	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2
Bicycle	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	3
Motorcycle	0	2	3	9	5	9	1	6	1	0	0	0	1	0	1	38
Car	1	2	0	1	1	2	0	1	0	0	0	0	1	0	0	9
Chair	1	0	0	4	4	0	0	0	0	0	0	0	0	0	0	9
Radio	4	7	4	10	5	12	6	6	0	1	1	2	1	1	0	60
TV	2	5	7	21	10	18	10	10	1	1	0	1	1	1	1	89
Mobile Phones	0	6	9	12	4	10	3	5	1	0	0	1	4	0	2	57
Other	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3

4.3.7 Income and Expenditure among Farmers

Results of analysis of the annual income and expenditure among 96 households in the Study area are presented below (of a total of 103 sample households selected for the household survey, seven that recorded no income were excluded). It should be noted that since early 2012, Iran is experiencing a rapid inflation, due to impacts of considerable decrease in the value of Iranian Rials in the international exchange market and the subsidy reform policy implemented since 2010; as this section analyzes data collected in 2010 (unless otherwise noted), figures presented below, regarding household economies, tend to be generally low, considering the today's prices.

Table 4.8 Average Annual Household Income and Expenditure in the Rural Area of Iran, South Khorassan Province, and the Study Area

		Average Income (thousand Rls/household/year)			Average Expenditure (thousand Rls/household/year)		
		Agricultural	**Non-agri.**	**Total**	**Food**	**Others**	**Total**
Whole country of Iran (2008)	Urban	1,423 (2%)	86,797 (98%)	88,219 (100%)	21,360 (23%)	72,584 (77%)	93,944 (100%)
	Rural	10,480 (22%)	37,944 (78%)	48,424 (100%)	20,854 (39%)	33,141 (61%)	53,995 (100%)
South Khorassan Province (2007)	Urban	829 (2%)	50,331 (98%)	51,160 (100%)	15,415 (26%)	43,474 (74%)	58,889 (100%)
	Rural	5,576 (23%)	18,902 (77%)	24,478 (100%)	11,089 (45%)	13,475 (55%)	24,564 (100%)
Study area (2009)		12,168 (42%)	17,076 (58%)	29,244 (100%)	14,354 (55%)	11,657 (45%)	26,011 (100%)

Source: Statistics Year Book of Iran 1387 (2008); Statistics Year Book of South Khorassan 1386 (2007); JICA Study team (2010)

Compared to the rural area of the whole country or that of South Khorassan Province, the share of agriculture in the total income is higher in the Study area, reaching 42%.

Expenditure in the Study area is characterized by its high Engel's coefficient (55%).

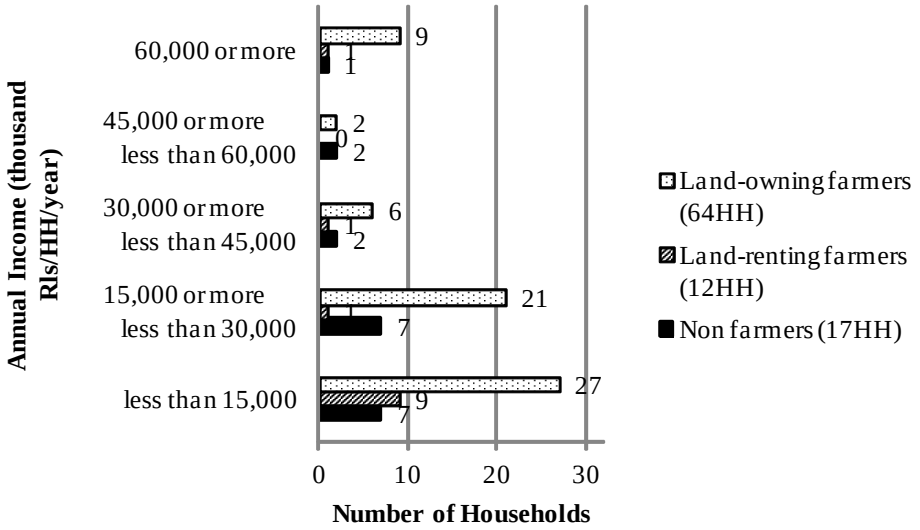
On average, the balance is positive among the households in the Study area. However, while there are 39 households with a positive balance, the remaining 57 households had a negative balance.

In the urban and rural area of the whole country and the urban area of South Khorassan Province, the average expenditures largely exceed the average incomes. A reason might be that many respondents reported a lower amount, compared to the real amount, of the following incomes that in fact complement their household budgets: (1) income from their side-businesses, in which many residents especially in urban areas are involved; (2) remittance from relatives or family members who are economically independent (due to reasons such as marriage); and (3) debt from friends or banks, which is not rare to have in Iran.

The value of self-consumed agricultural products was estimated to be 1,241 thousand Rls/household/year for the average of all the 96 households, or 1,610 thousand Rls/household/year for the average of the 74 households that were currently producing some crops. These values amount to around 10% of the food expenditure, which indicates that the contribution of self-consumed products to the households' budgets is low.

According to JAO, the legal daily minimum wage of Iran in 2009 was 31,560 thousand Rls/year (or 2,630 thousand Rls/month). Therefore, the mean income of the Study area was about 7% lower than the minimum wage.

(1) Details on the Income



Source: JICA Study team (2010)

Fig. 4.6 Number of Households in Different Ranges of Annual Income in the Study Area

In the Study area many households with low income and few households with high income coexist.

The income of 73 households (76% of the total) were lower than the legal minimum wage in 2009 of 31,560 thousand Rls/year.

Among the 96 households, 68% were landowning farmers (including 3 livestock raisers who did not practice farming), 13% were tenant farmers (interviewed farmers paid all the cost of production and a half of their harvest to the landowners), and 20% were non farmers (however including 6 households raising livestock for self-consumption).

No particular relation was observed between the size of income and the difference in the category of landowning, tenant, or non farmers.

The mean annual per capita income among the households was 9,198 thousand Rls (25,200 Rls/day). Of the 96 households (385 persons), 16 households (94 persons) obtained less than one dollar per capita per day (= 3,989 Rls, according to the estimation by International Monetary Fund (IMF) of the purchasing power parity price in 2009).

Table 4.9 Comparison of Mean Income among the Households Having Different Income Sources in the Study Area

		Income Source			Total
		Agriculture only	Agriculture + Non-agriculture	Non-agriculture only	
Number of households		21 (22%)	51 (53%)	24 (25%)	96 (100%)
Mean income (thousand Rls/HH/year)	Agri.	10,511	18,576	0	12,168
	Non- agri.	0	21,074	23,523	17,076
	Total	10,511	39,649	23,523	29,244

Source: JICA Study team (2010)

Households having only agriculture as their income source earn on average only one-third of the minimum wage.

Of the whole sample households, 53% earn both agriculture and non-agricultural incomes. While their mean agricultural income is larger than that of households earning only from agriculture, their mean non-agricultural income is comparable with that of households earning only non-agricultural income. As a result, the value of their total income is 3.8 times larger than that of "agriculture only" and 1.7 times larger than that of "non-agriculture only."

Table 4.10 Breakdown of Agricultural Income in the Study Area

	Barberry	Jujube	Livestock	Others	Total
Number of producing households (*)	68	55	17	19	71
Mean income (thousand Rls/HH/year)	10,391 (64%)	2,843 (17%)	2,502 (17%)	575 (4%)	16,311 (100%)

(*) A total of 71 households, excluding one from 72 households practicing agriculture whose income breakdown was unknown.
Source: JICA Study team (2010)

Barberry is produced by almost all the households practicing agriculture, while jujube is produced by 77% of them. These are the major agricultural products accounting for 81% of agricultural income in total. On the other hand, only about one-fourth of the households earn income from livestock.

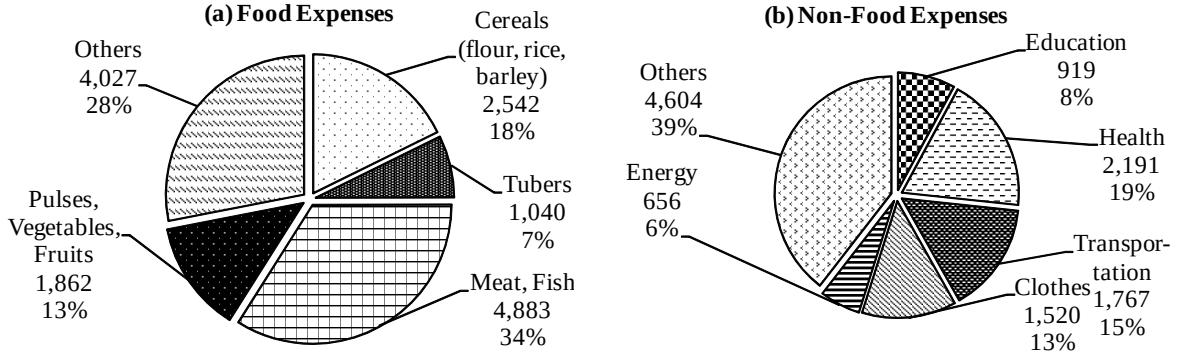
In the Study area, opportunities to earn non-agricultural income are very limited. The number of households earning from non-agricultural income sources decreases from 75 to 48, if taking into consideration only those households that are engaged in paid work or other business activities (the non-agricultural income of the remaining 27 households consists of supports from aid organizations). About one-third of these 48 households earn income by working in construction, in and outside the Study area. Besides construction, a few households earn income from carpet weaving, agricultural products trading, religious profession, tractor driving, welding, hair cutting, machine repairing, managing a company, or working as a laborer in a poultry farm.

Many young people in the Study area have left their family in the village and live in cities such as Birjand. Due to this phenomenon, working age population has been decreasing. According to the results of hearing surveys, villages in the Study area where more than 20 people between 20 and 60 years old live permanently in the village are limited to only the following five: Felarg, Borgeziad, Bozghong, Mafriz, and Sang Abad.

The annual income of the 73 households earning less than the minimum wage consists of on average 5,577 thousand Rls/household of agricultural income and 7,477 thousand Rls/household of non-agricultural income, totaling 13,055 thousand Rls/household. Assuming that their non-agricultural income does not change, their agricultural income should increase by 4.3 times as a whole, if their total income is to reach the minimum wage. This indicates that to improve the livelihoods of the residents in the Study area, it is indispensable to increase not only agricultural but also non-agricultural income.

It should be noted that the income presented in this section does not include the cash transfer from the government to all the Iranian citizens through the Targeted Subsidies Reform Act enforced in December 2010, because the discussion here is based on the data on the household economy in 2009, collected through the household survey. As explained about the Act in Section 2.2.3, Iranian citizens, regardless of age, currently receive 455 thousand Rls per capita per month from the government. In fact, all the 55 households interviewed in an additional household survey conducted in 2012 (see Section 5.4.5) received this cash transfer with no exception. For a household of 4 family members, the cash transfer amounts to 21,840 thousand Rls per year, and it has become a significantly important income source for farmers in the Study area. While the government has expressed its intention to exclude high-income population from the recipients in the future, following its original plan, in the Study area where the great majority of residents are low-income, many households are expected to keep receiving the cash transfer, at least from short- to mid-term period.

(2) Details on the Expenses



Unit: thousand Rls/household/year
Source: JICA Study team (2010)

Fig. 4.7 Breakdown of Mean annual Expenses of 96 Sample Households in the Study Area

In the food expenses, meat takes the largest share of 30% (4,373 thousand Rls/household/year). With regard to the cereals, rice takes 13% (1,865 thousand Rls/household/year), while wheat flour, which is rationed by the government (8 kg/person/month, according to JAO), takes only 4% (505 thousand Rls/household/year).

In the non-food expenses, the share of medical cost is high (19%), which appears to be the influence of aging among the residents in the Study area.

Regarding the transportation expenses, households not owning a car, when they cannot get a help of other villagers having cars, walk in general to the paved road running north-south in the Study area and ask for a ride to the drivers of circulating minibuses and cars. In such a case, they pay only 5,000 Rls to 10,000 Rls for one way to Birjand. Nevertheless, the share of transportation in the non-food expenses is high, which suggests that the residents in the Study area need to go out the village quite often for various reasons.

Of the 74 households currently producing some crops, 61 purchase fertilizers, and the expense was on an average 531 thousand Rls/household/year (5% of non-food expenses).

The mean value of per capita annual expenses across the surveyed households was 8,073 thousand Rls (or 22 thousand Rls/day).

Among the 96 households (385 persons), the Engel's coefficient of 71 households (287 persons) exceeds 50%, and moreover that of 53 households (212 persons) exceeds 60%. This means that in the Study area, households' income is generally low, while the expenses on food, which are indispensable goods to survive, cannot go below certain level, thus limiting these households' expenditures for other goods and services.

In the current situation where the food expenses overwhelm households' economy, they cannot afford to invest in economic activities such as agriculture. Therefore, the low productivity continues, preventing the improvement of their livelihoods. It would be important first to try to reduce Engel's coefficient through increase in the production of self-consumed crops.

(3) Details on income and expenses of each village

Table 4.11 Comparison of Households' Mean Annual Income and Expenses in the Villages of the Study Area

Village		Sample Households (*)	Mean Income (thousand Rls/HH/year)			Mean Expenses (thousand Rls/HH/year)		
			Agri.	Non-agri.	Total	Food	Non-food	Total
Alghourat Rural Municipality	1. Masen	4/10	15,008	36,005	51,013	24,525	20,897	45,422
	2. Alghor	7/26	14,220	24,829	39,049	10,851	18,591	29,442
	3. Kooshk	8/24	7,064	5,200	12,264	11,900	9,528	21,428
	4. Felarg	19/65	6,925	17,294	24,219	13,395	10,554	23,949
	5. Borgeziad	8/31	5,534	11,223	16,756	22,053	18,117	40,169
	6. Bozghong	21/63	6,734	17,189	23,922	10,664	5,122	15,786
	7. Mafriz	11/33	18,135	10,598	28,733	14,479	9,250	23,729
	8. Sang Abad	10/33	24,684	30,470	55,154	21,120	11,406	32,526
Kahshang Rural Municipality	9. Zin Abad	1/2	7,500	0	7,500	13,770	6,300	20,070
	10. Sheikhan	1/4	12,800	0	12,800	9,828	5,020	14,848
	11. Neyestan	1/4	0	4,600	4,600	7,596	4,910	12,506
	12. Garmidar	2/4	1,655	1,650	3,305	7,466	3,745	11,211
	13. Garmok	1/1	15,855	11,708	27,563	13,584	52,105	65,689
	14. Jalal	1/5	128,150	18,150	146,300	12,576	26,222	38,798
	15. Takhchar Abad	1/4	20,818	41,515	62,333	11,092	58,212	69,304
Total		96/309	12,168	17,076	29,244	14,354	11,657	26,011

(*) Sample households / Households living in the village
Source: JICA Study team (2010)

The income level of each village in the Study area is generally low. In particular, more than half of the seven villages in Kahshang Rural Municipality earn extremely low incomes. With regard to the Alghourat Rural Municipality, three out of eight villages, namely Masen, Alghor, and Sang Abad, earn a mean income that exceeds the minimum wage. However, upon excluding very few high-income households from the data, the mean annual income of all these three villages fall into the range of 22 to 23 thousand Rls/household, which is lower than the minimum wage. In the majority of the villages, the average expenditure exceeds the average income. As mentioned above, a reason might be that respondents reported a lower amount, compared to the real amount, of the secondary incomes, including remittance and debt.

High Engel's coefficient is another characteristic that can be observed across the villages in the Study area: all the villages except Alghor, Garmok, Jalal, and Takhchar Abad, have an Engel's coefficient of higher than 50%.

4.4 Irrigation

4.4.1 Qanats

(a) Dating back to about B.C. 500s, the method of excavating qanats was invented to secure water resources in Iran. Since then this method had become widespread to countries in the dry zone of the world as a useful means to secure water. The vertical shaft and the horizontal underground tunnel of the qanat were excavated by skilled workers with expertise in probing groundwater. A vertical shaft was excavated as deep as possible until it reached the groundwater passage. Then horizontal underground tunnels were excavated to the direction of both upstream and downstream. Only manpower was used for excavating the horizontal underground tunnel without timbering. Its height was as low as people could narrowly walk through with a stoop. From the viewpoint of engineering and safety of the structure there was an obvious limitation for continuing a horizontal underground tunnel excavation. Excavating horizontal underground tunnel toward the upstream and downstream directions and constructing vertical shafts were alternately repeated until

underground tunnels were finally connected. The excavation of horizontal underground tunnel was completed when groundwater surfaced to the ground to be readily available for the use of agriculture and domesticity. In general, the qanat has a gentle slope to convey groundwater safely to the downstream without damaging the inside walls and the bottom of the horizontal tunnel. The entrance of the vertical shaft was filled with broken stones. The walls of horizontal tunnels were easily to collapse. They had to be carefully and periodically maintained by clearing the soil sediment and by repairing the inside of the tunnel to prevent from collapsing. The entrance of a vertical shaft is likely to be broken by flood. In order to avoid such destruction the opening of the qanat is presently sealed tightly with concrete caps. In Iran, there was a time in the past when the development of tube wells was encouraged, to a great extent, in place of qanats for the use of groundwater. The result was that excessive drawing of groundwater caused critically drying up qanats nationwide. Since then the development of new tube wells has been tightly restrained in consideration of the past bitter experiences.

(b) The qanat is a private property jointly owned by farmers (users) having water rights and officially registered under the name of representatives at the South Khorassan General Office of Regional Water (Table 4.13). The water rights are combined together with the farm land. Farmers obtained those two in the era of Land reform. The qanats are classified into 3 categories, such as:

- 'Permanent': water is directly obtained from the aquifer, and discharge is relatively abundant;
- 'Affected by rain': while the discharge varies, affected by snow and rain, water does not stop even in the dry season; and
- 'Seasonal': discharge stops in the dry season.

(c) Table 4.14 shows the records of water discharge, EC, PH and water temperature, measured by the Study team between October 2010 and September 2012. Although the survey was conducted in the dry season, it showed that some qanats stably discharged a large quantity of water. On the other hand, many other qanats recorded weak and unstable discharge.

(d) While the qanat has been playing an important role in the rural society, its role has been changing in recent years, along with the change in the rural society. For instance, in many villages of the Study area in Alghourat Rural Municipality, a water supply system was developed in around the year 2000. Based on hearing from villagers of Felarg, where the discharge of qanat is the stablest in the Study area, change in the roles of qanat before and after the development of water supply system is recognized, as shown in the table below. While before the development of water supply system, the qanat was considered equally important for use for irrigation, cooking and laundry, after the development of water supply system, the considered importance of qanat for irrigation relatively increased, followed by laundry and cooking. The table below shows the result of analysis, in which relative importance of different roles of qanat that the respondents recognized before and after the development of water supply system were weighed, applying the *pairwise comparison* of the Analytic Hierarchy Process (AHP) method.

Table 4.12 Change of the Roles of Qanat before and after Development of Water Supply System

Before development of water supply system		**After development of water supply system**	
Use	**Weight**	**Use**	**Weight**
Irrigation	0.367	Irrigation	0.447
Cooking	0.276	Cooking	0.164
Laundry	0.274	Laundry	0.288
Chatting with neighbors	0.083	Chatting with neighbors	0.101
Total	1.000	Total	1.000

Note: based on hearing from 21 villagers of Felarg (both men and women, age of 32 to 72)

Table 4.13 List of Registered Qanats

	Village	**Qanat length (m)**	**Water condition**	**Discharge (Lit/s)**	**Min.dis. (Lit/s)**	**Max.dis. (Lit/s)**	**EC (µS/cm)**	**pH**
1	Masen	468	P	0.24	0.12	0.36	1580	8.2
2		411	P	0.90	0.04	1.50	3600	7.5
3		207	A	0.39	0.10	0.58	990	7.8
4		230	A	0.10	0.10	0.50	2450	0
5		87	A	0.50	0.00	1.00	1162	7.9
6		304	S	0.10	0.10	0.50	2450	7.8
7		363	P	0.50	0.10	1.00	2080	7
8		262	A	0.20	0.10	0.31	570	7.6
9		494	P	1.50	1.00	2.00	2740	7.8
10		203	S	0.10	0.00	0.50	2450	8
				4.53	1.66	8.25		
11	Alghor	209	P	0.10	0.10	0.50	4740	8.2
12		692	S	0.10	0.10	0.50	2450	7.8
13		175	P	0.10	0.10	0.50	2470	8.5
14		1500	A	1.00	1.00	2.00	1180	7.4
15		600	P	2.00	1.00	3.00	2150	8
16		628	P	1.70	0.85	2.55	2150	7.5
				5.00	3.15	9.05		
17	Felarg	211	P	5.60	2.80	8.40	3140	8.4
18		195	P	0.48	0.10	0.72	3400	8.4
19		335	P	1.00	0.50	2.00	2890	8.4
20		201	P	2.00	1.00	3.00	1715	8.7
21		157	P	0.10	0.10	0.50	3750	8.7
22		143	P	1.00	0.50	2.00	5170	7.4
23		77	P	0.10	0.10	0.50	1797	8.3
				10.28	5.10	17.12		
24	Bozghong	312	P	3.00	3.00	4.00	5800	7.8
25		331	P	0.50	0.10	1.00	618	8
26		273	P	0.22	0.10	0.33	635	7.8
27		65	S	0.10	0.10	0.50	590	8
28		356	P	2.00	1.00	3.00	425	7.6
29		358	P	0.50	0.10	1.00	590	7.8
				6.32	4.40	9.83		
30	Mafriz	214	A	1.00	0.50	2.00	800	8.2
31		224	P	0.35	0.10	0.52	11760	8.1
32		48	P	1.00	0.50	2.00	10420	7.9
33		332	P	1.30	0.65	1.95	3450	8.4
34		528	P	2.60	1.30	3.90	340	7.9
35		185	S	0.10	0.10	0.50	590	8

	Village	Qanat length (m)	Water condition	Discharge (Lit/s)	Min.dis. (Lit/s)	Max.dis. (Lit/s)	EC (µS/cm)	pH
36		820	P	1.00	0.50	2.00	760	8
				7.35	3.65	12.87		
37	Sheikhan	372	A	0.28	0.10	0.42	695	7.8
38		564	A	1.00	0.50	2.00	1500	7.6
39		246	A	0.50	0.00	1.00	597	8.1
40		257	P	0.50	0.50	1.00	1520	8.7
				2.28	1.10	4.42		
41	Neyestan	126	A	0.23	0.10	0.34	350	8.5
42		428	A	0.50	0.00	1.00	1803	7.6
43		170	A	0.12	0.10	0.18	1600	8.1
44		108	A	0.50	0.00	1.00	360	7.1
				1.35	0.20	2.52		
45	Garmidar	650	A	1.00	0.20	1.50	3330	8.2
46		43	A	0.01	0.00	0.01	2580	8
				1.01	0.20	1.51		
47	Garmok	170	A	1.00	0.50	2.00	1020	8
48		220	A	0.10	0.10	0.50	2500	8
49		134	A	0.10	0.10	0.50	2500	7.8
50		228	S	0.10	0.10	0.50	2500	7.8
51		18	A	0.01	0.00	0.01	1160	8.2
52		156	A	0.33	0.10	0.49	1170	8.5
53		12	A	0.10	0.00	0.50	1140	7.1
54		10	A	0.10	0.05	0.15	1120	7.6
55		40	A	0.03	0.01	0.05	1640	7.6
56		84	A	0.50	0.00	1.00	1060	7.5
				2.37	0.96	5.70		
57	Jalal	190	A	0.50	0.00	1.00	5690	8
58		84	A	0.01	0.00	0.01	3500	7.9
59		89	A	0.15	0.10	0.22	4550	7.4
60		145	A	0.34	0.10	0.51	4730	7.9
61		296	A	0.50	0.00	1.00	2500	7
				1.50	0.20	2.74		
62	Takhchar Abad	826	A	0.50	0.00	1.00		7.4

Note:

Qanats are registered at the South Khorassan General Office of Regional Water

P (Permanent): Discharge of water is always abundant and stable.

A (Affected by rain): While the discharge varies, affected by snow and rain, water does not stop even in the dry season.

S (Seasonal): Discharge stops in the dry season.

Table 4.14 Observation of Discharge of Qanat Water

Village	Name of Qanat	Discharge (Lit/s)	EC (mS/cm)	pH	Water Temperature (°C)
Masen	Masen	Hard to measure	0.84	8.0	14.1
Alghor	Alghor	Hard to measure	0.84	7.9	15.3
Alghor		0.06	1.01～1.41	8.3～8.4	16.6～19.0
Alghor	Nowraz	1.08	0.74	8.3	15.5
Kooshk	Kooshk	Hard to measure	0.68	7.5	17.0
Felarg	Felarg	4.36～4.85	1.52～2.00	7.4～7.9	19.5～20.0
Felarg	Felarg End	0.18	1.89	7.6	17.8
Borgeziad	Borgeziad	Hard to measure	3.80	7.9	16.0
Bozghong	Bozghong	1.55	4.40	7.4	15.5
Bozghong	Dinouki	2.26～3.16	1.90～2.50	7.4～7.9	19.0～20
Bozghong	Tagiloon	0.19～0.22	2.20～2.90	7.8～8.3	17.0～18.1
Bozghong	Gosmabad	Hard to measure	3.40	8.4	16.0
Mafriz	Mafriz	2.09～2.48	3.00～3.90	7.3～7.9	16.0～17.0
Sang Abad	Sang Abad	0.47	2.00	7.7	18.0
Sang Abad	Hussein Abad	0.73～0.80	1.58～2.00	7.6～8.1	19.0～20.0
Sang Abad	Hussein Abad	0.30～0.32	1.54～2.00	7.4～7.7	17.0～19.4
Zin Abad	Zin Abad	0.42～0.54	1.58～2.00	7.8～8.4	17.1～19.0
Sheikhan	Sheikhan	0.59～0.65	2.70～3.60	7.3～8.3	18.0～19.0
Neyestan	Vaznj	Hard to measure	3.10	8.4	17.0
Neyestan	Neyestan	0.07～0.12	2.60～2.80	7.8～8.2	15.0～18.0
Garmidar	Garmidar	0.64～0.88	2.90～3.00	8.1～8.5	18.0～18.5
Garmidar	Spring Garmidar	0.05	2.2～2.3	8.1～8.2	19.8～20.0
Garmok	Garmok	0.24～0.31	1.01～1.06	7.8～8.6	17.0～20.0
Garmok	Garmok	0.14～0.20	1.02～1.20	7.4～8.2	17.0～18.5
Garmok	Garmok	0.06～007	1.04	7.6～7.9	19.0～20.0
Jalal	Jalal Top	0.29～0.54	1.20～2.00	7.2～7.9	18.0～19.8
Takhchar Abad	Takhchar Abad	Hard to measure	2.60	7.8	17.1

Source: JICA Study team (data collected from October 2010 to September 2012)

4.4.2 The Irrigation System

The irrigation system starts at the point where the underground tunnel surfaces to the ground. At the beginning point of the irrigation system there is usually a small pool which can store the quantity of water for an about 12-hour distribution. Before delivery of irrigation water starts, the quantity of water needed is stored in the pool, according to the area owned by each farmer. The recipient farmer of water in order of the irrigation rotation opens the lid located on the bottom of the pool to start water discharge. After finishing a rotation (about 2 to 6 hours; different according to the area owned by each farmer), storing water for the next rotation begins. A cycle of storing water in the pool and distributing water to the field continues day and night according to the rotation of irrigation in the irrigation season. These operations of storing, delivering and irrigating are carried out by the recipient farmer alone except in case he gets assistance from others. The irrigation system consisting of a pool and a small-scale open unlined or concrete canal with a distribution structure connects to the field directly. The system is arrayed in a series of a pool, main canal, distribution structure, and field. While a farmer

is operating in order, other farmers are not allowed either to get water from the canal or to irrigate their fields. Water is dammed up by a stop-log placed at the distribution structure immediately downstream so as to keep the water as high as required. A water level measurement post is not provided since the farmer uses a fixed amount of water in the exclusively occupied canal within an allocated time. As far as main irrigation system is concerned, there does not seem to be a critical problem about the operation of the system since such main structures as a pool, canal and distribution structure are fully used by a farmer. Many farmers' fields are, however, scattered in several distant places. These scattered fields are connected by unlined canals with irregular shape. The farmer has to irrigate all his scattered fields within allocated time. Conveyance losses of irrigation water are apparently so large that they cannot be overlooked. It would be possible to reduce conveyance losses if the farmer could exchange his land with other's so as to reduce a distance from the main canal to his fields. Grouping of farmers' land is also a good step to reduce conveyance losses and farmer's work load. The ending point of the irrigation canal leads to the fields of wheat and barley. Remaining water in the canal is used for the preparation of tilling and sowing seeds of wheat and barley. Wheat and barley which are sown from the end of October to November grow by rain in the rainy season, that is, rainfed irrigation is prevailing. Then water stored in the underground in the rainy season is discharged from the qanat as supplementary irrigation water.

4.4.3 Field Irrigation

In the Study area, agricultural fields are generally located on the slope, with complicated topography. While perennial fruit crops are cultivated in fixed fields, for annual crops, fields are used in various ways, depending on their types and periods of cultivation. Irrigation methods applied for annual crops vary, such as use of hoses between distribution structure to the field, and furrow and/or basin irrigation at the field's level.

Much water is needed for planting a nursery fruit tree, but over-irrigation may cause root rot for already grown fruit trees, which exist in a large quantity, surviving a long period against severe weather conditions in the dry season as well as in the rainy season. Irrigation water needs to be supplied to the root zone of the fruit tree which becomes broader and deeper as the fruit tree grows year by year.

The methods of furrow irrigation and basin irrigation are usually employed on the field of vegetables. In case of furrow irrigation vegetables are commonly planted in the furrow instead of on the ridges of the field which are provided to prevent water from escaping and to drain unnecessary water. Being preoccupied with the notion of insufficiency of irrigation water farmers customarily have tendency to plant vegetables in the furrow. In case of basin irrigation water is distributed widespread to cover the entire field without providing any ridge on the field. As a standard, a quantity of irrigation water of 1 ℓ/s/ha has been used in every village, but the distribution of water has to be reduced in case the water discharge from the qanat is much less than the standard quantity under unexpected circumstances. This quantity of water is widely used for projects supported by international organizations but it needs to be determined based on the local conditions of soil and the kinds of vegetables to be planted. According to the soil classification by FAO soils are classified as volcanic sandy soils of which horizon is shallow with debris and water holding capacity is low. Based on their empirical knowledge of the nature of soil farmers having water rights demand to JAO to provide irrigation water as much as possible. Accepting the farmers' demand JAO has used its own formula to decide water requirement. Results of the measurement test of intake rate (infiltration rate), conducted on vegetable and orchard fields, indicate that the method of spray irrigation is more suitable for the soil of these fields than methods of furrow and basin irrigation. In addition, the field capacities (equivalent to 24-hour field capacity) of these soils were examined at each depth of 10, 20 and 30 cm. The test results showed that the field capacity decreased as the depth of soil profile increased. Soil texture is mainly of sandy loam (SL). However, it also contains more or less clay and silt that are easy to consolidate, which probably prevent water from going downward and keeps it on in the upper layer of soil.

It is commonly known that mulching is a useful way of reducing evaporation from the soil surface in

the semi-arid region. The present methods of irrigation do not take into account sufficiently the relationship between soil characteristics and crop properties. It would be necessary to improve the method of irrigation from the viewpoint of water saving and most appropriate cultivation of crops. The drip irrigation needs to be implemented for achieving the goal of effective cultivation. In the Study area, a certain advanced farmer independently employs a method of drip irrigation and mulching, although such methods are not yet commonly applied.

4.4.4 Water Management

The water management of the qanat is composed of the two functions, that is, the distribution of water to the field, and operation and maintenance including the repairing of qanats. As mentioned above, the qanat is a private property jointly owned by farmers having water rights. They discuss and decide the discharge of the qanat available, the quantity of water distribution to each farmer member, the distribution schedule of time and irrigation intervals, and the order of the rotation of irrigation. The interval of rotation for vegetables and fruit trees is about two weeks. Distribution of water to newly reclaimed land is not allowed except that the discharge of qanat is extremely abundant. The maintenance of the qanat requires periodical clean-up of the sediment of earth and sand and the repairing of collapsed tunnel walls. To implement these works member farmers decide through discussion the amount of levy to share among them, the method of collection of levy, and the schedule of collection. From generation to generation the member farmers have enjoyed exercising their own rights to exclusive use of water and related facilities within the rotation period. Furthermore, they are entitled to decide important O & M issues including the costs in detail. Therefore, there would be no reason for them to organize a so-called water users association. In addition, more than half the member farmers live in Birjand. Those member farmers positively participate in the activities of the organization but manage their land independently according to their own farm management plan. Consequently they are not in a position to support organization of water users association. In case they cannot find a solution among water right holders to subject such as the sharing of the huge repairing cost of the qanat, the subject is passed to the village council for discussion. If necessary, the council may request to JAO for the implementation of the repairing works and accompanying financial support of subsidy.

Incidentally, some past reference materials emphasize the authority of the milab regarding water management. At present, the milab is no longer a meaningful position because it would be difficult for him to be significantly involved in decision making process of the management of such shared private property by the member farmers.

4.4.5 Repairing of Qanats

At present, there are restrictions on digging a new tube well and excavating a new qanat which may influence the existing qanats. The excavation of a new qanat requires the permission of the Ministry of Energy so that there is hardly any newly constructed qanat. There are, however, a large number of existing qanats to be repaired nationwide for which MOJA is a responsible organization.

Through the site survey most qanats are clearly located in the past flood plains, the existing wadis, and the road cum natural floodways. Once flood water discharges abruptly and reaches downstream unexpectedly, a vertical shaft and horizontal underground tunnel are easily berried and destroyed with mud and stones. To protect the qanat the entrance of the vertical shaft is tightly sealed up with concrete as much as possible. The inside of the horizontal underground tunnel has been repeatedly repaired by an expert of the qanat whenever the flow of water was blocked by sediment of soil and sand. In the case of a small scale repairing works member farmers shoulder all costs of works except otherwise the village concerned bears a part of the costs. In the case of a large scale repairing works the village concerned request to JAO, on behalf of farmer members, for the financial support through Shahrestan. Then JAO submits to MOJA necessary documents and materials for review and consideration. After granted the amount of subsidy covering the costs of construction materials and the repairing of horizontal underground tunnel is delivered to the Shahrestan through JAO. Shahrestan is

responsible for the procurement of the contractor. JAO and the Shahrestan assign their members of staff for construction management, respectively. The village or the member farmers assist the Shahrestan and JAO in providing laborers at their expense. JAO implements repairing of the canal and constructing a pool and floodwall in addition to repairing the qanat.

Repairing of the qanat is basically limited to restoring the original function and the shape of the damaged qanat. Repairing works is carried out by placing an irregular oval shape of concrete block of about 1m high × 70cm wide × 20cm long × 7cm thick in the unlined vertical shaft as well as horizontal underground tunnel to protect the surface of the structures. There are however, some issues to be recognized for the smooth implementation of repairing works, such as:

- It is difficult to find the direction of the horizontal underground tunnel to be repaired due to the lack of the location map and the route map.
- When qanats that are located under crop fields are damaged or subside by natural disasters, farmers tend to refill the ground to avoid their farming activities to be disturbed. This also makes it difficult to identify the location of qanats.
- Being carried out only by manpower in a small space of the horizontal underground tunnel repairing of the qanat takes a long period of time to complete.
- During the repairing period all users of the qanat are hampered about water use. Consequently, a substitution of water source needs to be arranged in advance.
- Securing human resources of qanat experts is a critical problem since the number of successors to the senior experts has drastically decreased.
- There is an argument about granting subsidy to a private property like the qanat.
- The influence of the subsidy reform policy is still unknown.

Table 4.15 Qanat Repair Recently Carried Out by JAO

	Name of village	Name of qanat	Year of repair	Part of repair			
					Qanat		
				Pool (m^3)	Vertical shaft (m)	Horizontal underground tunnel (m)	Mother well (m)
1	Garmidar	Garmidar	2011	230			
2	Neyestan	Neyestan	2012	70			
3	Masen	Akbar Abad	2009		75	150	15
4	Masen	Nalgander	2007	100	60	150	18
5	Masen	Abhkizi	2009		120	260	18
6	Masen	Tangal	2009		20	60	8
7	Masen	Miyantang	2009		90	500	17
8	Alghor	Alghour	2009		120	580	20
9	Alghor	Nowraz	2009		110	500	15
10	Alghor	Mougerd	2009		180	1700	25
11	Borgeziad	Borgeziad	2005		50	200	9
12	Bozghong	Ghasem Abad	2011	100			
13	Bozghong	Ghandab(Ghond)	2010	80	450	160	9
14	Mafriz	Nasr Abad	2007-2011	250	150	650	13
15	Mafriz	Ghanbarouk	2011		80	250	12
16	Sang Abad	Sang Abad	2006		35	150	12
17	Zin Abad	Zin Abad	2005		160	450	18
18	Sheikhan	Shiekhan					
19	Alghor	Patoot	2009		95	400	15
20	Bozghong	Dinouk	2009-2010	100	90	350	22
21	Masen	Kelate Molayan	2008	100			
22	Kooshk	Kooshk	2007-2009		120	500	14

Source: JAO

4.5 Agricultural Production

4.5.1 Land Ownership

The table below shows the land area available to 103 households, selected for the household survey.

Table 4.16 Land Area Available to 103 Households Selected for Household Survey

Statistics	Available land (ha)
Average	1.24
Median	0.22
Maximum	10.11
Minimum	0.00

Available lands include residential area, cultivated, fallow, abandoned area.

While the average size of available land is 1.24ha, due to a relatively small number of households owning large areas, a half of the households have access to a much smaller area of 0.22ha or less.

Among the 103 households, 21 mentioned that they had no residential area or agricultural land available to them, and three had abandoned their agricultural lands; therefore, the remaining 79 used agricultural lands. The average land area of these 79 households is 1.45ha, while the median is 0.40ha.

Table 4.17 Agricultural Land Area of 79 Households (Those Using Agricultural Land among 103 Surveyed Households)

Statistics	Agricultural land (ha)
Average	1.45
Median	0.40
Maximum	10.10
Minimum	0.01

Table 4.18 Planted area of 79 Households (Those Using Agricultural Land among 103 Surveyed Households)

	0.1ha>	0.1-0.5ha	0.5-1.0ha	1.0-5.0ha	5.0-10.0ha	10.0ha<	Total
HH (No.)	16	24	10	23	5	1	79
Ratio (%)	20	30	13	29	6	1	100
Area (ha)	1	6	6	54	40	10	117
Ratio (%)	1	5	5	46	34	9	100

- While small-scale farmers with a planted area of less than 1ha account for about 60% of the 79 households, their total planted area accounts for only 11% of the total planted area of the 79 households. As shown in Table 3.6, in the whole South Khorassan Province, 42% of farmers own land of less than 1ha. This indicates that the ratio of small-scale farmers is high in the Study area.
- Also as shown in Table 3.6, the average planted area per household was 1.8ha for the Province and 3.8ha for the whole country, while it is as small as 1.5ha (117ha/79 households) in the Study area.
- The number of households with more than 5ha of planted area is only six (7% of the 79 households), but accounting for 43% of the total planted area.

4.5.2 Agricultural Land Use

The situation of land use for agriculture in each village of the Study area was estimated using Google Earth, as shown in Table 4.19. The total agricultural land area of the 15 villages was estimated to be 178ha, of which 73ha for barberries, 44ha for orchards and 61ha for upland crops. The villages with a large area of barberry cultivation were Felarg, Jalal and Bozghong, the villages with a large area of orchard cultivation were Kooshk and Felarg, and the villages with a large area of upland crop cultivation were Kooshk, Felarg and Alghor.

Table 4.19 Agricultural Land Use in the Study Area

Land use / Village	Barberry		Orchard [1)]		Upland crop [2)]		Total	
	ha	%	ha	%	ha	%	ha	%
1. Masen	1.73	(2.4)	1.10	(2.5)	1.05	(1.7)	3.88	(2.2)
2. Alghor	7.82	(10.8)	4.63	(10.5)	8.08	(13.3)	20.52	(11.6)
3. Kooshk	6.25	(8.6)	15.32	(34.8)	12.67	(20.9)	34.24	(19.3)
4. Felarg	9.87	(13.6)	7.92	(18.0)	9.11	(15.0)	26.90	(15.2)
5. Borgeziad	2.95	(4.1)	0.38	(0.9)	1.73	(2.9)	5.06	(2.9)
6. Bozghong	8.78	(12.1)	5.11	(11.6)	3.80	(6.3)	17.69	(10.0)
7. Mafriz	7.40	(10.2)	1.17	(2.7)	3.20	(5.3)	11.77	(6.6)
8. Sang Abad	4.81	(6.6)	2.03	(4.6)	0.20	(0.3)	7.04	(4.0)
9. Zin Abad	0.46	(0.6)	0.69	(1.6)	7.04	(11.6)	8.19	(4.6)
10. Sheikhan	2.86	(3.9)	0.28	(0.2)	5.24	(8.6)	8.38	(4.7)
11. Neyestan	1.89	(2.6)	0.52	(1.2)	1.38	(2.3)	3.79	(2.1)
12. Garmidar	2.65	(3.6)	0.69	(1.6)	2.23	(3.7)	5.56	(3.1)
13. Garmok	0.66	(0.9)	0.77	(1.8)	2.37	(3.9)	3.80	(2.1)
14. Jalal	9.79	(13.5)	3.22	(7.3)	0.67	(1.1)	13.69	(7.7)
15. Takhchar Abad	4.73	(6.5)	0.22	(0.5)	1.88	(3.1)	6.83	(3.8)
Total	72.65	(100.0)	44.04	(100.0)	60.66	(100.0)	177.36	(100.0)

1) Area of orchards other than barberries; 2) Area of agricultural land used for cultivation of crops other than barberries and other orchards.

Notes: Figures in parentheses are the ratio of land area used for barberries, orchards or upland crops in the village to the land area used for the same crops in all the 15 villages.

Source: Prepared by the Study team, based on data obtained from Google Earth.

4.5.3 Farm Management Strategies

During the village survey carried out as a part of the baseline survey conducted in 2010, the heads of all the surveyed 8 villages (Masen, Alghor, Borgeziad, Bozghong, Mafriz, Sang Abad, Jalal and Takhchar Abad) recognized that the cultivation area of wheat and barley has been decreasing. Besides, the cultivation areas of many fruits have also been decreasing. On the other hand, the cultivation area of barberry and jujube has been flattened or increased in many villages. In addition, the area of almond has been increasing in some villages.

The similar trend can be seen in the yield; the yield of wheat and barley has been decreasing while those of barberry and jujube have been increasing. These indicate that villagers have been transforming the wheat and barley fields into orchards.

Thus, facing the continuing drought and increase in the living costs, farmers have been turning their farm management strategies from focusing self-consumption crops such as wheat and barley, to focusing cash crops such as barberries and jujube. In other words, to adapt to the recent year's changes in natural, social and economical environments, while farmers (mainly men) have been increasingly engaged in non-agricultural jobs, at the same time they have been putting more importance on barberries and jujube, crops that are high in land productivity, have high drought tolerance, and are able to be managed by extensive farming. Especially, the planted area of barberries has been in an increase, although at a slow pace, as this crop is easily increased or renewed by farmers themselves with their technical level.

Of the 103 households selected for the household survey, 79 practiced agriculture. Their total cultivating area is presented below for each crop.

Table 4.20 Planted area of Different Crops by 79 Households (Those Practicing Agriculture among 103 Surveyed Households)

Category	Item	Area (ha)
Cereal	Wheat	43.49
	Barley	1.55
Industrial crop	Sugar beat	0.08
	Turnip	0.02
	Saffron	0.02
	Mangel wurzel	0.02
Vegetable	Onions	0.06
	Potato	0.05
	Tomato	0.02
Summer production	Water melon	0.54
	Musk melon	0.01
	Cucumber	0.01
Pasture	Alfalfa	0.05
Fruits	Barberry	30.59
	Jujube	28.35
	Almond	5.50
	Grapes	3.32
	Pomegranate	1.26
	Plum	2.12
	Walnut	0.16
	Apple	0.04
	Pear	0.03
	Apricot	0.002
	Mulberry	0.001
	Pistachio	0.06
Total		117.353

The largest planted area is that of wheat, which is a major cereal crop. Barberry and jujube follow it.

Table 4.21 Main Crops' Planted area, Production and Yield of 79 Households (Those Practicing Agriculture among 103 Surveyed Households)

	Wheat			Barberry*			Jujube*		
	Area (ha)	Production (kg)	Yield (kg/ha)	Area (ha)	Production (kg)	Yield (kg/ha)	Area (ha)	Production (kg)	Yield (kg/ha)
1. Masen	-	-	-	1.10	860	785	0.55	467	848
2. Alghor	6.57	450	68	0.78	854	1,095	2.62	1,568	599
3. Kooshk	2.61	3,800	1,456	1.42	734	517	0.58	1,824	3,150
4. Felarg	15.28	3,660	240	2.98	1,595	535	2.31	1,457	630
5. Borgeziad	4.82	1,030	213	1.15	715	619	2.07	542	261
6. Bozghong	0.09	100	1,149	5.14	1,962	382	5.05	1,957	388
7. Mafriz	2.52	200	79	6.92	2,196	318	4.27	733	172
8. Sang Abad	11.25	1,260	112	9.03	2,722	301	9.10	2,797	307
9. Zin Abad	0.10	200	2,000	0.03	120	4,000	0.03	250	8,333
10. Sheikhan	-	-	-	1.00	200	200	1.00	400	400
11. Neyestan	0.25	150	600	0.01	14	1,167	-	-	-
12. Garmidar	-	-	-	0.21	101	479	0.03	10	400
13. Garmok	-	-	-	0.14	290	2,044	0.15	33	220
14. Jalal	-	-	-	0.09	500	5,741	0.03	210	7,216
15. Takhchar Abad	-	-	-	0.60	296	497	0.56	1,858	3,300
Total	43.49	10,850	249	30.59	13,159	430	28.35	14,106	498

(Barberry: Dry weight x 5 = Fresh weight; Jujube: Dry weight x 3 = Fresh weight)

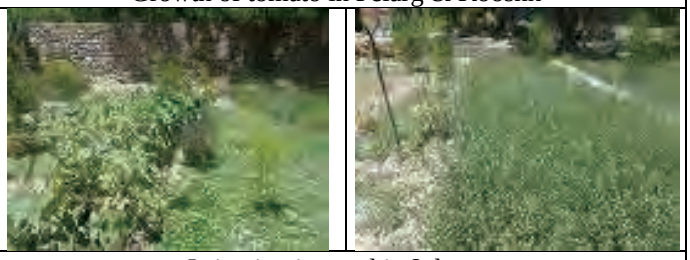
	Almond			Grape			Total (ha)
	Area (ha)	Production (kg)	Yield (kg/ha)	Area (ha)	Production (kg)	Yield (kg/ha)	
1. Masen	0.03	50	2,000	2.53	600	238	4.20
2. Alghor	0.76	200	263	0.20	30	150	10.93
3. Kooshk	0.20	50	250	0.01	30	3,000	4.82
4. Felarg	-	-	-	0.03	60	2,000	20.60
5. Borgeziad	0.11	292	2,600	0.00	-	-	8.17
6. Bozghong	1.72	-	-	-	-	-	11.99
7. Mafriz	0.50	200	400	0.50	150	300	14.70
8. Sang Abad	1.91	340	178	-	-	-	31.29
9. Zin Abad	-	-	-	-	-	-	0.16
10. Sheikhan	-	-	-	-	-	-	2.00
11. Neyestan	-	-	-	-	-	-	0.26
12. Garmidar	0.01	10	2,000	-	-	-	0.24
13. Garmok	0.27	114	423	0.05	-	-	0.62
14. Jalal	-	-	-	-	-	-	0.12
15. Takhchar Abad	-	-	-	-	-	-	1.16
Total	5.50	1,256	228	3.32	870	262	111.25

- Wheat cannot be cultivated in the villages where irrigation water is in shortage.
- Villages endowed with richer water resource and having more residents tend to cultivate more wheat.
- Barberry and jujube are cultivated in all the villages.
- As for the villages endowed with richer discharge of water from qanat, the crop planted area is bigger than the less discharged villages, except Sang Abad.
- Average wheat yield in the Study area is as low as about one-tenth of that in the whole Birjand township (2.3ton/ha).
- Average yields of all the perennial crops are also lower than those in the whole Birjand township (barberry: 1,322kg/ha; jujube: 3,336kg/ha; almond: 705kg/ha; and grape: 1,488kg/ha).

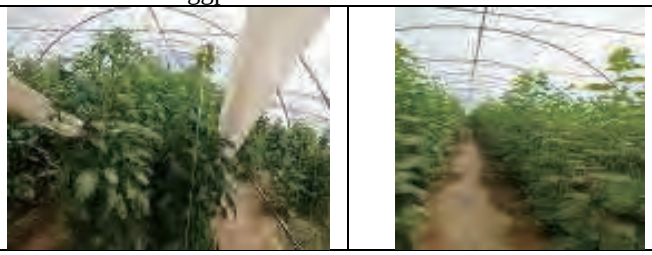
4.5.4 Annual Crop

In the Study area, many farmers cultivate vegetables on a small scale for self-consumption, starting in March. Several varieties of vegetables are cultivated in small plots (about 3-4 m x 5-10 m). In addition to the crops appearing in the statistics, there are other many varieties of vegetables cultivated in the Study area, such as eggplant, onion, herbs, pumpkin, and sunflower.

Irrigation interval is from 12 to 14 days.
Growth of tomato in Felarg & Kooshk



Irrigation interval is 6 days.
Eggplant and alfalfa in Kooshk



Irrigation interval is 1 day.
Tomato and cucumber cultivation with drip irrigation system by a progressive farmer in the area.

Fig. 4.8 Vegetable Growth by Irrigation Interval Days

Fig. 4.8 shows growth situations of vegetables by different irrigation intervals in the Study area. Most of vegetable fields showed low germination rates and unequal growth. The main reasons are likely to be as follows:

Generally, irrigation interval in the Study area is very long, from 12 to 14 days. The long interval induces drought injury and severely slow growth of crops. The growth period is longer than that of the standard growth period.

In general, excess water flows into the field at once when the field is irrigated. Due to the excess irrigation water, root rotting occurs, and crops show a low growth rate and/or die in the end. Moreover, at seeding stage, the excess flow washes the seeds away.

Due to the situations mentioned above, the growth period is longer than normal. Generally vegetables are seeded in the middle of March and harvest starts from the end of July to the end of August. The current irrigation method requires in total a large quantity of water, and still results in very low yield. The low yield cannot meet the self-consumption demand of farm households and oblige them to buy vegetables from town.

Cropping calendar of main crops in the area is shown in the figure below.

- Cultivation of summer vegetables starts in April, and cultivation of winter vegetables starts in November.
- Planted area of winter vegetables is much smaller than that of the summer vegetables. Winter crops are grown only in the villages endowed with richer water resource.
- Sugar beet, turnip and alfalfa are cultivated as livestock feed, rather than for human consumption.

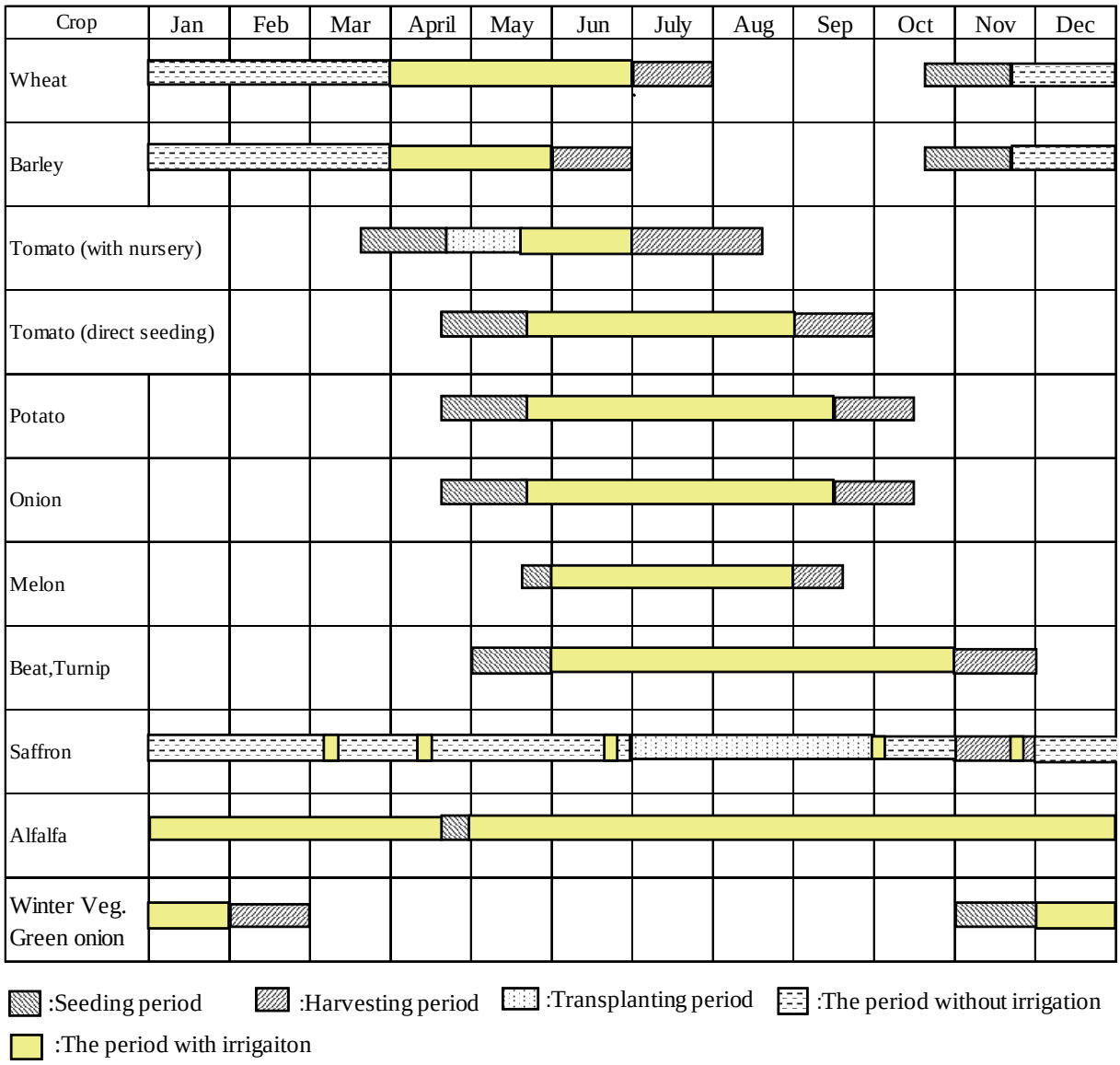


Fig. 4.9 Cropping Calendar of Major Annual Crops

4.5.5 Perennial Crop

In the Study area, the production of perennial crops is the most important source of income among the agricultural products. Major perennial crops are jujube and barberry. In addition, nuts (such as almond, pistachio and walnut) and fruits (such as grape, pear, pomegranate, fig, plum [yellow skin type and purple skin type] and apple) are also cultivated in a small scale (Fig. 4.10). The harvesting time of perennial crops is as follows: almond in August, barberries from late October to early November, and most others in September.

Incomes per hectare by crop in the Study area are shown in Table 4.22. Among cultivated crops in the Study area, the largest income per hectare is obtained from the cultivation of barberry, followed by pistachio and jujube. These three crops have high tolerance to the low temperature in winter and draught resistance. Therefore, these crops are suitable to the climate condition of this Study area.

Table 4.22 Income per Hector by Crop

Unit: Rls/ha

	Irrigated	Rainfed
Pistachio	30,782,070	-
Almond	14,722,000	4,380,000
Pomegranate	28,567,763	-
Barberry	54,500,000	-
Apple	27,471,500	-
Grape	21,948,165	7,471,408
Jujube	29,240,400	-
Apricot	13,032,837	

Jujube: 12,000 Rls/kg, Barberry 50,000 Rls/kg (Source: hearing survey)
Source: Iran Statistic Office (Farm gate price in 2008, MOJA (yield in 2008))

Cultivation of barberries in the eastern part of Iran is said to have begun more than 200 years ago. Also, in the Study area, its cultivation for sales is said to have increased in 1970s. Therefore, farmers have a long-year experience and knowledge for barberry cultivation, and it is a common and familiar crop to the Study area. In addition, as mentioned above, barberries have higher profitability per unit of land, compared to other orchards. It also has high tolerance to drought, cold, and pests and insects. Therefore, nowadays it is the most suitable crop to the Study area. Furthermore, it can be relatively easily multiplied by sucker, which allows farmers to increase the number of plants and thus planted areas by themselves. These characteristics have led farmers to switch from other crops to barberries, for securing profits using limited amount of irrigation water, which is continuously diminishing in recent years. As a result, the planted area of barberries is in an increasing trend.

A fruiting characteristic of barberries is that it has on-year (i.e., year of large harvest) and off-year (i.e., year of small harvest). This causes the amount of harvest to be unstable. However, through fertilizing and pruning techniques, it is possible to reduce, to some extent, the difference in the amount of harvest between on-years and off-years.

The main harvest method of barberries is to cut off fruits together with branches, using tools such as scissors. After harvest, the branches holding fruits are dried either in-house or on the roof. After drying for about one month, the fruits can relatively easily be separated from the branches. The fruits are then put in boxes or bags and become ready for shipping.

Barberries are mainly used as food. Small amount of dried barberries are often put on or mixed in rice, or they are also used as an ingredient in traditional dishes. They are also often consumed by being processed into jam, syrup, juice and others: many farmers prepare home-made syrup and/or jam. Moreover, as a traditional drug, barberries are said to have several medicinal effects, such as antibacterial, alleviation of fever, and lowering cholesterol and blood pressure. Therefore, they are used as a natural drug at home.

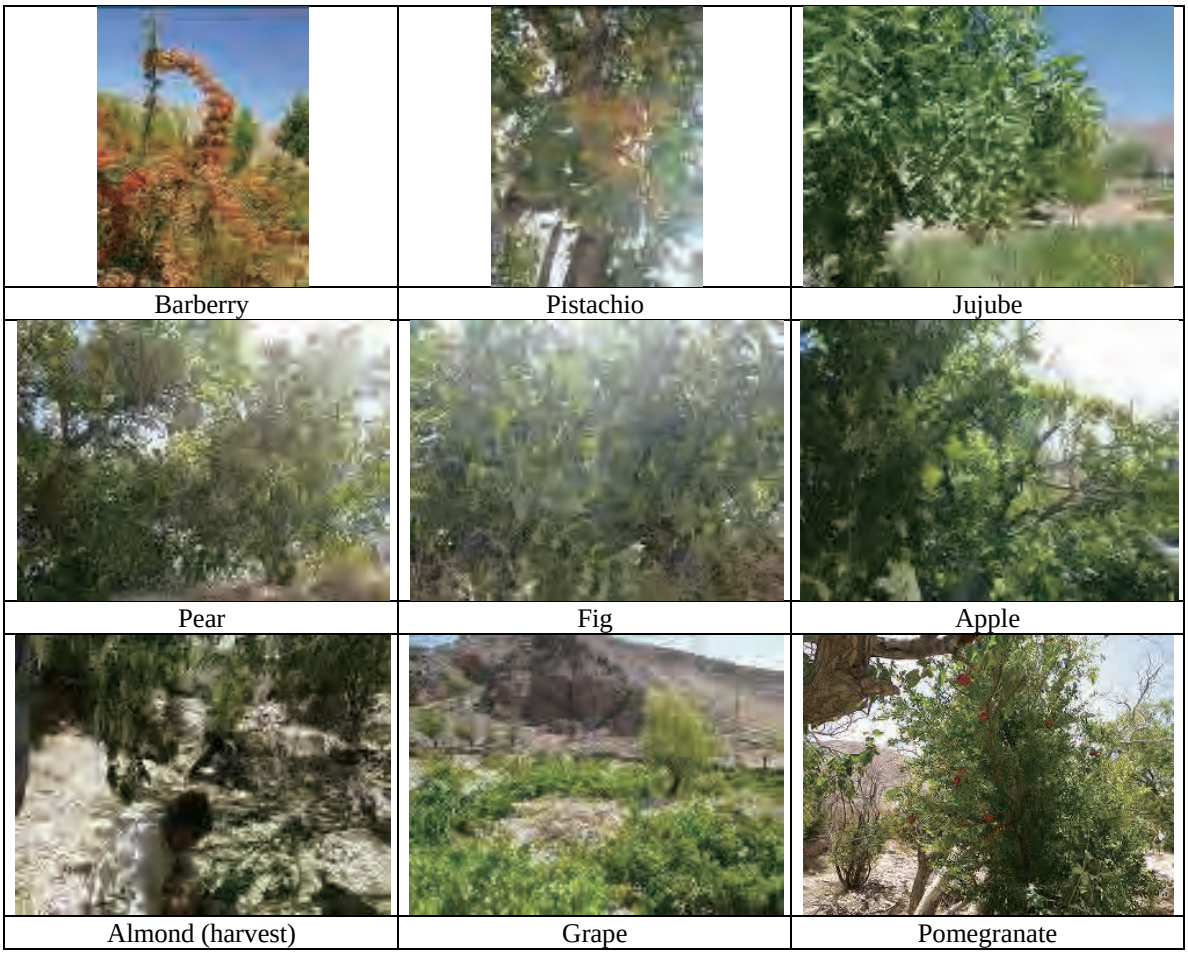


Fig. 4.10 Main Perennial Crops Cultivated in the Study Area

4.5.6 Livestock

The results of the household survey, with 103 interviewees, are as follows, about livestock production.

- Of all the households surveyed, 62 owned animals.
- Of these 62 households, only two raised dairy cattle.
- The majority of livestock animals are sheep and goat, and cow and chicken are relatively few.
- Goat milk is processed into yoghurt for home consumption.
- Goat and sheep are sold when they reach at the maximum body weight or when the cash is needed.
- The wool of goat and sheep is cut twice a year and sold at a high price, making it a valuable source of farmers' income.
- Goat and sheep are grazed by farmers. Those who have a large number of animals consign them to a shepherd, who obtains cash income for this service. Recently, the total number of livestock tends to decrease due to drought, and many farmers breed livestock mainly for home consumption.

Goat shed

Grazing

Cow raising

Fig. 4.11 Livestock Situation in the Study Area

Table 4.23 Number of Livestock Raised by 103 Surveyed Households

	Cow	Bull	Calf	Sheep	Goat		Chicken		Donkey
				Local	Local	Improved	Local	Improved	
1. Masen	0	0	0	12	22	0	62	0	1
2. Alghor	0	0	0	13	14	0	15	0	3
3. Kooshk	2	1	0	11	21	0	33	0	3
4. Felarg	5	1	2	27	61	0	31	4,002	6
5. Borgeziad	1	0	0	15	16	0	14	0	4
6. Bozghong	0	0	0	24	31	0	17	0	2
7. Mafriz	0	0	0	32	0	0	41	0	2
8. Sang Abad	0	0	0	122	60	40	41	0	4
9. Zin Abad	2	0	0	0	2	0	5	0	1
10. Sheikhan	0	0	0	0	0	0	0	0	0
11. Neyestan	0	0	0	0	0	0	0	0	0
12. Garmidar	0	0	0	0	0	0	2	0	0
13. Garmok	0	0	0	0	0	0	0	0	0
14. Jalal	0	0	0	12	0	0	0	0	1
15. Takhchar Abad	0	0	0	10	20	0	4	0	0
Total	10	2	2	278	247	40	265	4,002	27

- Felarg, Sang Abad and Bozghong, which is situated in the north-east with larger population, raise more livestock than other villages.
- A commercial chicken farm exists in Felarg.

4.5.7 Problem Consciousness about Agriculture and Livestock

As a part of the household survey, where 103 households were interviewed, data were collected on their concerned problems about crop cultivation and livestock raising. According to the results, it can be said that farm households recognize the lack of irrigation water as the most serious problem for crop cultivation, followed by high-price agricultural inputs (as the second) and damages caused by pest and insects (as the third).

As for issues of livestock raising, damages caused by pest and insects are the most serious problem; the lack of feed and natural conditions follow this.

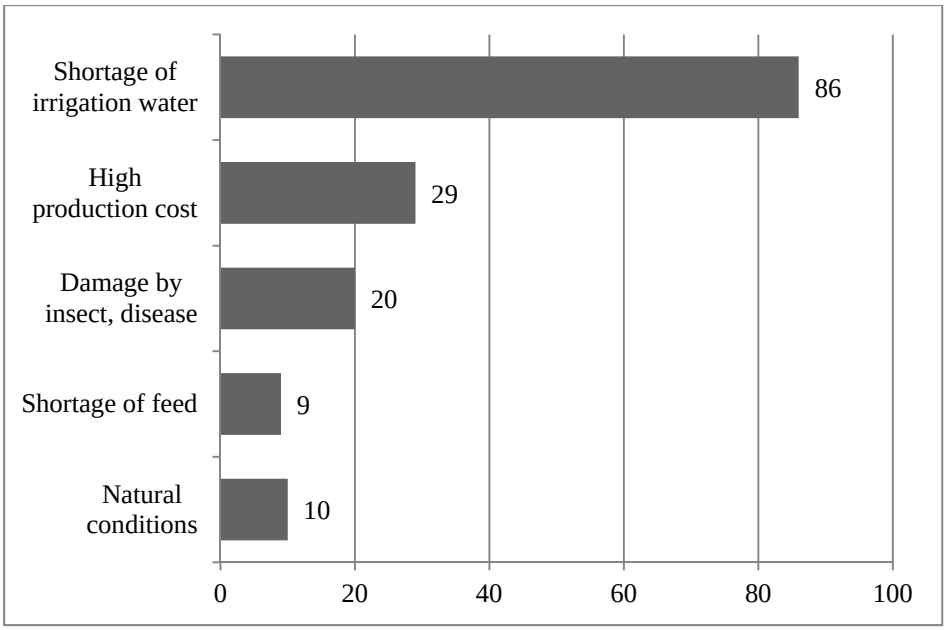


Fig. 4.12 Problems on Crop Cultivation and Livestock Raising, Recognized by 103 Surveyed Households (up to 2 answers selected)

With regard to obstacles of agricultural production and increase in agricultural income, farm households recognize that the lack of water (for irrigation and animals) is the most serious problem.

Damages caused by pest and insects, and high agricultural inputs and lack of agricultural credits follow this.

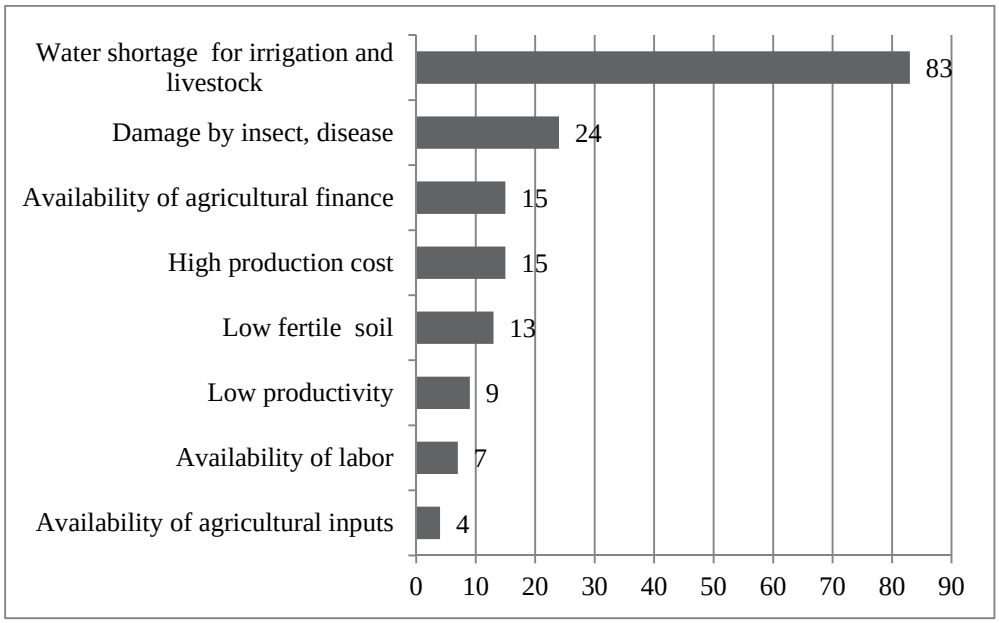


Fig. 4.13 Obstacles to Increase Agricultural Production and Agricultural Income, Recognized by 103 Surveyed Households (up to 3 answers selected)

With regard to sales of agricultural products, farm households recognize that the biggest problem is low sales price.

Lack of means of transportation and collection and shipment center, and fluctuation of price follow this.

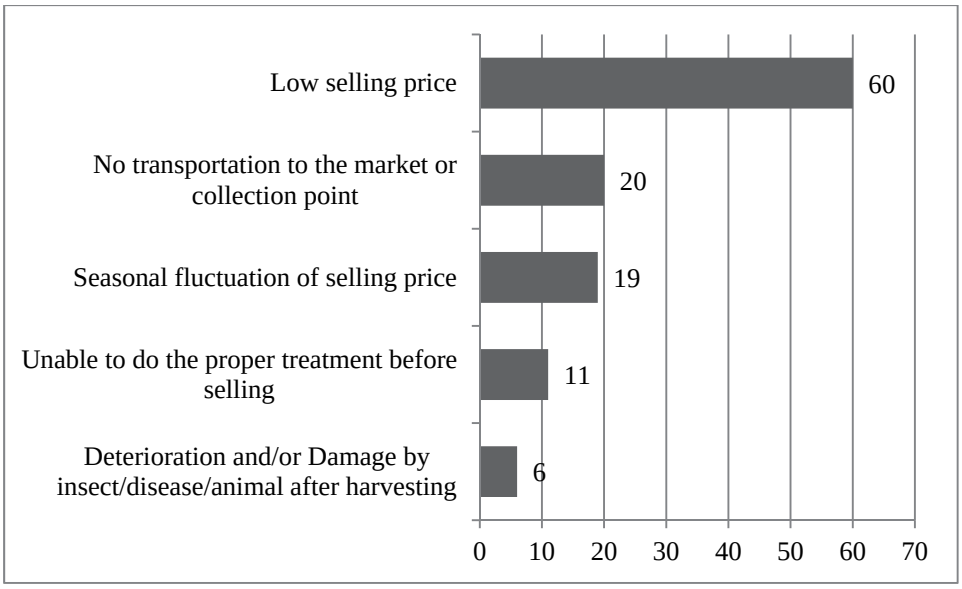


Fig. 4.14 Problems on Sales of Agricultural Products, Recognized by 103 Surveyed Households (up to 2 answers selected)

With regard to ideas to increase agricultural income, farm households feel that expansion of farm scale is the most important issue.

Installation of new crops and value addition follow this.

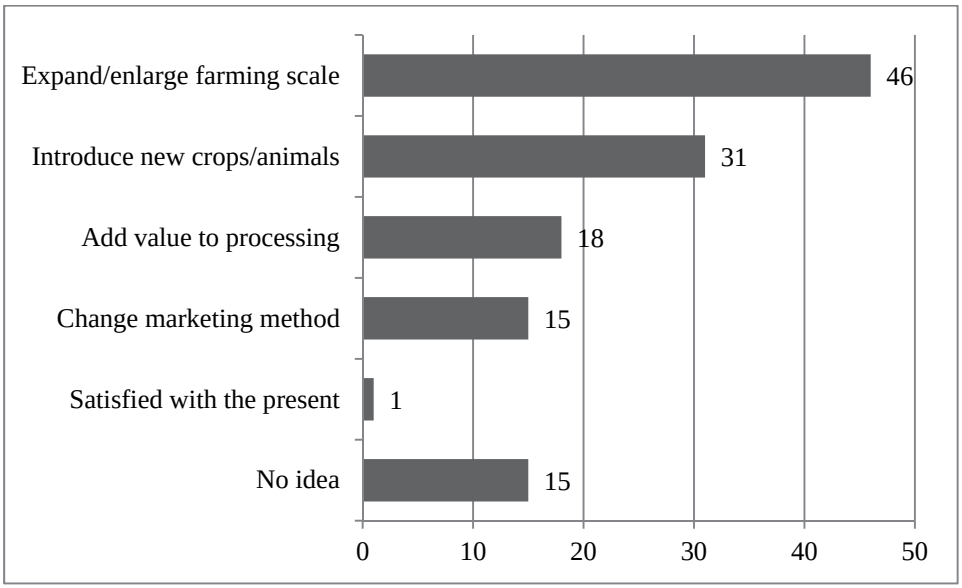


Fig. 4.15 Ideas to Increase Agricultural Income, Recognized by 103 Surveyed Households (up to 2 answers selected)

If adopting new crops and animals, farm households want to adopt, in priority, fruits for new crops and sheep for animals.

Cereals and vegetables as new crops and goats and cow as new animals follow this.

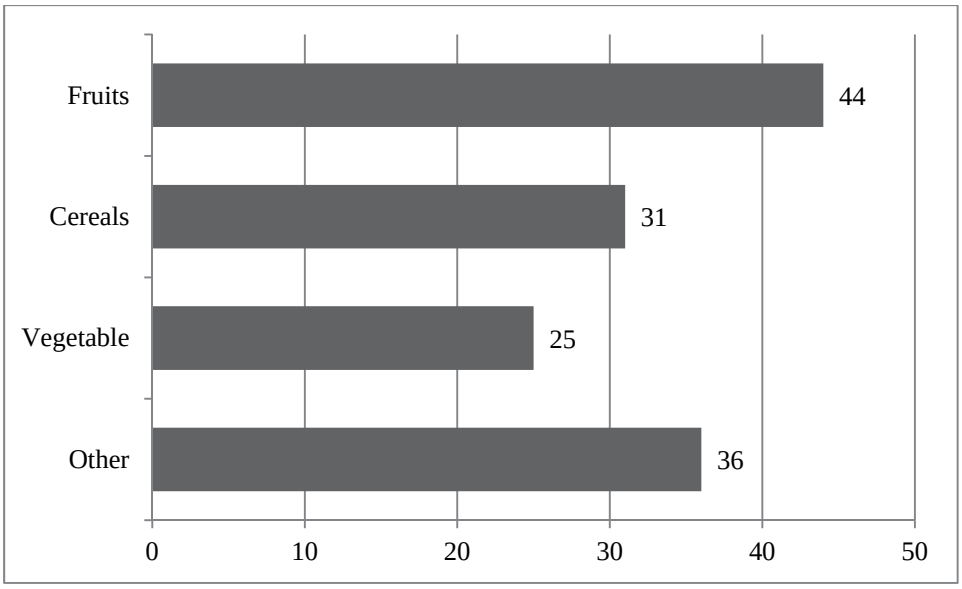


Fig. 4.16 New Crops that 103 Surveyed Households Hope to Adopt (up to 2 answers selected)

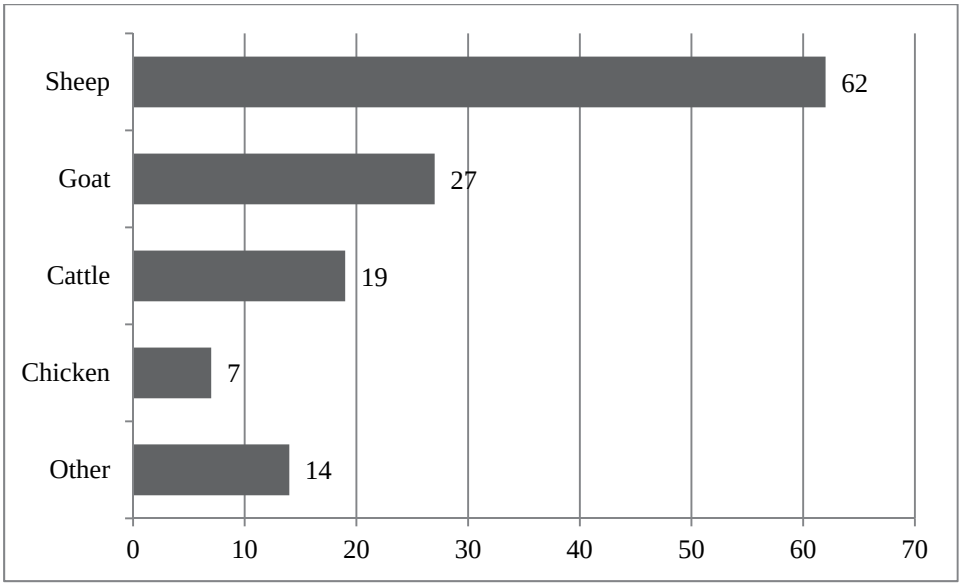


Fig. 4.17 New Animals that 103 Surveyed Households Hope to Adopt (up to 2 answers selected)

4.5.8 Situation of Farm Management of Each Village

Table 4.24 Situation of Farm Management of Each Village

	Annual total income (1,000Rls/HH)	Income from crops (1,000Rls/HH)	Income from livestock (1,000Rls/HH)	Share of income from crops (%)	Share of income from livestock (%)	Share of income from agriculture (%)	Crop productivity per ha (1,000Rls/ha)	Average cultivation area (ha)	Share of planted area (%)			
									Wheat	Bar-berry	Jujube	Total
Masen	60,517	13,677	1,333	23	2	25	8,702	1.6	0	23	12	35
Alghor	44,557	11,590	5,000	26	11	37	6,165	1.9	55	6	23	84
Kooshk	12,264	5,742	1,323	47	11	58	9,114	0.6	52	28	11	91
Felarg	18,660	7,133	4,829	38	26	64	3,849	1.9	64	15	11	90
Borgeziad	25,568	7,918	3,150	31	12	43	5,067	1.6	38	18	33	89
Bozghong	19,088	9,322	64	49	0	49	10,929	0.8	0	43	42	86
Mafriz	38,137	28,314	171	74	0	75	13,456	2.1	17	47	29	93
Sang Abad	67,314	26,084	4,006	39	6	45	6,417	4.1	35	28	28	90
Zin Abad	7,500	7,500	0	100	0	100	21,429	0.4	29	9	9	46
Sheikhan	12,800	12,800	0	100	0	100	6,400	2.0	0	50	50	100
Garmidar	3,305	1,535	120	46	4	50	12,739	0.1	0	88	10	98
Garmok	27,563	15,855	0	58	0	58	23,810	0.7	0	21	23	44
Takhchar Abad	62,333	9,078	11,740	15	19	33	7,463	1.2	0	49	46	95
Average of 13 villages	30,739	12,042	2,441	50	7	57	10,426	1.5	22	33	25	80

Note: Of the 103 households interviewed for the household survey, 68 had income from selling crops. The table was prepared using the data collected from these 68 households. Among the 15 villages in the Study area, Neyestan was excluded because there was no income from selling crops; and Jalal was excluded due to missing information.

Source: JICA Study team (2010)

Based on the planted area and profitability of the major crops in each village, as presented in the table, it is clear that:

- Villages where a larger share of land is used for cultivating barberry and jujube tend to show higher productivity per hectare (except Zin Abad and Garmok). On the other hand, villages where a larger share of land is used for cultivating wheat tend to show lower productivity per hectare.
- Farmers' income level tends to be proportional to the size of planted area.

4.6 Processing and Distribution of Agriculture and Livestock Products

4.6.1 Processed Agriculture Products

- Major processed agriculture products in the Study Area that are produced and sold are dried jujube and dried barberry.
- The dried barberry is dried and cleaned by farmers after harvest. Some farmers use machinery such as electric fan and sieve for the cleaning. However, it is difficult to clean completely.
- According to the village survey (where eight villages in the Study area were surveyed), production of dried jujube is 1 – 5 ton/year and that of dried barberry is 2 – 15 ton/year.
- Other processed products which are produced in the Study Area are dried saffron, almond, grape and plum. However, the production amounts are a little and they are mainly consumed at home and sold some. Although, barberry jam and wheat flour are produced a little in the Study Area, they are mainly consumed at home or within the villages.

4.6.2 Processed Livestock Products

Homemade yogurt, yogurt drink (doogh), butter and cheese are produced in the Study Area. However, these production amounts are very little. The products are mainly consumed at home or within the

village. They are not sold to outside of the villages.

4.6.3 Distribution of Agriculture Products

According to the interview, major distribution channels of barberry and jujube are shown below.

- Farmers sell the products to brokers who come to the villages and the brokers sell to retail shops
- Farmers carry and sell the products directly to retail shops
- Farmers sell directly to consumers in bazaars

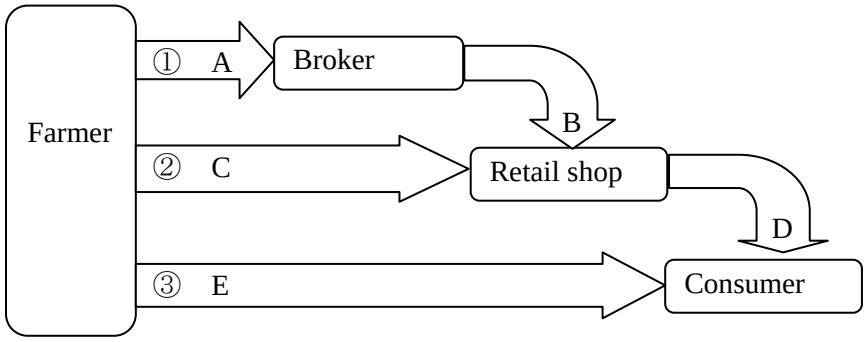


Fig. 4.18 Major Distribution Channels of Agriculture Products

Selling price in each steps of the distribution channels are generally A<C<B<D. However, E is not clear since quality of the products in E is various and enough information could not be collected.

In case of the Study Area,

- Mainly dried jujube and dried barberry are sold to outside the villages. More than 90% of the harvested amounts of both products are sold.
- While village products are distributed to outside the villages mainly through brokers, a part of vegetables, fruits and grains are sold within the villages.
- Although some farmers carry barberry etc. to retail shops in cities by themselves, the rate is low. Selling price directly to retail shops is higher than that to brokers. However, farmers need cost of transportation.

4.6.4 Distribution of Livestock Products

- Major livestock products which are raised in the Study Area and sold are goat and sheep. Other livestock products such as cattle, chicken, milk and eggs are sold only in a few villages in the Study Area.
- The livestock products are mainly sold through brokers as same as agriculture products.
- In case of milk, some part of it is sold within the villages although a farmer sells it directly to milk factory.

4.6.5 Quality, Package and Transportation

(1) Agriculture Products

As mentioned above, major products sold are dried jujube and barberry. These products are put into sack and sold to brokers after cleaning; removing leaves etc., by farmers. In case of dried barberry, it is difficult to completely clean and the products include few others.

(2) Livestock Products

Livestock for meat is checked and slaughtered in slaughterhouses and then carried to retail shops. Livestock breeders sell the livestock to retail shops and the shops carry them to slaughter house. Retail shops generally have refrigerators. Hygiene and quality of meats are relatively kept good condition.

4.6.6 Price of Agriculture and Livestock Products

Selling price of agriculture products are shown below. Price of wheat in South Khorassan Province is almost the same as that in Iran. Prices of melon, water melon, pistachio etc. which are produced in a large quantity in South Khorassan Province are relatively lower than that in Iran.

Table 4.25 Selling Price of Crops in Rural Area (Rls/kg)

Area and Year	Wheat	Barley	Sugar beet	Sun flower	Melon	Water melon
Iran (2006)	2,068	1,603	497	3,794	1,598	1,033
South Khorassan (2006)	2,009	1,811	578	-	1,740	1,194
Iran (2008)	2,926	3,793	561	12,622	2,866	1,331
South Khorassan (2008)	2,942	3,693	372	-	1,534	1,300

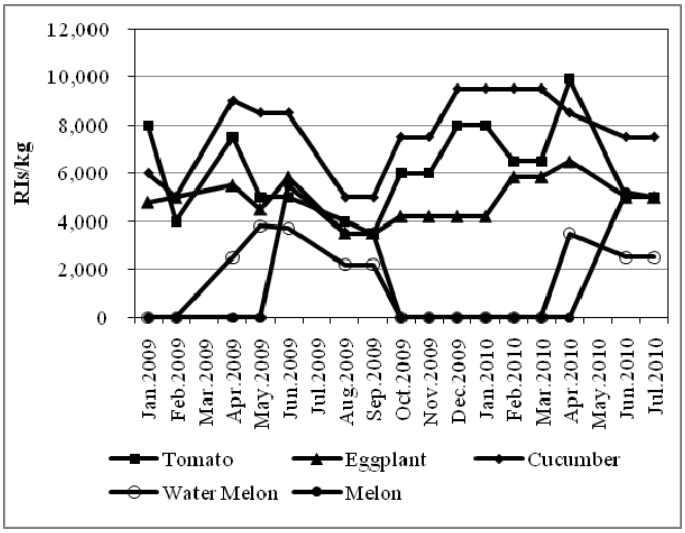
Area and Year	Tomato	Cucumber	Potato	Onion	Apple	Apricot
Iran (2006)	1,059	2,161	1,671	1,308	2,790	2,709
South Khorassan (2006)	-	-	-	-	3,233	3,017
Iran (2008)	2,433	2,132	1,305	1,629	4,378	4,716
South Khorassan (2008)	-	-	-	-	5,000	3,017

Area and Year	Pear	Grape	Pomegranate	Pistachio	Almond
Iran (2006)	3,204	2,046	3,240	30,461	12,763
South Khorassan (2006)	5,000	1,841	4,020	-	10,000
Iran (2008)	6,833	5,505	7,108	43,227	12,265
South Khorassan (2008)	6,000	5,357	-	40,238	10,000

Source: Iran Statistic Year Book (2008 and 2006), Statistical Center of Iran

Retail price of agriculture products provided by JAO of Birjand Township are shown below.

- Prices of vegetables tend to increase in winter. In case of water melon and melon, the prices only in summer season are obtained.
- Prices of dried products are comparatively stable.
- Prices of fruits are obtained in the harvest season.



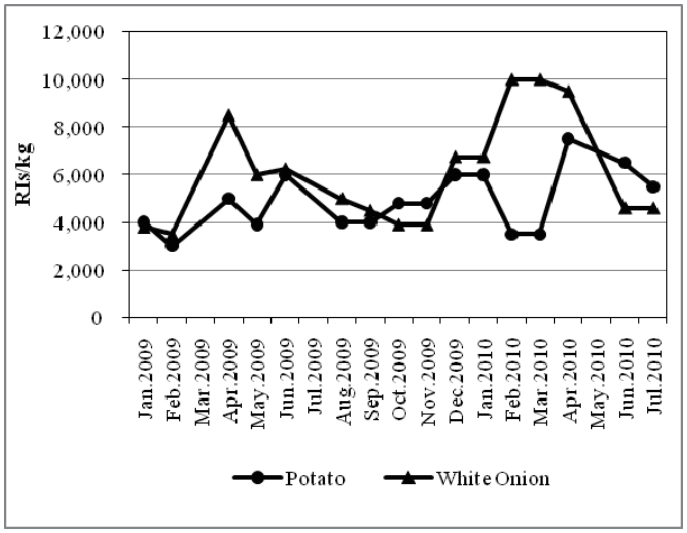


Fig. 4.19 Change of Retail Price of Vegetables

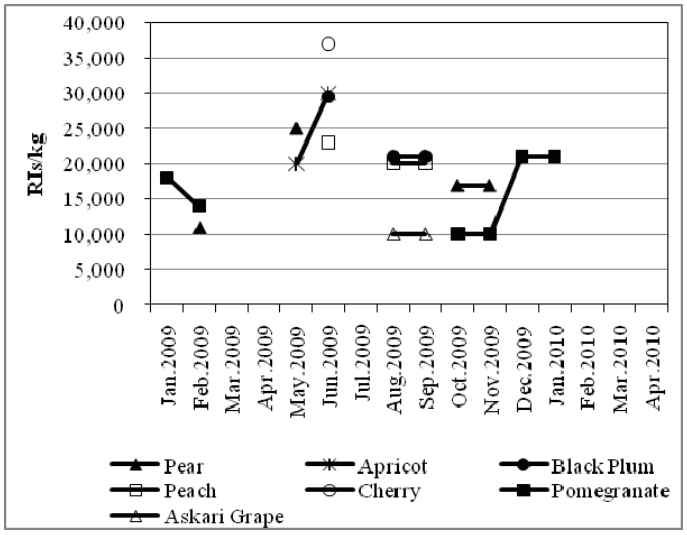


Fig. 4.20 Change of Retail Price of Fruits

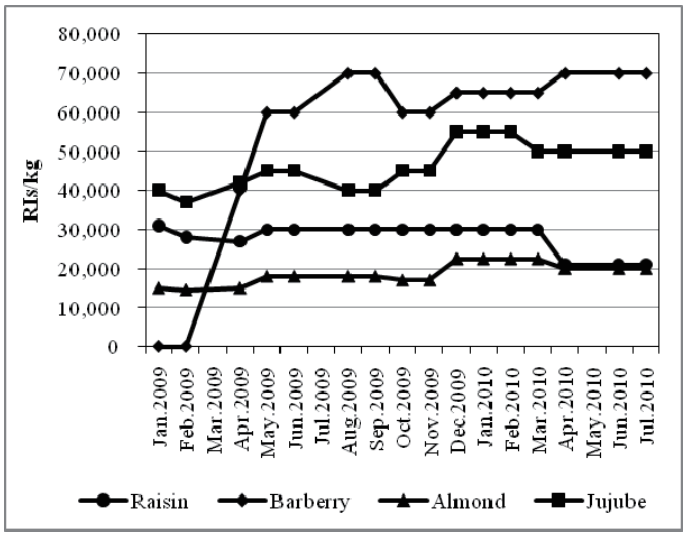


Fig. 4.21 Change of Retail Price of Dried Products

According to the household survey in the Study Area, average selling price of dried barberry of farmers is about 32,000 Rls/kg. According to the statistic data of JAO, retail price of barberry in 2009 was 60,000 – 70,000 Rls/kg. It means that the farm gate price of dried barberry is about 45 – 56 % of the retail price. However, the retail price was 100,000 Rls/kg according to the interview conducted at retail shops in November 2010.

According to the household survey in the Study Area, average selling price of dried jujube of farmers is about 16,500 Rls/kg. According to the statistic data of JAO, retail price of jujube in 2009 was 45,000 – 55,000 Rls/kg. It means that the farm gate price of dried jujube is about 30 – 36%. However, the retail price was 60,000 – 70,000 Rls/kg according to the interview conducted at retail shops in November 2010.

Prices of livestock products in 2008 based on the statistic data of MOJA, are shown below. Mutton is the most expensive in the meats, followed by beef and chicken.

Table 4.26 Market Price of Livestock Products in 2008 (Rls/kg)

Mutton	70,000 – 75,000
Beef	67,000 – 70,000
Chicken meat	24,000 – 28,000
Egg	13,000 – 17,000
Milk	4,000 – 4,800

Source: National Agriculture Statistics Vol. 2. 2008, MOJA

Prices of meats based on interview in August 2010 are shown below.

Table 4.27 Price of Livestock Products in Birjand City

Type	Buying Price	Selling Price	Notes
Mutton	1,000,000 – 2,500,000 Rls/head	110,000 Rls/kg	From Sistan and Bulchestan
Beef	18,200,000 – 26,000,000 Rls/head	85,000 Rls/kg	From Sistan and Bulchestan
	13,200,000 – 35,000,000 Rls/head	85,000 Rls/kg	From South Khorassan
Chicken meat	30,500 Rls/kg	32,000 Rls/kg	From South Khorassan

According to interview, sheep is sold for about 1,000,000 Rls/head and chicken is sold for about 23,000 Rls/kg in the Study Area.

4.7 "Poverty in the Arid Area"

The present Study targets small-scale farmers who are "poor in arid areas" and aims to prescribe measures to improve the situation as a Master Plan. Before suggesting the Master Plan, characteristics of "poverty in the arid area" is reviewed in this section, from the perspective of the circumstances that small-scale farmers are facing, mainly based on analyses of the above-presented data on South Khorassan Province as well as the Study area. This process would further clarify the intentions of the Master Plan that the Study team is suggesting.

As the table below shows, among the 30 provinces of Iran, nine, including South Khorassan, are classified as arid area provinces, with an annual rainfall of less than 250mm, and 17 are classified as semi-arid area provinces, with an annual rainfall of between 250mm and 500mm. The nine arid area provinces cover from central to eastern and southern parts of the country.

Table 4.28 Arid and Semi-Arid Provinces of Iran

	Province	Annual rainfall (mm)	Category		Province	Annual rainfall (mm)	Category
1	Fars	324	Semi-arid	16	Kerman	130	Arid
2	Kermanshah	456	Semi-arid	17	North Khorassan	305	Semi-arid
3	Razavi Khorassan	196	Arid	18	Booshehr	300	Semi-arid
4	Golestan	465	Semi-arid	19	Qazvin	332	Semi-arid
5	Zanjan	308	Semi-arid	20	Gilan	1,000	Humid
6	Hamedan	339	Semi-arid	21	Tehran	285	Semi-arid
7	Kordestan	451	Semi-arid	22	South Khorassan	135	Arid
8	Khoozestan	290	Semi-arid	23	Sistan Baluchestan	111	Arid
9	East Azarbayjan	354	Semi-arid	24	Chaharmahal Bakhtiari	659	Semi-humid
10	Ardabil	325	Semi-arid	25	Kohgiluyeh BooyerAhmad	542	Semi-humid
11	West Azerbayjan	357	Semi-arid	26	Semnan	143	Arid
12	Mazandaran	720	Semi-humid	27	Ilam	415	Semi-arid
13	Lorestan	458	Semi-arid	28	Hormozgan	171	Arid
14	Markazi	278	Semi-arid	29	Yazd	92	Arid
15	Esfahan	168	Arid	30	Qom	167	Arid

Source: JAO (2012, based on hearing from Iran Meteorological Organization)
Category: Arid: below 250mm; Semi-arid: 250-500mm; Semi-humid: 500-750mm; Humid: over 750mm

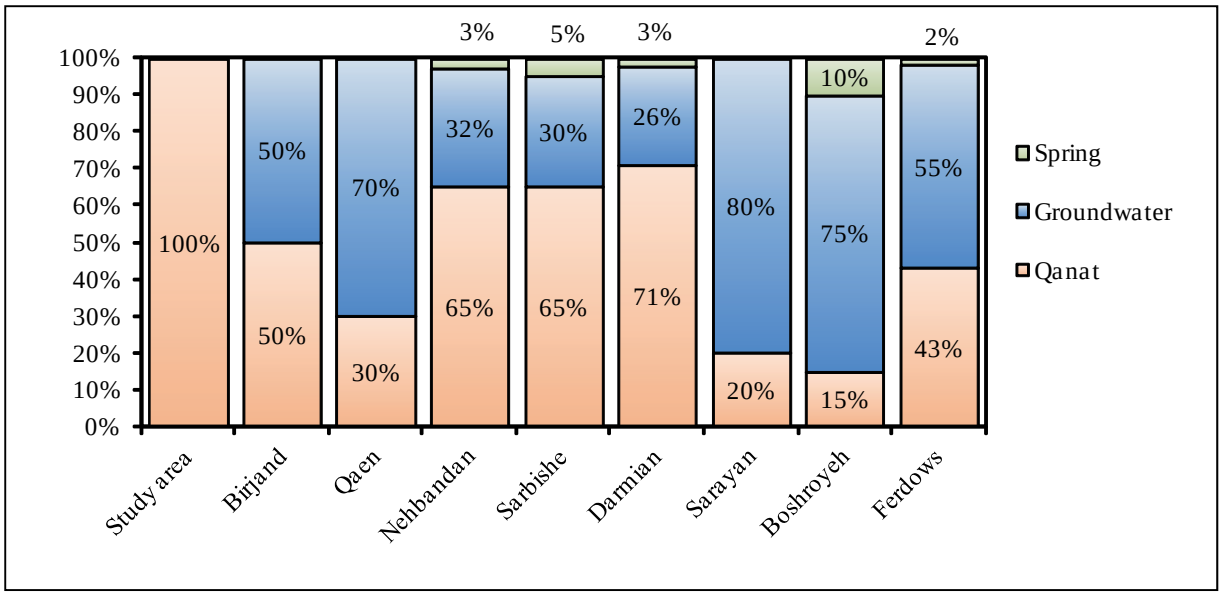
In today's world, the rural area is rarely superior to the urban area in terms of economy, and it is common to find more low-income people in the rural area than in the urban area. Iran is not an exception: as shown in Table 4.8, the ratio of average per-household income in the rural area to average per-household income in the urban area is 55% in the whole country and 48% in South Khorassan Province. This means that a significant economic disparity exists between the urban and rural areas. Therefore, "poverty in the arid area" can be interpreted as "poverty in the arid rural area."

4.7.1 Constraints in the Arid Area

(1) Constraints with Regard to Water Resource

Average annual rainfall in Iran is 228mm, and 90% of its land is either arid or semi-arid, leading that only 8% of its land is under cultivation. Water resource is a major constraint for agricultural development. Although Iran has traditionally practiced agriculture using water from qanat, small-scale farmers are now facing diminishing water, due to reasons such as the recent years' drought, and their livelihoods are becoming unstable.

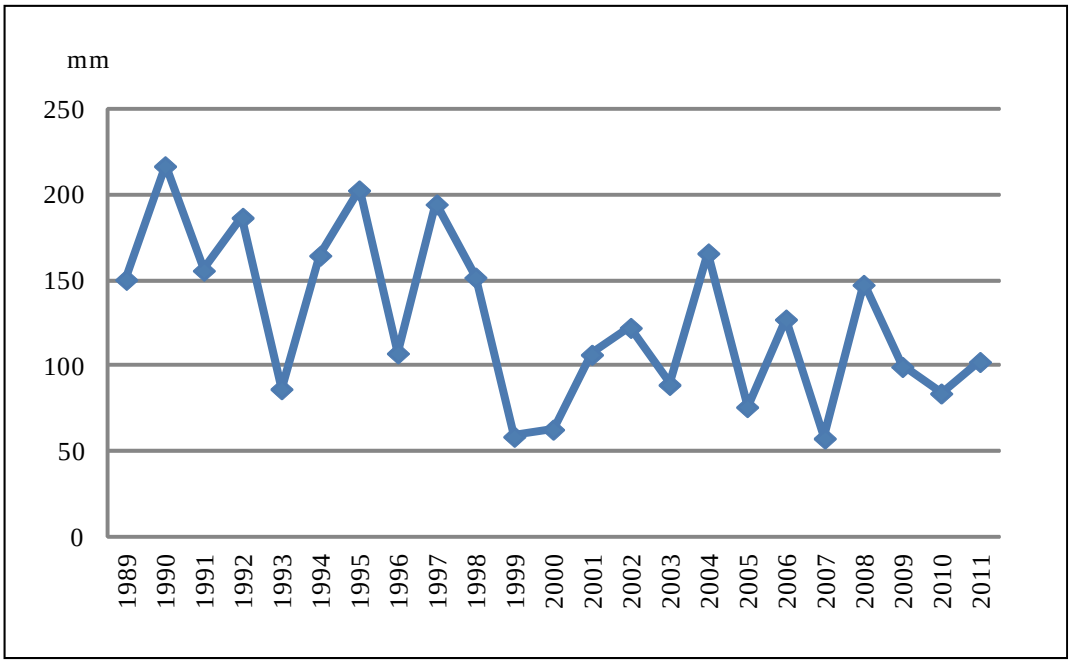
The figure below shows the ratio of water sources used for irrigation in each township of South Khorassan Province. While there are townships that highly depend on groundwater (wells), such as Sarayan, Boshroyeh and Qaen Townships, the Study area entirely depends on qanat. Small-scale farmers generally have limited access to water sources other than those having public characteristics, such as qanats and springs. The recent years' reduction in qanat discharge is becoming a question of life or death in areas that highly depend on qanats while not having alternative water sources, such as the Study area. Thus, small-scale farmers are most affected by the drought and diminishing discharge of qanats.



Source: JAO

Fig. 4.22 Ratio of Water Source for Irrigation

Traditionally, rainfed cultivation of wheat has been widely practiced in South Khorassan Province. Although the annual rainfall in Birjand is lower than the national average, wheat has been produced using a spring wheat variety that has an extremely high drought tolerance. However, the yield of rainfed wheat in South Khorassan Province (200-300kg/ha) is lower than half the yield in other provinces. In addition, as the figure below shows, the average annual rainfall in Birjand, which was 170-180mm during 1990s, declined to 130-140mm in 2000s. This indicates that small-scale farmers in the Study area are facing a risk of further reduction in the yield, or even no harvest at all.



Source: Meteorological Department of South Khorassan Province

Fig. 4.23 Trends of Rainfall in Birjand City

(2) Constraints with Regard to Land

A characteristic of agriculture in Iran is co-existence of many small-scale farmers and a few large-scale farmers. Through the land reform implemented from 1962 for 10 years, former tenant

farmers obtained land; however, as of 1976, 35% of such farmers were already small-scale, with less than one hectare of land (Ryuichi Hara & Yoko Iwasaki, 2000, "Dynamism of Iran's national economy"). Due to events such as land segmentation brought by heritage, per-household agricultural land today is expected to be even smaller across the country.

As mentioned in Section 3.4, in 2003 in South Khorassan Province, 42% of farmers owned less than 1ha of land; as mentioned in Section 4.5.1, in 2010 in the Study area, 63% of farmers are estimated to be cultivating 1ha or less of land. Moreover, in mountainous areas like the Study area, significant expansion of agricultural land cannot be expected in the future. It is not possible for such small-scale farmers facing the land constraint to sustain their livelihoods only by agriculture, and therefore, engaging in non-agriculture jobs is indispensable.

(3) Constraints with Regard to Labor Force

Due to reasons such as lack of opportunities for education and agricultural stagnation, caused by the above-mentioned water and land constraints, Iran has been experiencing migration of population from the rural area to the urban area, making depopulation in the rural area a nation-wide challenge. As mentioned in Section 4.3, the rate of population increase in Birjand city has been higher than the rate of population increase in the whole province for the last several decades; and during the same period, the population of the Study area continuously declined. Also, according to the results of the household survey implemented in the Study area, population aging between 30 and 60, who are supposed to contribute the most to the area's economy, accounts for only about 28% of the whole population. In addition, the average number of household members is as low as 3.9. These indicate that the constraint with regard to labor force exists both at the whole Study area's level and at the household level.

4.7.2 Income Structures

Affected by the above-described constraints, as shown in Table 4.8, agricultural income is much lower than non-agricultural income in the rural area, both at the national and provincial level and in the Study area as well (the ratio of agricultural income in the total annual income is 22% for the whole country, 23% for the Province, and 42% for the Study area). The relatively high ratio of agricultural income in the Study area would be because farmers in the Study area mainly produce the prevailing cash crops of barberries and jujube.

Although non-agricultural income greatly contributes to the household income in the rural area, non-agricultural income in the rural area is far lower than non-agricultural income in the urban area: non-agricultural income in the rural area of the whole country is only 44% of non-agricultural income in its urban area, while non-agricultural income in the rural area of South Khorassan Province is only 38% of non-agricultural income in its urban area. This would be because the employment opportunities are limited in the rural area. In fact, the surveys have found out that in the Study area, the most common employment opportunities are to work as unstable and seasonal agricultural or construction laborers. It has been also found out that the income from these employment opportunities is lower than the income obtained from employment in the educational or public sectors, in which a part of the population in the Study area is engaged.

4.7.3 Towards Poverty Alleviation

From these discussions, it is clear that both agricultural and non-agricultural incomes should be increased to alleviate the poverty in the arid rural area.

Increase in agricultural income is generally realized through: (1) improvement in productivity; (2) expansion of planted area; and (3) increase in selling price. As for (1) improvement in productivity, it would be achievable in the Study area, although long-term research and extension activities are required with regard to crop varieties and cultivation methods. As for (2) expansion of planted area, it has been just mentioned above that increase in area is difficult in the Study area. However, although it

is difficult to expand the agricultural land per-se, it would be possible to increase the planted area, by improving the irrigation methods to save water, which would allow to convey water to the lands that are not currently cultivated due to lack of water. Finally, as for (3) increase in selling price, there is a potential to achieve higher selling prices of existing products, through processing and better marketing these products, thus increasing their value added.

For increasing non-agricultural income, new income sources should replace or be added to the current unstable and low-income employment opportunities.

Considering the constraints with regard to labor force, it is necessary to address these challenges in a way that encourages involvement of elders, youngsters, and women who are not currently participating in economic activities.

The Master Plan of the present Study proposes development strategies and concrete projects that take these issues into consideration. Moreover, the above-mentioned constraints in the arid rural area are unlikely to be the case only found in South Khorassan Province or in the Study area, but rather likely to be more general challenges that other arid provinces are commonly facing. Therefore, the Master Plan formulated by this Study has potential to be applied in such provinces as well.

Chapter 5 Rural Development Plan (Master Plan)

5.1 Consideration of Development Direction by SWOT Analysis

The characteristics and constraints of small scale farmers under poverty in the arid area were described in the prior chapter 4.7. It was also pointed out that "adding value to agricultural products", "rural women's participation in economic activities" etc. are important as the direction for the small scale farmers to correspond to the constraints. To consider more detailed development direction, the present situation of the Study area was analyzed by using the SWOT analysis based on the results of baseline survey and field survey. In the SWOT analysis, "strengths" and "weaknesses" (internal factors) of the Study area and "opportunities" and "threats" (external factors) affecting the Study area were analyzed. The results are indicated in the figure shown below.

Internal factors	External factors
Strengths	**Opportunities**
S-1. Barberry and jujube are the major cash crops. S-2. There are farmers who are doing farming by regularly commuting to the Study area. S-3. The Study area is located near Birjand city. S-4. The retired people are returning back to the Study area. S-5. Livestock has been reared since long ago. S-6. The farmers are aware of the know-how of working corresponding to the hard environments.	O-1. Barberry and jujube have been recognized as specialty products. O-2. The women's social participation is progressing. O-3. The establishment of the direct sales shop is under processing. O-4. There is a successful example of handcraft making in another area. O-5. There is a demand of small livestock and vegetables throughout the year. O-6. The establishment of the rural women cooperative is under processing.
Weaknesses	**Threats**
W-1. The income is low. W-2. The working opportunity is low. W-3. There are a few marketing channels of agricultural products. W-4. The area suitable for agriculture is less. W-5. The productivity of vegetables is low. W-6. The production of food for self-consumption (small livestock and vegetables) is stagnant. W-7. The road to Kahshang Rural Municipality is unpaved.	T-1. The quantity of water of Qanats is decreasing. T-2. The precipitation is decreasing. T-3. The natural vegetation is decreasing. T-4. The food cost is increasing.

Fig. 5.1 Results of SWOT Analysis of the Study Area

The internal factors (strengths and weaknesses) and the external factors (opportunities and threats) classified by the SWOT analysis were combined and measures to correspond to the each combination were considered.

1) Strengths and Opportunities (measures of using the strengths corresponding to the opportunities)

Strengths	Opportunities	Corresponding Measures
S-1. Barberry and jujube are the major cash crops. S-2. There are farmers who are doing farming by regularly commuting to the Study area. S-3. The Study area is located near Birjand city.	O-1. Barberry and jujube have been recognized as specialty products.	· Adding value to the specialty products · Making it easier for the farmers who are doing farming by commuting from the city (development of roads)

2) Strengths and Threats (measures of using the strengths to avoid the threats)

Strengths	Threats	Corresponding Measures
S-2. There are farmers who are doing farming by regularly commuting to the Study area. S-4. The retired people are returning back to the Study area.	T-1. The quantity of water of Qanats is decreasing.	· Promoting water saving irrigation
S-5. Livestock has been reared since long ago.	T-2. The precipitation is decreasing. T-3. The natural vegetation is decreasing.	· Improving forage cultivation by efficient water use · Reviving of rearing of small livestock animals

3) Weaknesses and Opportunities (measures to decrease the weaknesses corresponding to the opportunities)

Weaknesses	Opportunities	Corresponding Measures
W-3. There are few marketing channels of agricultural products.	O-3. The establishment of the direct sales shop is under processing.	· Managing the direct sales shop
W-5. The productivity of vegetables is low. W-6. The production of food for self-consumption (small livestock and vegetables) is stagnant.	O-5. There is a demand of small livestock and vegetables throughout the year.	· Improving the vegetable cultivation · Reviving of rearing of small livestock animals
W-1. The income is low. W-2. The working opportunity is low.	O-2. The women's social participation is progressing. O-4. There is a successful example of handcraft making in another area. O-6. The establishment of the rural women cooperative is under processing.	· Promoting the women's economical activities

4) Weaknesses and Threats (measures to decrease the weaknesses to avoid the threats)

Weaknesses	Threats	Measures to correspond
W-1. The income is low. W-6. The production of food for self-consumption (small livestock and vegetables) is stagnant.	T-4. The food cost is increasing.	· Improving vegetable cultivation for self-consumption · Reviving of rearing of small livestock animals

5.2 Needs of the Residents and Related Superior Plans

5.2.1 Needs of the Residents

According to the baseline survey, needs of the residents are below.

(a) Eighty six percent of the present residents in the villages have a mind to continue their life in the villages.

(b) The most people who emigrated from the villages to cities still commute from cities to the villages in holidays and continue agricultural production activities. Furthermore, the most people emigrated to cities have repaired their houses in the villages. These attitudes may show that the

most emigrated people have a mind to continue agricultural activities.

The above mentioned says that the most residents in the villages and people emigrated to cities have a mind to continue agricultural production in the villages.

The most villagers pointed out that solution of the low income problems by increasing working opportunities and agricultural income are the biggest needs.

In case of agricultural activities, the most farmers hope to cultivate barberry and other fruits, grains and vegetables as crops and to rear goat and sheep as livestock, namely they hope to improve agricultural income by continuation of the current agricultural activities and enlargement of the scale.

Furthermore, the farmers of all villages say that current problems are lack of irrigation water for crop production and lack of feed for livestock. Therefore, solving these problems are also needs of the residents.

5.2.2 Related Preceding Plans

Vision 2025 was proposed and it is the highest priority plan in Iran. Vision 2025 states social, economical and cultural outlook for 20 years in horizon of year 2025.

In Vision 2025, ensuring food security is an important subject of agriculture. In addition to food security, rehabilitation of natural resources, rural development, improvement of productivity, improvement of living condition and increase in income of rural population are important subjects in Vision 2025.

The major policies of agriculture sector in the Fifth Five-year Development Plan (2010-2014) are improvement of living standard of rural population, retention and expansion of employment opportunities in agriculture sector, improvement of crop-water productivity, improvement of crop productivity and providing technical education to rural population. In addition, the plan indicates that gap adjustment between urban and rural areas is one of urgent issues to be solved.

There are many small scale farmers and they started part time farm management to stabilize the farm household management in the process of involvement of rural area into the market economy. In addition, farmers have given up agriculture with stagnant agricultural production by recent decrease in water resources in the Study area. Under this situation, above mentioned policies have an important role to realize promotion of migration from cities to rural area and stabilization of population in the rural area.

5.3 Master Plan

5.3.1 Introduction

A draft MP was formulated through the SWOT analysis, based on the analysis of the current situations of the area and analysis of needs of the residents, and discussion with C/Ps, etc. It was modified and finalized through implementation of the PPs with participation of the residents and analysis of the results and the lessons learned. The framework of the proposed MP is presented below.

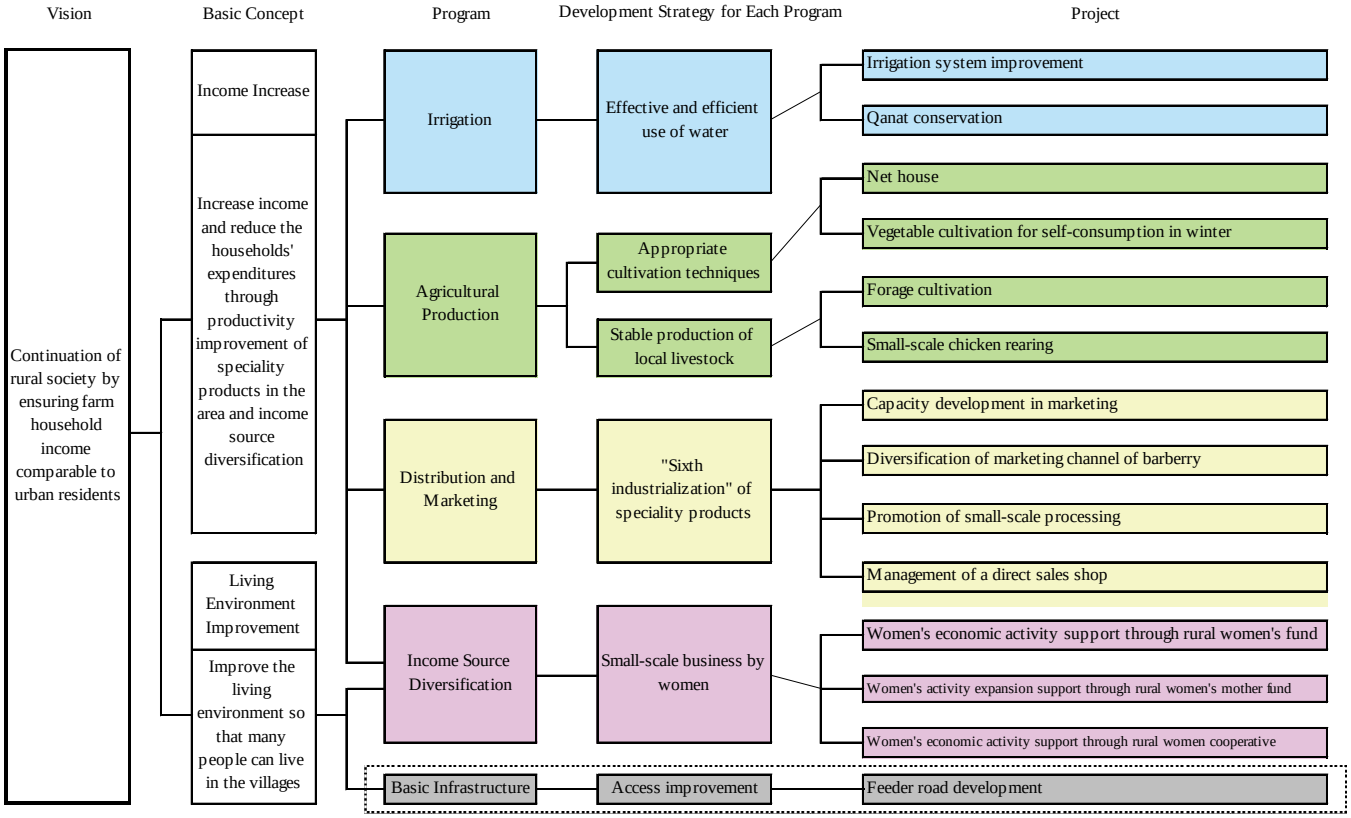


Fig. 5.2 Framework of Master Plan

5.3.2 Objectives and Target Area

The MP presents the measures of agriculture and rural supports for livelihood improvement of small scale farmers in the Alghourat-Takhchar Abad area (15,026 ha) of Birjand Township in South Khorassan Province. In addition, it is noted that the contents of MP will be applicable in other areas of the Province.

5.3.3 Duration of the Master Plan

The MP consists of programs which show mid-term development direction and five-year action plans (projects) which are implemented early based on the programs.

5.3.4 Vision and Basic Concepts

Self-support style agriculture has been managed in the Study area for long time. The self-support style agriculture uses small scale qanats to cultivate mainly grains in mountainous area. Demand of barberry rapidly increased with increase in consumption amount of rice in 1970's. Therefore, barberry had been produced more and obtained a position of important agricultural products. In addition, production of wheat, barley, vegetables etc. have been decreasing in the Study area, since precipitation is decreasing in recent years. Under this situation, famers set production of barberry, jujube etc., which are tolerant of dry, in the main part of the farm management. The products have played important parts in Iranian agriculture and economy by supply of the products to the domestic market. However, the most farmers are small scale farmers. Furthermore, increase in part time farmers, aging of residents and younger generation's leaving from agriculture are progressing in the Study area. The outflow of the residents from the Study area should be looked squarely although the residents want to stay in the villages. Because of the outflow of the residents, the functions of community are already declining in the several villages in the Study area and the villages have been faced with a crisis of extinction. Therefore, the measures to reduce the outflow of the residents need to be urgently implemented in the

Study area. The outflow of residents is a social phenomenon originated from social and economical gap between urban and rural areas. The Master Plan is positioned as a model of measures to reducing the gap between urban and rural areas.

To safely manage rural life and to keep the role of production area of the specialty products, vision of the Master Plan below is set.

Continuation of rural society by ensuring farm household income comparable to urban residents

To achieve the above vision, the basic concepts below are set.

(a) **Income is increased by improvement of productivity of specialty products in the area and diversification of income sources.**

(b) **Living condition of the residents is improved and many people can live in the villages at ease.**

That is to say that this basic concept shows measures for small scale and part time farmers, who account for majority of farmers in South Khorassan Province and the whole country of Iran, to keep economically stable rural life comparable to urban residents by using agricultural products and specialty products in the area.

5.3.5 Basic Strategies of the Development

To achieve the basic concepts, basic strategies below are set.

(1) Improvement of Income

1) Improvement of Productivities of Existing Crops

Further productivity improvement, stable production and efficiency improvement of water usage of barberry and jujube are the highest priority strategies, since barberry and jujube which are the specialty products of the Study area have suitability to the natural condition of the area and existing market.

a) Improvement of irrigation methods

b) Small scale intensive horticulture

2) Diversification of Income Sources

The most farmers in the Study area are small scale farmers who have less than 1 ha field and have limitations of improvement of income from crop production. Therefore, the income is improved through sixth industrialization of barberry and jujube (increasing value-added by branching out from production into processing and distribution). In addition, income of small scale farmers is improved through diversification of income sources by activities which do not depend on much water usage, such as production of small livestock, beekeeping, mushroom cultivation, herb cultivation, etc. since water resources are decreasing.

Furthermore, the income sources are diversified through supporting women who do not participate much in social and economical activities so far.

a) Improvement of distribution and marketing

b) Small scale business by women

3) Decrease in Food Expenditure (Engel's coefficient)

The Engel's coefficients of most residents are high and it is difficult for them to invest to education, etc. Therefore, the Engel's coefficient and expenditure of farm households are decreased. This is one of important strategies for stable farm management in rural area.

a) Decrease in food expenditure by introduction of small scale vegetable production for self consumption, and local chicken rearing

(2) Improvement of Living Condition

1) Improvement of Living Condition

The rural area provides a place for life and production. Women's role in their life is very important in the rural area. Women, who have not made the most of their abilities till now, have small scale economical activities and improve their life. Villages are activated through these activities.

2) Improvement of Access Roads

The access roads from the main road to the villages in Kahshang area in the Study area are unpaved. Therefore, by paving the access roads, transportation of agricultural products and farming by regularly commuting are made easier and convenience of their life is enhanced.

5.3.6 Development Strategy for Each Program

(1) Irrigation

With regard to irrigation, the priority strategy is to improve the productivity of crops through securing and effectively using water.

In the Study area, irrigated farming uses qanat as its water source. Decreasing rainfall and sedimentation in qanat cause shortage of irrigation water, leading to declining of the cultivation area of fruit trees and upland crops. The irrigation method is based on the open channel system, which causes much loss during water conveyance. Moreover, in the field, the irrigation methods with a low efficiency, such as furrow irrigation and basin irrigation, are applied. All these conditions prevent an effective use of water.

These factors cause unsustainable crop production, leading to a low agricultural income. In addition, the current irrigation system imposes a heavy workload for water distribution management, which is one of the reasons for the young generations to leave farming.

Introducing a new irrigation system that uses the limited water resource more effectively and efficiently could save water and lighten the workload for water management in the Study area. It would lead to improvement of the crop productivity, with the application of appropriate cultivation techniques, and contribute to increase farmers' income.

1) Land Use Plan

The main crops cultivated in the Study area are barberry, jujube and fruits. These crops are more suitable for the natural conditions (climate, soil, and water) of the Study area than the other crops such as annual crops. Especially, barberry and jujube are well known all over the country as the principal products of the area. They are highly marketable at the domestic market, and their productivity per unit area and per unit of water is high. Therefore, the cultivation of barberry and jujube shall be continued as the main crops of the area, and the cultivation area shall be partly increased by the introduction of water saving irrigation and crop conversion. With regard to the land use plan, the priority is to increase the cultivation area of barberries, which has a high profitability

relative to the volume of water. Since it is difficult to develop new agricultural land, the plan is to plant barberries in the existing agricultural land where upland crops are currently cultivated with a low efficiency. In fact, some farmers are nowadays observed increasing the cultivated area of barberries by planting this crop in their land where upland crops were cultivated. The plan aims to assist such replacement, by introducing water saving irrigation. The target of the proposed land use plan is as follows:

Table 5.1 Land Use Plan

	Barberry	Other Orchards	Upland Crops	Total
Current	72.7ha	44.0ha	60.7ha	177.4ha
Plan	85.7ha	44.0ha	47.7ha	177.4ha

(2) Crop and Livestock Production

In the Study Area, there are a few households whose income is less than US$1/person/day, which is considered as a main index of poverty. And, there are many households with a high Engel's Coefficient. Among the 93 households interviewed in the household survey, 71 were with an Engel's coefficient of more than 50, of which 53 were with an Engel's coefficient of more than 60. Therefore, while a high Engel's Coefficient is a characteristic of South Khorassan Province as a whole, the Study area marks an even higher Coefficient than the Province's average of 45%.

According to the FAO standard, the households with an Engel's coefficient of more than 50 belong to the moderate poverty category, and those with an Engel's coefficient of more than 60 belong to the poverty category, who can only purchase the necessaries, but cannot invest in agriculture or spend money on education etc.

In order to improve the poverty situation, the following basic development strategies are formulated in the agriculture sector.

(a) Expanding of food production for self-consumption to reduce the Engel's coefficient

(b) Improving the household income by diversifying the agriculture income

(c) Improving the living conditions by the consumption of the vegetables produced by the villagers and the animal protein.

1) Crop Production

Although the share of annual crop cultivation area is very small, it has played an important role as a crop for self-consumption and partly as a cash crop. However, the low productivity of the annual crop is the biggest issue to be solved. The main causes are identified as follows.

a) Irrigation interval, which is the same as for perennial crops (as long as 14 days), is too long to grow annual crop, because the long interval induce drought injury for annual crop.

b) When a large quantity of water is applied at the time of irrigation, it induces poor growth of crops, because of root rotting, and by destroying the structure of the soil.

c) The fruits are severely damaged by birds.

The following measures are proposed in the Plan in order to increase the crop productivity by alleviation of these damages.

a) To shorten the irrigation interval

b) To disseminate net house technology

c) To disseminate appropriate crop cultivation techniques

d) To disseminate crop rotation, combined with intercropping

The main crop cultivated in the proposed Project is tomato, which is a popular summer vegetable in the area. To increase the crop productivity by efficient use of land and water, radish is produced between the rows of tomato (intercropping), and after radish is harvested, carrot is planted (crop rotation).

During the winter period, it is almost impossible to grow vegetables in the open field, because of low temperature. Considering this situation, the following methods are applied to produce vegetables for self-consumption during the winter season.

a) Small-scale non-heating vinyl house

To cultivate crop under such severe conditions, a non-heating vinyl house is introduced to facilitate appropriate conditions for crop cultivation. The house is attached to a stone wall to better keep the heat from sunshine during the daytime, thus making crop production possible keeping a relatively high temperature inside the house. Leafy vegetables are recommended to the Project.

b) In-house sprout cultivation

In-house sprout cultivation, which requires a small amount of water, is disseminated to make up for the deficit of vegetables for the villagers during winter period.

2) Livestock

In the Study area, livestock rearing of sheep, goat and chicken used to play an important role as a main source of household income and protein for self-consumption. Especially, for the villages that are insufficient of irrigation water, livestock is still an important economic sector, as it occupies 30% of their household income. The nomadism of goat and sheep is a dominant livestock activity in the Study area. However, the activity has been affected by the reduction of rainfall in recent years, and the production has decreased due to devastation of natural grazing land by the climate change. To improve such situations, the Plan aims to maintain and increase livestock production, through feed production and especially, dissemination of small-scale chicken rearing, mainly as a source of protein for self-consumption.

The following development strategies are proposed in the Plan to achieve the target.

i) Increasing Feed Production

In the livestock sector, the biggest request from farmers is improvement in the shortage of feed, indicating that it is a major challenge to increase the livestock production. In the Plan, the following measures are applied to increase feed production.

a) Recovering of natural grass-land

To keep and expand nomadism of goat and sheep by recovering of grasslands, grass seeds which can grow under the dry condition are sown in the area where the rain water accumulates.

b) Cultivation of forage crop

The fruit trees are grown by basin irrigation in most of the Study area, and the area under the perennial crops are almost unused. In the Plan, it is promoted to use such area to cultivate the forage crops.

ii) Selection of Livestock

The suitability of new sheep and goat varieties to the region is not clear until now. Furthermore, it is very difficult for typical farmers in the Study area to rear them, because they require a large investment such as buying feed and medical care. Therefore, it is recommended that the existing local varieties suited for the nomadism are expanded for the time being now.

iii) Production Increase of the Protein Source for Self-consumption

The small-scale poultry farming of local variety is expanded in order to produce protein food for self-consumption, to maintain the health of residents. The surplus of produced eggs is sold to diversify the income source. To expand the farming effectively and to increase the productivity, an incubator is introduced.

(3) Distribution and Marketing

Barberry and jujube productions in South Khorassan Province contribute 99 % and 94 % of the whole production in the Iran respectively. They are recognized as specialty products in South Khorassan Province and major agricultural products in the Study area are also barberry and jujube. Therefore, more than 80% of agricultural income of the farmers comes from sales of these two specialty products.

The major marketing channel of barberry is shown in the figure below. The farmers sell barberry to the brokers in the villages, and then the brokers transport the barberry to the urban area after cleaning and sorting it, after that barberry is sold to the consumers through the retail shops. Brokers in South Khorassan Province make the rounds of the villages and procure barberry. In case of the Study area, 80 to 90% of barberry harvested is sold to the brokers and about 65% of barberry is distributed to the cities outside of the province through the brokers. Some parts of the barberry is packaged by the brokers or retailers and sold to the consumers. In addition, some parts of the barberry is processed to several processed commodities by the processors and sold through retail shops. Through the process, added value and the selling price of the barberry is increase. Retail price of the barberry is 1.6 to 2.6 times higher than that of the farm gate price in Birjand city.

Because of specialty products which are already recognized in the whole country, the farmers in the province obtain a big advantage. The farmers accepted that selling to brokers is a method of low cost and labor saving sales since it doesn't require the costs of transportation, labor work for cleaning, packaging, etc. On the other hand, the farmers who rely on the brokers to sell are weak in selling ability and have few options of marketing channels. In addition, practice to increase the value-added by packaging and processing for sales are not fully tried. As a result, limited marketing channels and low selling price are major problems for the farmers. It is suggested that production based on the marketing activities are important to continue agricultural production for future in the Study area.

Therefore, the development strategy of distribution and marketing sub-sector is "the increase of agricultural income through sixth industrialization (increasing value-added by integrating the activities of production, processing and selling) of existing specialty products based on the needs of the market".

According to the above development strategy, marketing capacity will be improved to diversify marketing channels based on the marketing activities. Through the capacity development, farmers mind will be promoted by shifting to "production for sales" wherein the farmers consider sales target and sales method before the production. And also, improvement and diversification of commodities and sales methods will be promoted through improvement of package style, introduction of processing and selling directly to the retail shops and consumers based on needs of the sales targets. As the result, opportunities obtaining more agricultural incomes by decreasing costs of distribution and increasing the value-added will be increased for the farmers.

During the implementation, it is better that the participants will try wide activities through sharing

roles, information and benefits by organizations such as farmers groups or cooperatives. And the sales to the brokers will also be kept as an important marketing channel since the marketing channel has advantages such as simple work and low sales cost for the farmers.

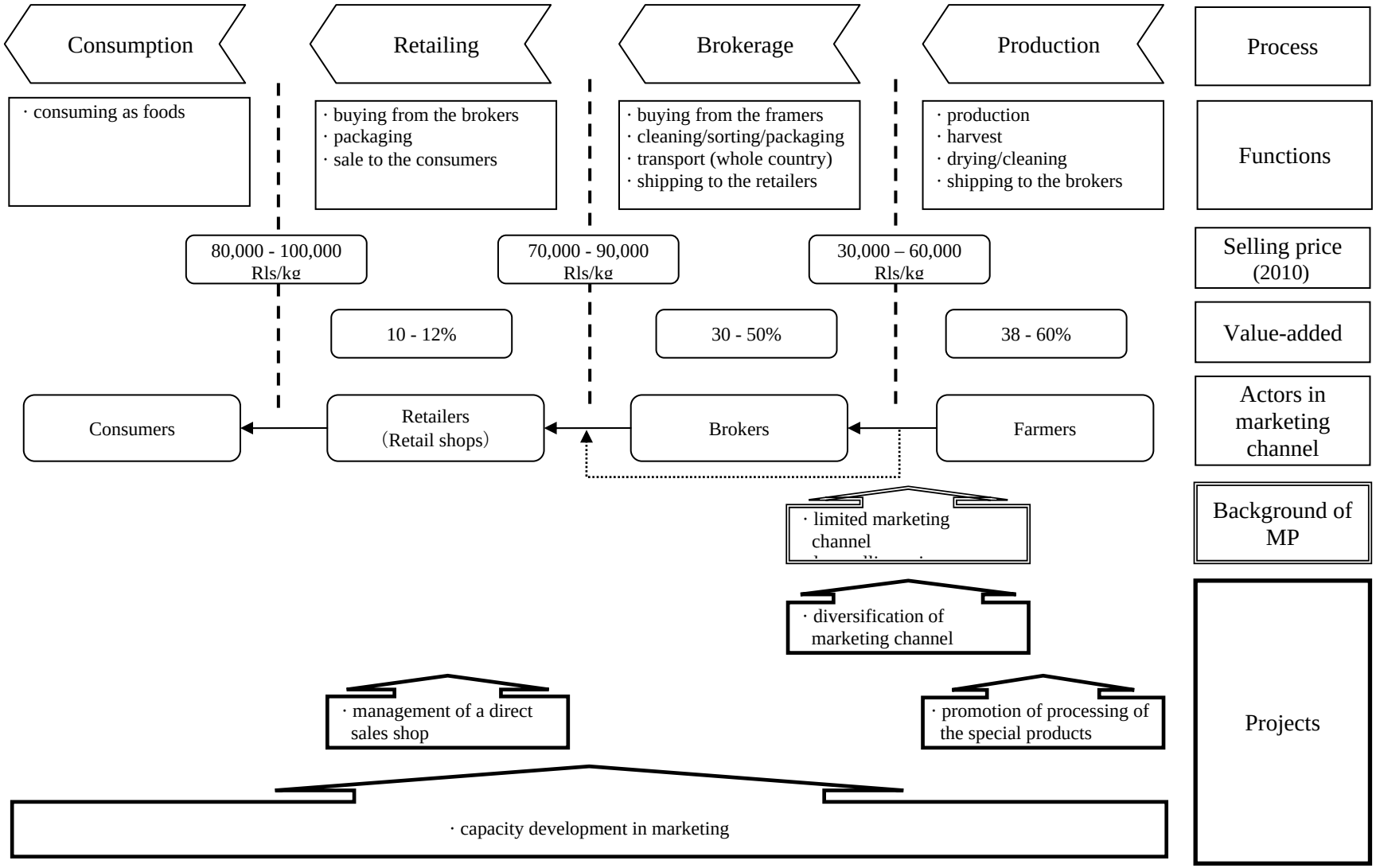


Fig. 5.3 Value Chain Analysis for Barberry and the Projects in Distribution and Marketing Sub-Sector

(4) Diversification of Income Sources

In this diversification of income sources sub-sector, income source diversification through supporting women's small scale economic activities is set as the priority strategy.

In the Study area, since women are relatively not socially mobilized compared with men, many of them are remained in the rural area. In addition, one of the characteristics of many women is that they do not have enough economic bases, and they have less educational opportunities than men. Therefore, it is effective to draw a strategy to support women in order to develop the rural areas. And it is important to aim women's capacity development through this process. Hence, it is important to increase opportunities to improve women's techniques, to support women's small scale economic activities and to diversify income sources.

First, since a fund is necessary to start economic activities, the women can start small scale economic activities by establishing women's group and making a fund in order to save a large sum of money. Then, it can be a lead for women to start economic activities by giving loans from the fund to the members of the group. When they begin to gain income after commencement of their economic activities, they will repay to the fund. There is the interest on the repayment, so the fund will be increased. After completion of the repayment, other members of the group will receive the loans, and they will start their new economic activities as well.

By repeating this cycle, promotion of women's economic activities can be realized; and therefore, the development of the Study area can also be aimed. Women in the Study area have not been organized into an economic group. However, the women could start economic activities by establishing a group and a fund, and giving loans from the fund during the implementation of the PP. Consequently, this was verified that women's economic basis can be reinforced by organization of them.

Second, since the members of the group can share their knowledge and experience that is a merit of the organization, the techniques and, knowledge and capacity for livelihood improvement are improved as a whole group. A secondary effect is indicated by lesson learned in former development that women spend money to their household when they earn extra money which they can use. It can say that the promotion of women's economic activities links not only to women's social participation but also to livelihood improvement in their households and villages. This could be confirmed that the women spent 50% of their money gained by the PP activities on buying staples and meats. Therefore, a program to support women's economic activities through groups and/or rural women's cooperative is implemented in this sub-sector in order that the women diversify their income sources.

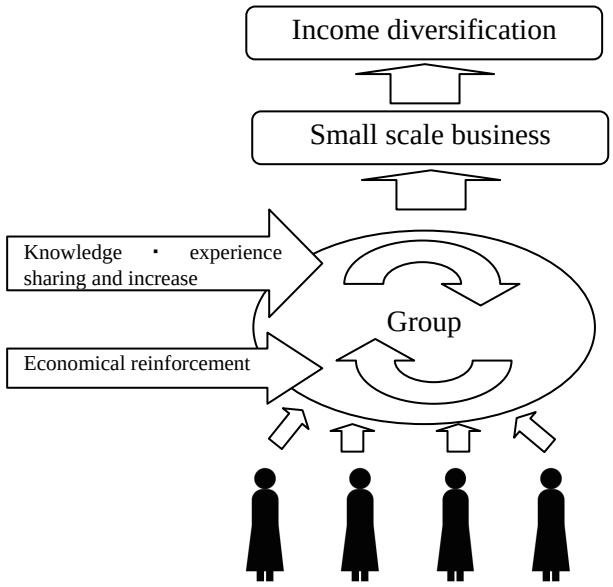


Fig. 5.4 Conceptual Diagram of Diversification of Income Sources through Women Support

(5) Basic Infrastructure

In the basic infrastructure sub-sector, the feeder roads in Kahshang area, where the access roads to the villages in the Study area are unpaved, are developed.

5.3.7 Program

(1) Program for Irrigation Improvement

In the Study area, farmers cultivate fruit trees as major crops, as well as vegetables in a small-scale, by using water from qanat as its sole water source. Water conveyance from outlet to each farmer's field is carried out through concrete or unlined open channels. In the field, furrow or basin irrigation is practiced. However, there is a long distance between diversion intakes and each field, causing much loss during water conveyance and making water management work heavy while distributing water. In addition, farmers have to irrigate according to a predetermined water distribution rotation, which limits interval and duration of irrigation. Due to this limitation, the amount of water irrigated at one time becomes large, causing over-irrigation and poor growth of some crops. At the same time, due to furrow or basin irrigation, irrigation efficiency is low, because such methods supply excess water to areas outside the root systems.

The main water sources are qanats which are unlined tunnels with a small diameter. They need regular maintenance works such as excavation of sand accumulated due to internal water flow and removal of sand due to buried vertical shaft or horizontal underground tunnels by flooding water. While small-scale rehabilitation works of qanats are undertaken by the owners (water use right holders), larger scale rehabilitation works depend on JAO's subsidies. However, many qanats need rehabilitation in the Province, including the qanats in the Study area. With a decrease in the number of qanat engineers, rehabilitation of these qanats is currently implemented insufficiently. In addition, the water volume of qanats in the Study area in general tends to decline, because of the low quantity of rainfall over more than ten years. Furthermore, the recent regulation on well digging, due to consideration on environment, makes importance of conservation of qanats even higher.

Based on such a situation, the following project aims to stabilize and improve the productivity of agriculture in the area, through establishing an irrigated agriculture that uses water effectively and efficiently, by introducing water-saving and small-scale irrigation system that is suitable for the area's limited water resource and geographic conditions. In addition, another project aims to reinforce maintenance and conservation of qanats, which is the water source for agriculture and livelihoods in the area.

1) Project for Irrigation System Improvement

i) Basic Concept

The basic concept of the project is to introduce a water distribution system that makes water management easier and establish a small-scale and water-saving irrigation system that is suitable for geographical conditions of the area. The irrigation system that will be introduced in the Study area is a model that is applicable to similar areas in the Province.

The target area of the plan for improving irrigation system is areas (villages) in the Study area, where there is a potential for development in agricultural production, including increase in cultivation area and production volume. Therefore, the target area is supposed to have a certain amount of qanat water with a relative stability and land where fruit cultivation, mainly barberries, can be expanded.

This project includes that the farmers concerned learn on operation and maintenance of the new systems in addition to surveying, designing and constructing for building the irrigation systems.

ii) Activities and Actors

Activities	Major actions and actors
1. Survey and design	JAO studies the current situation of area (villages and area benefiting from qanats) to consider the introduction of new irrigation systems. The relationship between the landowners and the current irrigation networks for barberry cultivation fields will be clarified by each land benefiting from qanat. The areas, where the quantity of water from qanat is stable, are selected as priority development targets. (Selected areas are described later.) Barberry farmers participating in the introduction of new irrigation systems are decided and the areas of targeted fields are determined. In this case, the agreement of contribution of farmers to the cost of development and maintenance of the facilities is needed. It is also necessary to build consensus among the non-participating local farmers and the rural cooperatives. The topographic survey (measurement) for each qanat is conducted in the areas where the new irrigation systems are introduced. Surveys are conducted by JAO itself or companies commissioned. Based on the results of the survey, the topographic conditions and relationship of location of the water resources and fields are understood and the irrigation methods to be developed are decided. (The irrigation methods are described later.) The irrigation facilities for the selected areas are designed and the necessary tender documents for the construction are made. The contractors are selected by bidding.
2. Construction of irrigation facilities	The construction work for the development of irrigation facilities are carried out by the selected contractors under the supervision of JAO. The "Farmers' participatory construction", in which the farmers concerned provide the labor force to the construction work, is recommended. The farmers can acquire the overview of new irrigation systems by participating in the construction. Besides, the farmers can understand the function of equipment and operation and maintenance method. The main facilities are water transmission and distribution pipelines, dripping equipments, drip pipes and tubes, emitters, pump facilities, water tanks, water distribution tanks, diversion boxes, etc. It is better that the construction period is selected when the necessity of irrigation for barberry is less, and the farmers can easily participate in the construction (October to March).
3. Operation and management of the irrigation facilities	After construction of the irrigation facilities, it is important to operate them properly. JAO should provide the necessary trainings to the farmers concerned. The practical trainings are conducted for the farmers to understand the new system (drip facilities, pumping facilities, valve operation, etc.) and the rule of water management (rotation irrigation methods). Especially, the water management is important since the water management requires a group administration by some number of households. It is very important to strictly keep the rule of irrigation rotation for the water saving, since the water resources of qanats are limited. (Rotation blocks and irrigation interval are described later.) The farmers need to fully understand the necessity of maintenance of facilities and the cost sharing by the users (each farmer). In case of the drip irrigation, it is necessary to implement the measures to prevent clogging of the emitters. (Cleaning of the filters, regular washing of the emitters, etc.)

a) Basic Conditions of the Plan for the Introduction of Water-Saving Irrigation System

Basic conditions of the plan for improving irrigation system are as follows:

- Targeted fields for installing the irrigation system are barberry fields, crops that are specialty products of the Study area, having a stable market and a high water- and land-productivity.
- Installation of the system to individual farmers needs a high cost, because their farm lands

are small and dispersedly located. Therefore, the system will be integrally installed to a qanat as the unit, as qanat can be considered as an irrigation organization, in terms of geography and water distribution.

- In addition to the integral installation plan for each qanat, the current water management system will be improved to become more efficient. The current water distribution operation that is managed by individuals will be replaced by a group water management, in which the related owners work in cooperation. For this purpose, a "water management group," consisting of qanat owners, will be established. However, irrigation rotation will still be needed due to the limitation of the amount of water in the water source.

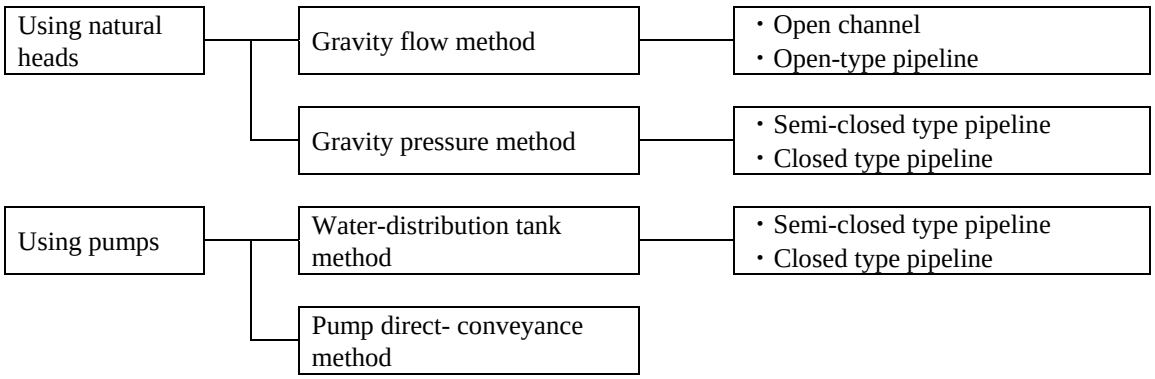
- In the field, drip irrigation will be applied as a pressurized irrigation method. The verification trial on irrigation, conducted in the present Study, has confirmed a water-saving effect of the drip irrigation to a certain degree. Basically, the most common drip irrigation system in Iran and in the Province will be applied.

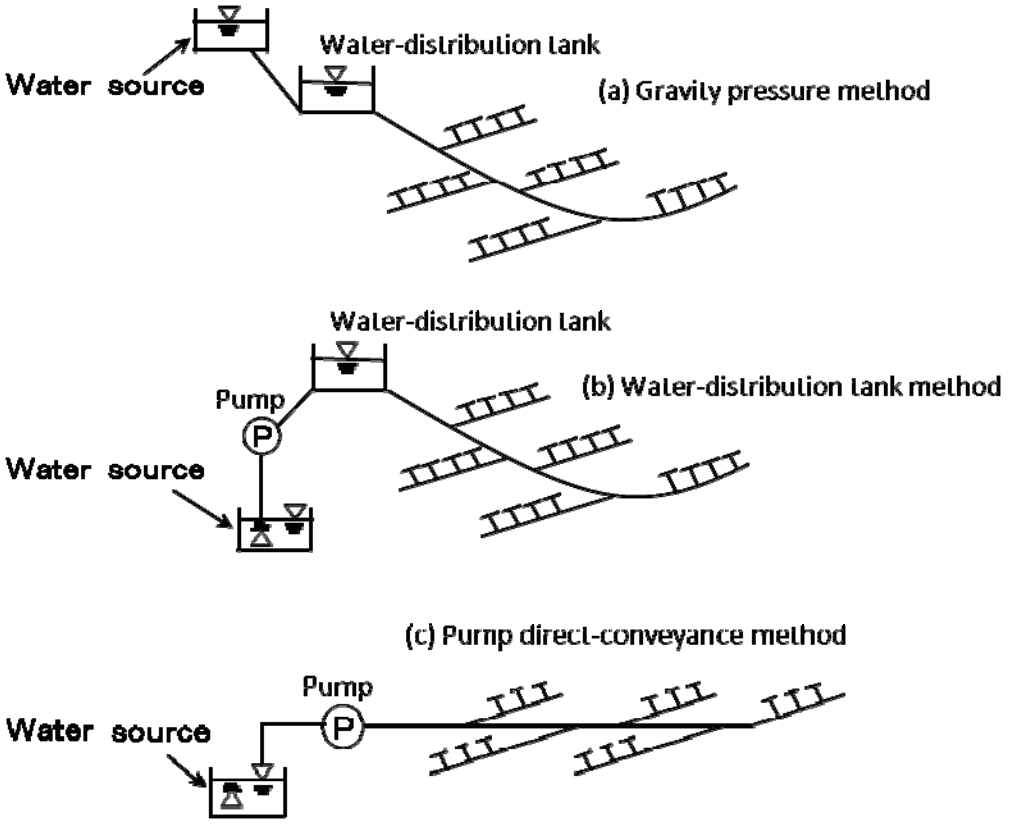
- With introduction of drip irrigation, the interval for irrigation rotation will be shortened. Currently, it is normal to irrigate fruit trees once in every 12 to 14 days. It is necessary to shorten this rotation interval, because the amount of irrigated water at one time will be reduced due to introduction of the drip irrigation system. Based on the results of the verification trial on irrigation, conducted in the present Study, the estimated appropriate irrigation interval is between 4 to 7 days. To realize this interval, it is necessary to install a water tank that can temporarily store water from qanat.

b) Contents of the Plan

In the project, the priority is application of water conveyance methods using natural head, taking advantage of geographical slopes of the Study area. For the fields that are located above the water source level (water-distribution tank method), the water conveyance methods using pumps is considered.

The water conveyance methods are generally classified as follows:





It is better that the downstream of water distribution tank is the pipeline using gravity pressure method such as (a) and (b) in the above mentioned figure in order to enable the water use with a simple operation in the fields. Especially, the method (a) has the advantage of low running cost, since the water distribution from the water source to the water-distribution tank is the gravity flow.

With regard to the methods for water conveyance and irrigation in the proposed project, the following four models can be considered, based on the characteristics of the area.

[1] Case in which the field is located below the level of water source (qanat)

- Case [1]-1) Slope (with a large difference in height) --- Water-distribution tank method, using natural head

  - ✓ Using gravity flow, water is conveyed from qanat to a water tank that is installed at a high place in the area, and the water is temporarily stored in the tank. Then, using gravity pressure, the water is conveyed through a pipeline to each field and irrigated by drip irrigation.
  - ✓ Newly installing facilities: Water-distribution tank, Pipelines, and Drip irrigation system

For drip irrigation, it is necessary to install filters to prevent clogging of emitters. For the field size of the target area (maximum several hectares), a difference in height of about 15 meters is enough, including the pressure needed for the filters to function properly. If emitters of a low-pressure type are used, a difference in height of 7 to 8 meters is enough for drip irrigation.

- Case [1]-2) Moderate slope (with a small difference in height) --- Installation of pipelines for water conveyance channels (open-type pipeline)

  - ✓ This case is applied where there is not enough difference in height for drip irrigation and

there is no suitable place for the water-distribution tank near the beneficiary area.

- ✓ Using pipelines and gravity pressure, water from qanat is conveyed to diversion boxes that are installed at the entrance of each field. Since the pressure is not enough for drip irrigation at the point of diversion boxes, the field is irrigated by applying the conventional furrow or basin, or hose irrigation.
- ✓ Newly installing facilities: Pipelines, Diversion boxes

[2] Case in which the field is located above the level of water source (qanat), or there is not enough difference in height (pressure) for the drip irrigation

◆ Case [2]-1) Slope (with large difference in height) --- Water-distribution tank method, using pumps

- ✓ It is a requirement that the suitable place for water-distribution tank is available next to the area.
- ✓ Using a pump, convey water from qanat to a water tank that is installed at a higher place in the area and temporarily store the water in the tank. Using gravity pressure, convey the water through a pipeline to each field and irrigate the field by drip irrigation.
- ✓ Newly installing facilities: Pump facilities, Water-distribution tank, Pipelines, Drip irrigation system

◆ Case [2]-2) Flat to moderate slope (with small difference in height) --- Pump direct-conveyance method

- ✓ This case is applied, if there is no suitable place for the water distribution tank.
- ✓ Using gravity flow, convey water from qanat to a water tank, and temporarily store the water in the tank. Using a pump, convey the water to the field and irrigate the field by drip irrigation.
- ✓ Newly installing facilities: Water tank, Pump facilities, Pipelines, Drip irrigation system.

In each village, several methods for water conveyance and irrigation are possible. The highest priority is in the drip irrigation using gravity pressure, and the pump direct-conveyance method is not recommended in this project.

The priority to select the water conveyance methods is shown below:

Case [1]-1) → Case [2]-1) → Case [1]-2) → Case [2]-2)

The table below shows the classification in applying each of the above-described methods to each village of the Study area. The targets of the consideration are the lands irrigated by qanats which have relatively large and stable quantity of water.

Table 5.2 Application Plan of the Water Transmission and Irrigation Methods for the Lands Irrigated by the Major Qanats

Qanat name	Village	Case [1]-1)	Case [2]-1)	Case [1]-2)	Case [2]-2)	Remarks
Nawraz	Alghor		△	○	△	Fruit trees are larger
Felarg	Felarg	○		○	△	
Bozghong	Bozghong	○		○	△	
Dinouki	Bozghong		△	○	△	Fruit trees are larger
Mafriz	Mafriz		○	○	△	
Sang Abad	Sang Abad		○	○	△	
Hussein Abad	Sang Abad		△	○	△	Intercropping with Jujube
Sheikhan	Sheikhan		△	○	△	Far from suitable place for water distribution tank
Garmidar	Garmidar		○	○	△	
On-farm Irrigation		Drip	Drip	Furrow/ Basin	Drip	

Note) ○: Possible to be applied △: Possible but not recommendable

In this table, although case [1]-2) and case [2]-2) are technically possible in all the areas, priority is given to case [1]-1) and case [2]-1) in this project. The current irrigation methods (furrow/basin irrigation) are applied in the fields in case [1]-2).

c) Installation Plan

The major facilities for the new irrigation systems to be introduced are planned based on the following policies.

[1] Water-distribution tank/Water-storage tank

The objectives of installing a water-distribution tank are to store water and to make water management easier through smooth water distribution. The pipeline system of the gravity pressure method is used at the downstream of the water-distribution tank.

- The size of water-distribution tank is determined by the factors such as irrigated area (area of rotation block) and rotation interval.
- Considering the severe climatic conditions, the water-distribution tank will be made of concrete, which has a high durability. However, in case of a small storage amount, a steel tank, which is commonly used in the Study area (and produced by order), is economical. Also, for concrete tanks, covers will be installed for reasons such as preventing foreign matter contaminations, shielding the sun light (to prevent formation of algae), and reducing water evaporation.
- The location (altitude) for installing water-distribution tanks will depend on the area irrigated from these tanks and will be determined considering the pressure needed for drip irrigation, head loss inside the water conveyance pipes, as well as other necessary pressures.

[2] Pump

Pumps are needed to lift water into water-distribution tanks or to apply the pump direct-conveyance method. In this plan, the purpose of pumping is only pumping the water to the water-distribution tanks.

- As for the type of pump, considering that it is a small scale, economical submergible

pumps will be used.

- For the pump power, electricity will be used, as most villages in the Study area are electrified.

[3] Water conveyance pipeline

The water conveyance pipelines will consist of main and branch pipelines.

- As for the material of pipes, considering that they are of small diameter, polyethylene pipes will be used, as they are economical, durable and versatile in the Study area.

- Open-piping is possible for polyethylene pipeline. However, underground-piping is preferable for a long-term use. Since the diameter of the pipeline is small, the pipeline can be buried at a shallower depth, and the depth of digging will be around 50 cm.

[4] Dripping equipment

Drip pipes will be connected to the water conveyance pipelines. Emitters will be attached to the drip pipes for irrigating fruit trees.

- The type, emitting capacity and number of emitters will be determined according to the amount of water for one time of irrigation and the age of target trees.

- In this plan, the standard barberry trees are 5-10 years old. The emitters with three droppers are installed per one tree.

d) Quantity of Irrigation Water and Potential Irrigation Area

- Designed daily consumptive use of water

The designed daily consumptive use of water (mm/day), which is the basis to decide the capacity of irrigation facilities, is calculated for barberry based on the crop water requirement formula of FAO (ETcrop=ETo・Kc) that have been applied in Iran.

Maximum designed daily consumptive use of water = 4.8mm/day (barberry)

- System capacity

The irrigation blocks are set for each qanat. The system capacity of one irrigation block (= maximum discharge) is decided by the following equation based on the assumption of the rotation irrigation.

$$Q = 2.78 \cdot (A' \cdot E / F \cdot T)$$

Q : System capacity (l / s)
A' : Wetted area by irrigation (ha)

$$A' = \alpha \cdot A = 0.3 \cdot A$$

α : Wetted area ratio: 30%
A : Area of the irrigation block (ha)

E : Gross water requirement (mm)
= 4.8 mm × 4 days / 0.9 = 21.3 mm (Irrigation efficiency: 90%)

F : Planned irrigation interval (days) = 4 days

T : Actual irrigation time per day (hr) = 6 hrs × 3 blocks = 18 hrs

Four rotation blocks (irrigation interval of 4 days) is divided into 3 sub-rotation blocks (three sub-blocks irrigated in a day) to increase the water saving efficiency by the drip irrigation and enlarge the potential area for irrigation. The quantity of irrigation water is equivalent to 18 hours of the qanat flow and the remaining 6 hours are used for other purposes.

- Estimation of potential irrigation area

The potential irrigation area is calculated by the following equation.

$Q = 0.25 \cdot A$ (l/sec)

$A = Q / 0.25$ (ha)

From the above equation, the potential areas for drip irrigation for barberry in each qanat are calculated and shown in the following table. In general, the areas calculated are larger than that of the current barberry cultivation. However, there is a limitation of area which can be applied for the drip irrigation in practice. Therefore, potential irrigation areas shown in the table can be considered as theoretical numeric values.

Only the main qanats for which flows were measured in the Study are shown in the table. (The maximum flow is more than about 0.5 l/s in the Study period.)

Table 5.3 The Flows of Main Qanats and Potential Area for Irrigation for Barberry (reference)

Village	Qanat	Qanat flow *Q* (l/s)	Potential area for irrigation *A* (ha)
Alghor	Nawraz	1.08	4.32
Felarg	Felarg	4.62	18.48
Bozghong	Bozghong	1.55	6.20
Bozghong	Dinouki	2.49	9.96
Mafriz	Mafriz	2.27	9.08
Sang Abad	Sang Abad	0.47	1.88
Sang Abad	Hussein Abad	0.75	3.00
Sheikhan	Sheikhan	0.62	2.48
Garmidar	Garmidar	0.69	2.76

Note: The flow of qanat is the average in the Study period (dry season).

And also, the theoretical potential areas for drip irrigation for barberry in all the qanats registered in the Study are shown in the following table.

Table 5.4 The Flows of Qanats and the Potential Areas for Irrigation for Barberry in Whole Study Area (reference)

	Village	Number of qanat	Qanat flow ΣQ (l/s)	Potential area for irrigation ΣA (ha)
1	Masen	10	4.53	18.12
2	Alghor	6	5.00	20.00
3	Felarg	7	10.28	41.12
4	Bozghong	6	6.32	25.28
5	Mafriz	7	7.35	29.40
6	Kooshk	1	—	—
7	Borgeziad	1	—	—
8	Sang Abad	3	1.53	6.12
	Sub total		**35.01**	**140.04**
9	Sheikhan	4	2.28	9.12
10	Neyestan	4	1.35	5.40
11	Garmidar	2	1.01	4.04
12	Garmok	10	2.37	9.48
13	Jalal	5	1.50	6.00
14	Takhchar Abad	1	0.50	2.00
15	Zin Abad	1	0.48	1.92
	Sub total		**9.49**	**37.96**
	Total		**44.50**	**178.00**

Note: The shaded cells are supplemented with the values measured by the Study team, since registration records are not available.

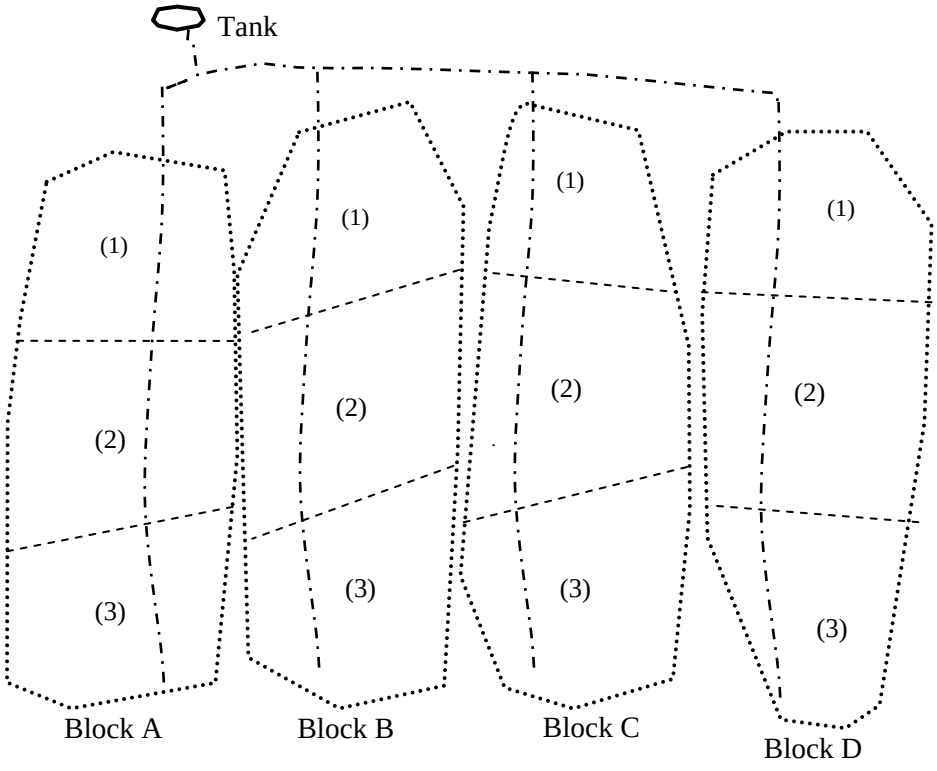


Fig. 5.5 Example of the Rotation Block (irrigation interval of 4 days)

Day	Time	Block
First day	6:00-12:00	Block A (1)
	12:00-18:00	Block A (2)
	18:00-24:00	Block A (3)
Second day	6:00-12:00	Block B (1)
	12:00-18:00	Block B (2)
	18:00-24:00	Block B (3)
Third day	6:00-12:00	Block C (1)
	12:00-18:00	Block C (2)
	18:00-24:00	Block C (3)
Forth day	6:00-12:00	Block D (1)
	12:00-18:00	Block D (2)
	18:00-24:00	Block D (3)
Fifth day	6:00-12:00	Block A (1)
	12:00-18:00	Block A (2)
	18:00-24:00	Block A (3)
To be continued		

e) Model Design

In the table 5.2, the irrigation models are examined for the 9 qanats which have comparatively much quantity of water. The 3 models proposed are designed for the 3 representative qanats in the table 5.2.

- Case [1] -1) Model: Felarg
  - Irrigated area: A = 6 ha
  - Water source: Felarg qanat pool (Elevation: about 2,040 m)
  - System capacity: $Q = 0.25 \cdot A = 1.5$ l / sec
  - Area of the rotation block: 6 ha / 4 days = 1.5 ha / day
  - Area of sub-rotation block: 1.5 ha / 3 = 0.5 ha (irrigated area at one time)
  - Capacity volume of water-distribution tank (V):
    Storing irrigation water for one day (= quantity for 1 rotation block)

    $V = 3.6 \cdot Q \cdot T = 3.6 \times 1.5 \times 18 = 97.2 = 100$ m^3

    Dimensions of the water-distribution tank:
    6 m x 7 m x 3 m (Water depth: 2.5 m) = 105 m^3
  - Elevation for installation of water-distribution tank: EL = About 2,037 m (LWL.)
  - Water transmission and distribution pipeline (Polyethylene pipe): φ 90 mm ~ φ 50 mm,
    Total length: L = 1,550 m (4 lines)
  - Drip pipe and tube (Polyethylene pipe): φ16 mm,
    Total length L= 15,500m (Interval : 4 m)
  - Emitter: 3 droppers / point (Interval : 3 m),
    Total number of emitters: 5,000 sets (1 point / 12 m^2)
- Case [2] -1) Model: Mafriz
  - Irrigated area: A =5 ha
  - Water source: Mafriz qanat pool (Elevation: about 1,932 m)

- System capacity: $Q = 0.25 \cdot A = 1.25$ l / sec.
- Pump equipment:
  The capacity of pump is to convey the water for the water distribution tank capacity in 6 hours.

  Pumping rate: $Q = 81 / (3.6 \times 6) = 3.75$ l / sec = 0.225 m^3 / min.

  Total pump head:
  H = Actual pump head (water distribution tank HWL – suction tank LWL) + Pipeline head loss

  Motor output: $P = 0.163 \cdot Q \cdot H \cdot (1 + R) / \eta_p = 1.5$ kw

  Q: Pumping rate (m^3/min) = 0.225 m^3/min → 0.25m^3/min

  H: Total pump head (m) = 18 m

  R: Allowance coefficient = 15 %, η_p: Pump efficiency = 60 %
- Capacity of water distribution tank: $V = 3.6 \times 1.25 \times 18 = 81$ m^3

  Dimensions of water distribution tank: 6 m x 6 m x 2.5 m (Water depth: 2.25 m) = 81 m^3
- Elevation for installation of water distribution tank: *EL.*= about 1,947 m
  (Installed on the hill at the eastern side of the area irrigated)
- Water transmission and distribution pipeline (Polyethylene pipe):

  Pumping station ~ Water distribution tank: φ90 mm, Total length = 250 m

  Water distribution tank ~ land irrigated: φ50 mm, Total length = 1,150 m (2 line)
- Drip pipe and tube (Polyethylene pipe): φ16 mm,
  Total length: L = 12,500 m (Interval : 4 m)
- Emitter: 3 droppers / point (Interval: 3 m),
  Total number of emitters: 4,200 nos. (1 point / 12 m^2)

■ Case [1] -2) Model: Sheikhan

- Irrigated area: A = 6 ha
  (Same as the current situation: barberry 3 ha, Other fruit trees and upland fields 3 ha）
- Water source: Sheikhan qanat pool (Elevation: about 1,917 m)
- Water transmission and distribution pipeline (Polyethylene pipe):
  The current open channel routes are changed to the pipeline. The diameter of the pipeline corresponding to the current water use is about φ150mm ~ φ90mm, including the margin. (The diameter is selected according to the size of land irrigated.)
- Diversion box: The diversion boxes are installed around the points of current diversion outlets of each field and connected by the pipeline. The pipes (φ50 mm) are installed on both the sides of each diversion box to diverse the water to each field. The valves for opening and closing are installed in each pipe.

  The simple steel sliding gates are installed in the diversion boxes (downstream side) and are operated to switch for the rotation.

  The size of the diversion box: The box is made of concrete, and the standard inner

dimensions are 1.0 m x 1.0 m x 1.0 m.

Qanat	Irrigation model	Area introduced a)	Area added b)	Total
1. Felarg	Case[1]－1)	2	4	6
2. Bozghong (Bozghong)	Case[1]－1)	1	2	3
3. Mafriz	Case[2]－1)	1.6	3.4	5
4. Garmidar	Case[2]－1)	1	2	3
5. Sang Abad (Sang Abad)	Case[2]－1)	0.6	1.4	2
6. Sheikhan	Case[1]－2)	6	-	6
7. Bozghong (Dinouki)	Case[1]－2)	3	-	3
8. Alghor	Case[1]－2)	4	-	4
9. Sang Abad (Hussein Abad)	Case[1]－2)	3	-	3
Total		22.2	12.8	35

a): Potential area for the drip irrigation for barberry in the land irrigated by a qanat (assuming about 30 % of total)
b): The potential area for barberry to be irrigated newly by the water saved by the introduction of drip irrigation

iii) Implementation Structure

Implementation organization: JAO of Birjand Township

Related villages: Alghor, Felarg, Bozghong, Mafriz, Sang Abad, Sheikhan, Garmidar (Seven villages)

iv) Implementation Schedule

Table 5.5 Implementation Schedule of the Project for Irrigation System Improvement

Activities	2013	2014	2015	2016	2017
1. Survey and design					
2. Construction of the irrigation facilities					
2-1. Felarg, Bozghong					
2-2. Mafriz, Sang Abad					
2-3. Alghor, Sheikhan, Garmidar					
3. Training on Operation and management of the irrigation facilities					
4. Operation and management of the irrigation facilities					

v) Project Cost

Table 5.6 Project Cost of the Project for Irrigation System Improvement

Unit: 1,000 Rls

	2013	2014	2015	2016	2017	Total
1. Survey and design (35 ha)	522,500	0	0	0	0	522,500
2. Construction of the irrigation facilities (35ha)						
2-1. Felarg, Bozghong	0	826,200	0	0	0	826,200
2-2. Mafriz, Sang Abad	0	0	816,400	0	0	816,400
2-3. Alghor, Sheikhan, Garmidar	0	0	0	755,100	0	755,100
3. Training on operation and management of the irrigation facilities	0	7,200	7,200	7,200	0	21,600
4. Operation and management of the irrigation facilities	0	24,786	49,278	71,931	71,931	217,926
Total	522,500	858,186	872,878	834,231	71,931	3,159,726

Note:
1) JAO and the farmers share 70% and 30% of the cost respectively.

2)Project for Qanat Conservation

i) Concept

Generally, the flows of the qanats in the Study area tend to decrease slightly according to the survey of the flows conducted in the Study period (three years), although the flows of some qanats such as the main qanat in Felarg almost don't fluctuate.

JAO, which is in charge of qanat repair projects in the province, responds to the requests for subsidies for the repair from the water right holders of the qanats at any time. Although JAO is making efforts to maintain the qanats, effect of the project implemented may not be enough. The causes may be mainly the project budget, implementation system, application method, selection method, etc.

The current request for repairing a qanat is not based on a formal document. It is said that the priorities of the projects are decided based on the selection criteria such as population, number of water right holders, the quantity of water, area irrigated, etc. although it is not officially provided.

Currently, both of the Ministry of energy and MOJA play a role in the qanats. The Ministry of energy is in charge of the overall in qanats including the approval of projects and the execution of budget, and MOJA is in charge of the repairing of the existing qanats.

ii) Contents of the Plan

a) Development of Organization for Maintaining and Controlling the Qanat Facilities

1. Reinforce the maintenance of qanats, by creating an organization or structure specializing in the operation and maintenance projects, with a major focus on qanat rehabilitation.

2. The organization will be an independent "Department (Division) of Qanat," which will be established by unifying a part of the Groundwater Division of the Regional Water Organization, a branch organization of the MOE, and the JAO's Management of Soil and Water.

Since the qanats in the Province, including in the Study area, mainly play their roles in agriculture and serve the rural areas, the "Department (Division) of Qanat" is preferable to be under the JAO.

The "Department (Division) of Qanat" and the Townships' Infrastructure Affairs of Water and Soil Unit will work in collaboration and create a system in which all the information from each area is gathered in the Department (Division).

b) Contents of the Project

- Understanding the current situation, through organizing the information on qanats
  - Organization of information on location of qanats, using GPS (preparation of location map and line map)
  - Organization of information on structures and forms of qanats (such as line length, line slope, depth of mother well and number of vertical shafts)
  - Number of holders and users
  - Diagnosis of function and situation of degradation, through inside-qanat inspection (such as checking the number and degree of defects and taking pictures)
- Formulating project plans for qanat rehabilitation and maintenance (mid-term plan and annual detail plan) and implementing the projects
- Training personnel who are involved in the projects for qanat rehabilitation and maintenance

(2) Program for Crop and Livestock Productivity Improvement

The crop and livestock productivity improvement program, based on the above-described development strategy, is formulated as follows.

1) Project for Net House

i) Concept

The following cultivation techniques are introduced to improve the main causes of the existing low productivity.

a) To shorten the irrigation interval, some irrigation water is saved in a tank at the time of irrigation water supply. It is used to irrigate vegetables during the interval (every 2 to 3 days, with a smaller amount of water).

b) To prevent bird damage and prepare appropriate environment for crop cultivation, a house covered by net is applied to the cultivation (reducing evapotranspiration and decreasing temperature in hot summer).

c) To accelerate the roots growth, ridging method of cultivation is applied.

d) To increase crop productivity, basic technologies of vegetable cultivation such as disbudding, training and fertilizer application is disseminated.

e) To increase land productivity, intercropping of carrot and radish with tomato is applied.

ii) Activity and Actor

In the first year, the net-houses constructed for the pilot project are used as a demonstration farm to exhibit the technology applied to the project for farmers who are interested to grow vegetables. From the second year onwards, 10 participants are selected from the villages where the pilot project was not implemented (at least one from each village), and 10 demonstration net-houses are constructed for dissemination of the technology.

Activities	Major actions and actors
1. Technical extension using the existing net-house	Confirming the technologies applied to the pilot project and implementing the net house seminar for farmers who intend to grow vegetables.
2. Improvement of facilities	Improving the facilities used in the pilot project by JAO during the confirmation of the cultivation technology in the first year.
3. Selection of the participants and construction of the improved facilities	Selecting the participants from each village and implementing the technical extension using the improved facilities.
4. Technical extension	Implementing extension activity on crop cultivation to interested villagers.

iii) Implementation Organization

The agronomists of JAO are responsible for the technical extension, and implementation of technical seminar in the demonstration farms and construction of net house.

iv) Implementation Schedule

The program is implemented for 5 years period from 2013. The net house used for the pilot project is applied in the first year to confirm and improve the technology. During the first year, JAO staff improves the facilities, which are cheaper and easier to establish, and disseminate. It is planned to construct 10 numbers of improved net houses in 2 years period from 2014.

Table 5.7 Implementation Schedule of the Project for Net House

	2013	2014	2015	2016	2017
1. Activities using the existing demonstration farm					
2. Establishment of new demonstration farm and activities using them					

Table 5.8 Annual Implementation Schedule of the Project for Net House

Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. Preparation												
2. Cultivation												
3. Extension												

v) Project Cost

The project cost is summarized in the following table.

Table 5.9 Project Cost of Project for Net House

Unit: 1,000Rls

	2013	2014	2015	2016	2017	Total
1. Irrigation material	0	18,100	18,100	0	0	36,200
2. Net house construction	0	25,000	25,000	0	0	50,000
3. Agriculture inputs	2,851	10,403	13,254	8,554	8,554	43,615
Total	2,851	53,503	56,354	8,554	8,554	129,815

2) Project for Vegetable Cultivation for Self-consumption in Winter

i) Concept

The basic policies of the project are as follows:

a) The vegetable cultivation in winter for self-consumption is expanded by installing small-scale non heating vinyl house.

b) In-house sprout cultivation technique is disseminated as the substitution of vegetables in winter to the villagers who do not have irrigation water and land.

ii) Activity and Actor

In the first year, the non-heating vinyl tunnels constructed for the pilot project are modified to non-heating vinyl houses using stone walls and used as a demonstration facility to disseminate the technology to the villagers. In the second and third years, 10 participants are selected from the villages where the pilot project was not implemented, and 10 vinyl houses are constructed for demonstration and dissemination. Participants shall be farmers who have the land and irrigation water for the project, and also should cooperate in the extension activities of the project.

Activities	Major actions and actors
1. Remake of pilot facilities and extension activity	Under the instruction of JAO's agronomists, remaking the vinyl tunnels installed in the field of PP participants to small-scale non-heating vinyl houses using stone walls; and implementing the technical seminar for farmers who intend to grow vegetables.
2. Selection of the participants and construction of improved facility	Selecting the participants in each village and implementing the technical extension using improved facility.
3. Technical extension	Implementing extension activity on crop cultivation to interested villagers.

iii) Implementation Organization

The JAO's agronomists are responsible for the technical extension, implementation of technical seminar at the demonstration farms, and installation of vinyl houses.

iv) Implementation Schedule

The program is implemented for 5 years period from 2013. In the first year, the facilities used for the pilot project are modified and used as demonstration farms. In 2014 and 2015, under the instruction of JAO's agronomists, a total of 10 small-scale non-heating vinyl houses using stone walls are constructed and disseminated.

Table 5.10 Implementation Schedule of the Project for Vegetable Cultivation for Self-consumption in Winter

	2013	2014	2015	2016	2017
1. Remake of PP facilities and extension activities using them					
2. Establishment of new demonstration farms and activities using them					

Table 5.11 Annual Implementation Schedule of the Project for Vegetable Cultivation for Self-consumption in Winter

Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. Preparation												
2. Cultivation												
3. Extension												

v) Project Cost

The project cost is summarized in the following table.

Table 5.12 Project Cost of Project for Vegetable Cultivation for Self-consumption in Winter

Unit: 1,000Rls

	2013	2014	2015	2016	2017	Total
1. Materials for sprout cultivation	340	753	965	765	765	3,588
2. Installation of vinyl house	1,311	7,447	8,266	2,949	2,949	22,921
3. Agriculture inputs	1,544	2,809	3,774	3,474	3,474	15,075
Total	3,195	11,009	13,005	7,188	7,188	41,584

3) Project for Forage Cultivation

i) Concept

The production of forage is the main request from the villagers, because shortage of feed is a major cause of the decrease of livestock production today, including chickens. In this project, the following measures are applied to increase the forage crop cultivation for maintaining and expanding livestock production.

a) Forage crop cultivation is expanded to unused area around perennial and upland crops, as in the Study area there is almost no irrigated agricultural land available to grow exclusively forage crops.

b) Sprout cultivation is disseminated to produce feed for chicken rearing.

ii) Activity and Actor

The forage crop seeds are distributed to the livestock farmers in each village to expand forage

cultivation. The seeds are distributed only in the first year, because the farmers will produce the seeds for the next year's cultivation by themselves. For demonstration, the forage production activity targets around 10 farmers owning irrigated area for forage crop cultivation, and the sprout cultivation activity targets around 10 farmers rearing chicken.

Activities	Major actions and actors
1. Distribution of forage seeds and sprout cultivation materials	Distributing to the participants the seeds of forage crop and materials for sprout cultivation.
2. Technical extension for the cultivation	Implementing technical extension of crop cultivation to the participants.
3. Technical extension for post harvesting	Dissemination of technology on post harvest and storage of forage.
4. Technical extension for the seed production	Dissemination of technology on production of forage crop seed.

iii) Implementation Organization

JAO distributes forage crop seeds and materials for sprout cultivation, and JAO's livestock experts implement the technical guidance. The participants produce seeds in the first year, and use them from the second year onwards to continue the activity.

iv) Implementation Schedule

The program is started in 2013 and the technical extension is continued to be implemented for five years.

Table 5.13 Implementation Schedule of the Project for Forage Cultivation

	2013	2014	2015	2016	2017
1. Distribution of seeds and materials and technical extension					

Table 5.14 Annual Implementation Schedule of the Project for Forage Cultivation

Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. Preparation												
2. Cultivation												
3. Extension												

v) Project Cost

The project cost is summarized in the following Table.

Table 5.15 Project Cost of Project for Forage Cultivation

Unit: 1,000Rls

	2013	2014	2015	2016	2017	Total
1. Forage crops cultivation	490	490	490	490	490	2,450
2. Sprout cultivation	1,180	780	780	780	780	4,300
Total	1,670	1,270	1,270	1,270	1,270	6,750

4) Project for Small-scale Chicken Rearing

i) Concept

The basic policies of the project are summarized as follows.

a) Local chicken rearing is expanded to many farmers for self-consumption (of chicken meat and eggs), also aiming to diversify income source through sales of surplus.

b) Incubator is introduced to breed it effectively for disseminating the activity.

ii) Activity and Actor

Ten chickens are distributed to each of about 10 farmers selected from the villages where the pilot project was not implemented. The farmers are responsible for breeding chicken and distribute chicks to other villagers to expand chicken rearing.

Participants are selected among the villagers who own a chicken house or land to keep chicken. To minimize the construction costs, existing chicken houses are rehabilitated. Such chicken houses will serve as a model to expand the chicken rearing.

Activities	Major actions and actors
1. Technical improvement	JAO's livestock experts provide training in the villages that participated in the PP, to improve the materials and techniques for chicken rearing.
2. Selection of participants	Participants are selected from villagers who own a chicken house or land to rear chicken.
3. Installation of chicken house	Installation of chicken houses is done, mainly through rehabilitating existing chicken houses.
4. Distribution of materials	Ten chickens (two cocks and eight hens), feed and the materials for the rearing are distributed to the participants.
5. Technical extension	Chicken rearing techniques are disseminated to the participants.
6. Distribution of incubator	Incubator is installed and a seminar on the operation is implemented. The machine is selected on condition that the model is easy to operate with minimum troubles or breakdowns.
7. Establishment of extension system	Distribution system of chick bred by the project is established and implemented in each village.
8. Establishment of chicken rearing cooperative	If necessary, establish a cooperative for group purchase of feeds and group sales of eggs.

iii) Implementation Organization

JAO supplies the necessary materials and equipment, and JAO's livestock experts implement the technical extension.

iv) Implementation Schedule

Starting in 2013, the project distributes the materials in two years to the villages where the pilot project was not implemented. The technical extension is implemented by livestock specialists in JAO. In the first year (2013), the activities for improving materials and rearing techniques are implemented through training participants of the pilot project. The activity for the newly selected participants starts from the second year (2014). It is desirable that the project starts in April or May, because the temperature is suitable for the rearing.

Table 5.16 Implementation Schedule of the Project for Small-scale Chicken Rearing

	2013	2014	2015	2016	2017
1. Distribution of materials					
2. Technical training					

Table 5.17 Annual Implementation Schedule of the Project for Small-scale Chicken Rearing

Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. Preparation												
2. House construction and chicken distribution												
3. Extension												

v) Project Cost

The project cost is summarized in the following table.

Table 5.18 Project Cost of Project for Small-scale Chicken Rearing

Unit: 1,000Rls

	2013	2014	2015	2016	2017	Total
1. Chicken	0	3,000	3,000	0	0	6,000
2. Chicken house construction	0	3,783	3,783	0	0	7,565
3. Chicken rearing materials	0	1,391	1,751	721	721	4,584
4. Incubator	0	9,470	9,470	0	0	18,939
5. Materials for chick rearing	0	400	400	0	0	800
Total	0	18,043	18,403	721	721	37,888

(3) Program for Distribution and Marketing Improvement

At first, the program for distribution and marketing improvement aims at capacity development of the farmers on market survey and understanding of needs of market as a basis for developing commodities and improving sales methods. And then, increase of the value-added and agricultural income is aimed to be achieved through the activities of production, processing, distribution and sales of the specialty products based on the needs understood in the market survey.

1) Project for Capacity Development in Marketing

i) Concept

To increase the value-added of agricultural products and diversify the marketing channels, the famers need to understand the needs of the sales targets and marketing channels. The farmers need to implement the activities based on the results of the market survey. However, farmers have obtained the information of price and needs mainly from the brokers and the farmers don't have enough opportunities to get such information from the others. And also, the most farmers don't have opportunities to learn the knowledge of marketing systematically. Therefore, the training is provided for the farmers to build a basis of improvement of marketing activities. Through the training, it can be expected that marketing abilities of the farmers, rural cooperatives and rural women cooperative are improved and their attitude change to producing products aiming at sales.

ii) Activities and Actors

The target of this project is the farmers who are producing barberry and jujube, specialty products in the Study area, and are executives of the rural cooperative and the rural women cooperative. The famers, who live in Birjand city and produce these products in the Study area, are included in the target of the project. Although the training shown in the table below is basically held once in each village, it is possible to hold the training in Birjand city for the villages where the most people live in Birjand city (Kahshang Rural Municipality).

<table>
<tr><th>Activities</th><th>Major actions and actors</th></tr>
<tr><td>1. Holding the training of marketing</td><td>Experts of JAO provide the training of marketing to the targets. The major contents of the training are mentioned below and they should not only be theoretical but also be practical.
<table>
<tr><th>Items</th><th>Notes</th></tr>
<tr><td>Objectives and necessities of marketing</td><td>Transition to production focusing on sales is required in the future. Therefore, the understanding of the needs, improvement of sales based on the needs and sales activities respecting customers' needs are important. For this transition, the marketing activities are necessary.</td></tr>
<tr><td>Survey method for needs</td><td>Method of the survey is to conduct the interviews to the brokers, the shop keepers and the consumers. Items of the interviews are requiring commodities, quality, quantity, season, price etc.</td></tr>
<tr><td>Selection of sales targets and selection of commodities for the targets selected</td><td>Major sales targets are brokers, retail shops and consumers. Selection of the commodities which are suitable for each sales target assumed is necessary.</td></tr>
<tr><td>Making sample commodities and necessity of the evaluation</td><td>Samples of the commodities are made and the evaluation of them is asked to the sales targets assumed. For the evaluation, interviews are made in the Wednesday market and retail shops to collect the comments on price, size, looks, willing to buy etc.</td></tr>
<tr><td>Cost element structure and setting method of selling price</td><td>Understanding of the price formulation at each distribution stage and method of setting appropriate selling price and cost are important. Using this understanding, negotiation on price can be done to ensure the profits.</td></tr>
<tr><td>Practice of survey for needs</td><td>Practicing the interview survey in retail shops etc.</td></tr>
</table></td></tr>
<tr><td>2. Providing the marketing information</td><td>JAO establishes a window of an information system at the project office for technical support on marketing activities. The office provides information on the survey for needs, commodity development and diversification of marketing channels and, supports marketing activities of the farmers. In addition, the office collects information of cases of marketing activities in the other areas and provides it to the farmers.</td></tr>
</table>

iii) Implementation Structure

Implementation organization: JAO of Birjand Township

iv) Implementation Schedule

Table 5.19 Implementation Schedule of the Project for Capacity Development in Marketing

Activities	2013	2014	2015	2016	2017
1. Holding the training of marketing					
2. Providing the marketing information					

v) Project Cost

Table 5.20 Project Cost of Project for Capacity Development in Marketing

Unit: 1,000Rls

Activities	2013	2014	2015	2016	2017	Total
1. Holding the training of marketing	68,500	0	0	0	0	68,500
2. Providing the marketing information	0	33,600	33,600	33,600	33,600	134,400
Total	68,500	33,600	33,600	33,600	33,600	202,900

2) Project for Diversification of Marketing Channel of Barberry

i) Concept

Eighty to ninety percent of the barberry harvested in the Study area is sold to the brokers and options of marketing channels are few. To improve this situation, marketing channels are diversified by promoting directly selling the barberry from the farmers to the retail shops and the consumers. In this case, selling in bulk to the retail shops and selling simply packaged products to consumers in the Wednesday market and a direct sales shop are promoted.

However, strong personal relationships among brokers and between brokers and retail shops have been already established and huge amount of products have been traded for large area distribution. Much difficulties and investment are expected in advance for farmers to newly join the large area distribution which exists as a major marketing channel.

Therefore, activities on diversification of the marketing channels in this project are done mainly in Birjand city and neighboring cities at the beginning. Through the activities in Birjand city and the neighboring cities, the farmers accumulate the experience in distribution and sales and then the farmers groups or cooperatives are aiming at direct sales for the large area distribution. And this project is also placed as a model project to be referred for other agricultural products.

ii) Activities and Actors

Activities	Major actions and actors
1. Improving the products	Various types of barberry commodities are needed in corresponding to the needs of the various sales targets. Therefore, JAO supports the farmers and cooperatives in the improvement of cultivation techniques, development of simply packaged and processed commodities.
1-1. Improving the cultivation techniques	In case of diversification of the marketing channels, high quality products are sometimes required since the commodities are sold based on needs of the sales targets. And improvement of the quality is a precondition to increase value and price of the products including selling to the brokers. Therefore, JAO implements the trainings and demonstrations about barberry cultivation techniques in each village. Especially, methods on pruning and fertilizer applications are focused in the trainings and demonstrations since they are effective to improve quality of barberry.
1-2. Developing the simply packaged commodities	It is recommended that barberry in the form simply packaged commodities are directly sold by each farmer to consumers in the Wednesday market. The packages need to be several kinds of plastic containers with 250 g to 500 g the capacities. Since it is efficient that much amount of the containers are bought at once, farmers groups buy the containers or rural women cooperative buy them and sell to farmers at the office or the kiosk. The simple package improves the looks of the commodities and is effective to promote buying. Therefore, JAO provides technical training of simple package to the farmers. The farmers package barberry and develop commodities.

<table>
<tr><td>1-3. Developing the processed commodities</td><td>The processed commodities are developed in the project for promotion of small scale processing.</td></tr>
<tr><td>2. Promoting sales activities</td><td>Priority of the sales targets of the each commodity form mentioned above is shown at the table below. Since there are needs in detailed differences even in each sales target, improvement and diversification of the commodities are needed to be continued based on the marketing activities.
<table>
<tr><td colspan="2" rowspan="2"></td><td colspan="3">Commodity form</td></tr>
<tr><td>Bulk</td><td>Simple package</td><td>Processed</td></tr>
<tr><td rowspan="3">Sales target</td><td>Brokers</td><td>High</td><td>Low</td><td>Low</td></tr>
<tr><td>Retail shops</td><td>High</td><td>Middle</td><td>Middle</td></tr>
<tr><td>Consumers (Wednesday market, direct sales shop)</td><td>Low</td><td>High</td><td>High</td></tr>
</table></td></tr>
<tr><td>2-1. Selling in the Wednesday market</td><td>Selling in the Wednesday market is recommended as one of the methods for farmers to sell barberry directly to the consumers. The farmers can obtain needs of the consumers and ideas for further improvement of their commodities through the sales in the Wednesday market. In case of sales in the Wednesday market, sales costs such as transportation, place in the market, etc. are required. Therefore, selling by a group of farmers is recommended since it is efficient in procedure that famers make a group, sell various commodities in cooperation and share the sales costs.
Consumer service such as calling in, explaining and negotiating and also manner affect the sales. It is expected that the sales amount will increase if they would positively have more experience in consideration with improvement of the services and manner.
JAO promotes the sales in the Wednesday market by the farmers and assists the farmers on the procedures.</td></tr>
<tr><td>2-2. Selling to the direct sales shop</td><td>The establishment of a direct sales shop by the grant assistance for grass roots human security projects has been requested. Sales to the consumers through the direct sales shop are promoted.
The farmers and rural women cooperative discuss and decide quality, package standard, price, quantity, time of delivery, payment method, etc for packaging barberry. The rural women cooperative provides packaging materials to the farmers. Each famer packages barberry according to the agreement and sell to the rural women cooperative. The rural women cooperative pays to the farmers and sells the bought commodities to the consumers in the direct sales shop.
The quality of commodities affects the mutual trust between the consumers and the direct sales shop. Therefore, it is important that the commodities should be kept to meet the agreement decided through the discussion. In addition, the rural women cooperative guides the farmers and tries to keep the quality of the commodities.</td></tr>
<tr><td>2-3. Selling to the retail shops</td><td>After the marketing trainings, it is recommended that each farmer collects the needs of the retail shops and sells directly to the retail shops. This is one of the measures to diversify the marketing channels. In case of selling to retail shops, it is recommended to sell in bulk. Selling by the farmers' group and sharing the sales cost are recommended, since tens of kg of barberry is required at a time and cost for transportation is also needed.
The samples of commodities are shown to the retail shops and necessary</td></tr>
</table>

	items for the trading such as quantity, time of delivery, price, etc. should be clarified in advance. The farmers should closely communicate with the retail shops and keep the quantity, quality of the commodities, the time of delivery which the retail shops expect. Through these activities, mutual trust between the farmers and the retail shops is built so that the sales become increase. JAO promotes direct sales from the farmers to the retail shops through the marketing training and provides information regarding the sales activities for the farmers.
3. Trying large area distribution	The direct sales to the retail shops in large area distribution are a middle or long term target. For the time being, information about customers, prices, needs, etc. is collected in the outside of the province. In this case, it is considered that the cooperative collects the information and provides it to the farmers. In addition, the farmers' group or the cooperative prepares transportation means, cleaning equipment, etc. for the sales in large area distribution. After the preparation, the commodities are sold to the outside of the province according to the collected information about customers and needs.

iii) Implementation Structure

Implementation organizations: Each farmer, JAO of Birjand Township

Related organizations: Rural cooperative, Rural women cooperative

iv) Implementation Schedule

Table 5.21 Implementation Schedule of the Project for Diversification of Marketing Channel of Barberry

Activities	2013	2014	2015	2016	2017
1. Improving the products					
1-1. Improving the cultivation techniques					
1-2. Developing the simply packaged commodities					
1-3. Developing the processed commodities					
2. Promoting sales activities					
2-1. Selling in the Wednesday market					
2-2. Selling to the direct sales shop					
2-3. Selling to the retail shops					
3. Trying large area distribution					

v) Project Cost

Table 5.22 Project Cost of Project for Diversification of Marketing Channel of Barberry

Unit: 1,000Rls

Activities	2013	2014	2015	2016	2017	Total
1. Improving the products (excluding development of processed commodities)	49,600	42,600	0	0	0	92,200
2. Promoting sales activities	81,547	120,086	115,104	135,204	119,705	571,645
3. Trying large area distribution	0	0	0	60,400	30,400	90,800
Total	131,147	162,686	115,104	195,604	150,105	754,645

3) Project for Promotion of Small Scale Processing

i) Concept

The agricultural products produced include low quality products such as small fruits. These products are sold at low price or leaved at farms. The low quality and unused agricultural products are used for processed commodities such as lavashak, jam, pickles, etc which are produced are in the small scale processing workshop. Through these activities, it is promoted that the agricultural products are added value and sold.

However, it is difficult in a financial aspect for an individual farmer to establish a processing workshop which is cleared for hygiene standard even if it is a small scale. Therefore, it is recommended that the rural women cooperative establishes and manages the processing workshop with the government support. The rural women cooperative buys unused or low quality agricultural products from the cooperative members, processes them and sells the processed commodities in the direct sales shop.

ii) Activities and Actors

Activities	Major actions and actors
1. Establishing the management system	The rural women cooperative elects the members of the managing committee and establishes the managing committee to manage the processing workshop through discussion with the cooperative members. The managing committee consists of a chairman, a person in charge of processing and a person in charge of accounting. The managing committee takes responsibility for management of the processing workshop. Major roles of the managing committee are formulating a management plan of the processing workshop (plans for purchasing materials, production, sales, etc.), procuring the materials of each processing product, processing, selling, accounting, maintaining the facilities, reporting to the members of cooperative, etc. JAO provides training of basic knowledge (making plan, accounting, various procedures concerned) regarding the management of the processing workshop for the members of managing committee.
2. Selecting and developing the commodities to be processed	The managing committee collects the information through market survey to select commodities to be processed. Based on the information collected, the managing committee selects commodities to be produced and sold. JAO provides information regarding processing technologies and market and also assists in selecting the commodities. It is recommended that processed commodities are made from low quality or unused agricultural products or are traditional distinctive processed commodities which are not available in other areas. Especially, lavashak, jam and cookies using unsold barberry and small size jujube, pickles of herbs and so on may be the candidates of the processed commodities. When the processed commodities are being developed, sales targets should be assumed since the commodities to be produced are for selling. It is tried to select and develop the processed products suitable to the sales targets' taste and interest to buy. After selecting several candidate commodities, samples of the processed commodities are made, and the opinions of consumers are collected to consider whether it is possible for the sales. Improvements of the candidates processed commodities are considered, if it is necessary.
3. Establishing the processing workshop	The processing workshop is a small scale processing workshop similar to the domestic industry that can produce a little quantity of processed commodities selected above. The processing workshop is established

	next to the rural women cooperative office or the direct sales shop of the below project. The processing workshop should be authorized by the government on hygiene standard, commercial production, etc. JAO assists the rural women cooperative in designing the processing workshop, raising fund such as low interest loan and getting authorization.
4. Managing the processing workshop	The managing committee makes a plan of the management and manages to procure materials, to process and to sell. The managing committee employs workers when it is necessary. JAO assists the rural women cooperative in processing techniques, various procedures, etc. The rural women cooperative purchases the materials in the Study area as much as possible and produces the processed commodities. The processed commodities are packaged and labeled to show the name of cooperative or the Study area and then they are sold. The processed products in the Study area are distinguished from products in the other areas by the label and package. Branding and value-adding are promoted through the methods. There is a possibility that the processing facilities may not be used for some time since the materials may be available only in harvest season. In the case, the managing committee tries to increase the operating rate of the facilities by receiving orders of processing on commission (Clients bring materials to the processing workshop and receive all products processed after the processing. The processing workshop receives commission and processing cost from the clients) from the other organizations.
5. Selling the processed commodities	The processed commodities are sold to the consumers through the direct sales shop managed by the rural women cooperative. And the managing committee tries to sell them to retail shops and supermarkets, too.

iii) Implementation Structure

Managing organization of the small scale processing workshop: Rural women cooperative

Implementation organization: JAO of Birjand Township

iv) Implementation Schedule

Table 5.23 Implementation Schedule of the Project for Promotion of Small Scale Processing

Activities	2013	2014	2015	2016	2017
1. Establishing the management system					
2. Selecting and developing the commodities to be processed					
3. Establishing the processing workshop					
4. Managing the processing workshop					
5. Selling the processed commodities					

v) Project Cost

Table 5.24 Project Cost of Project for Promotion of Small Scale Processing

Unit: 1,000Rls

Activities	2013	2014	2015	2016	2017	Total
1. Establishing the management system	3,150	0	0	0	0	3,150
2. Selecting and developing the commodities to be processed	6,300	0	0	0	0	6,300
3. Establishing the processing workshop	0	347,700	0	0	0	347,700
4. Managing the processing workshop and selling the processed commodities	0	278,560	278,460	278,460	278,460	1,113,940
Total	9,450	626,260	278,460	278,460	278,460	1,471,090

4) Project for Management of a Direct Sales Shop

i) Concept

Sales in the direct sales shop is an effective measure in reduction the cost of distribution and diversification of marketing channels by selling commodities directly to the consumers. And there is a possibility that the products in the area are branded by mentioning production area and added value by being distinguished from products in other areas. In addition, it is easier to understand the needs of the consumers through selling directly to the consumers and it is an advantage to improve the commodities and sales.

The Government of Iran has requested the grant assistance for grass roots human security projects of the Government of Japan for the establishment of a direct sales shop. The location for the direct sales shop is proposed near the Study area and it takes about 20 minutes by a car from Birjand city. The place is situated on the main road linking Mashhad and Birjand. The traffic volume will be increased since the main road is being widened at present. Therefore, long distance drivers and passengers, tourists to Mashhad and residences going home in Birjand are expected the major customers and selling commodities such as goods demanded in the rest and souvenirs are proposed in the direct sales shop.

ii) Activities and Actors

Activities	Major actions and actors
1. Establishing the management system	The rural women cooperative elects the members of the managing committee and establishes the managing committee through discussion with the cooperative members. The managing committee consists of a chairman, a person in charge of procurement and sales and a person in charge of accounting. The managing committee takes responsibility for management of the direct sales shop. Major roles of the managing committee are formulating a business plan and procuring commodities, selling them, maintaining the facilities, accounting, advertizing the shop, reporting to the members of cooperative, etc.
2. Formulating the business plan	The managing committee formulates a business plan to manage the direct sales shop. JAO provides technical support and information to formulate the business plan. In the business plan, it is included that policy of the management, target of sales, assortment of commodities to be sold in the direct sales shop, pricing, procurement sources, funds management, marketing activities, employment plan etc. In addition, the managing committee shares the business plan with the cooperative members and keeps transparency of the management and a relationship of mutual trust. In the management of the direct sales shop, “local production for local consumption” is regarded as an importance to show characteristics of the

	area. The commodities which can be procured within the area are sold as much as possible. The commodities which can be procured within the area are barberry, jujube, almond, herbs, apricot, local bread, lavashak, dried tomato, jams, pickles, honey, handcrafts, etc. If these products are sold with showing the name of production area and accepted by the consumers, the sales method contributes branding of the area. Therefore, standardized labels and packages are used for the commodities produced in the area and it is important to keep quality. It is recommended to make and distribute pamphlets with information of the area (events, touristic places, specialty products, etc.) in the direct sales shop.
3. Establishing the procurement system for the commodities to be sold	The managing committee surveys the sources of commodities to be sold based on the business plan and establishes a condition to procure the commodities stably. Although it is important to procure the commodities within the area as much as possible to show characteristics of the area, number of kinds and assortment of the commodities are also important to respond the needs of the customers and to secure many customers. Therefore, necessary commodities which are not available in the area are procured from outside of the area. When commodities of the cooperative members are procured, the information on standardized quality, package, price, place of delivery, date of delivery, etc. of each commodity is decided through the discussion with the cooperative members. Agricultural products are packaged by the farmers and delivered to the decided place.
4. Managing the direct sales shop	The managing committee sells the procured commodities in the direct shop and also advertizes the direct sales shop as one of sales promotion activities. In addition, the managing committee maintains the facilities of the direct sales shop and repairs them, if it is necessary.

iii) Implementation Structure

Managing organization of the direct sales shop: Rural women cooperative

Implementation organization: JAO of Birjand Township

iv) Implementation Schedule

Table 5.25 Implementation Schedule of the Project for Management of a Direct Sales Shop

Activities	2013	2014	2015	2016	2017
1. Establishing the management system					
2. Formulating the business plan					
3. Establishing the procurement system					
4. Managing the direct sales shop					

v) Project Cost

Table 5.26 Project Cost of Project for Management of a Direct Sales Shop

Unit: 1,000Rls

Activities	2013	2014	2015	2016	2017	Total
1. Establishing the management system	3,150	0	0	0	0	3,150
2. Formulating the business plan	13,450	0	0	0	0	13,450
3. Establishing the procurement system	5,950	0	0	0	0	5,950
4. Managing the direct sales shop	0	655,600	522,600	522,600	522,600	2,223,400
Total	22,550	655,600	522,600	522,600	522,600	2,245,950

(4) Program for Income Source Diversification

The program for income source diversification is consisted of projects listed below;

Program for income source diversification
- ├Project for women's economical activity support through rural women's fund
- ├Project for women's activity expansion support through rural women's mother fund
- └Project for women's economical activity support through rural women cooperative

1) Project for Women's Economic Activity Support through Rural Women's Fund

i) Concept

This project aims to promote women's economical activities by supporting sub-projects of sub-groups which are established in the women's group through management of the rural women's fund.

JAO supports the rural women's fund[1] managed by women's group, and directs whenever necessary. The women's group studies market prices etc. on several action plans (products) through its member's market study and tries to understand the needs. After that, they will select their products together with use of local resources; for example, the cloth weaving techniques remained in the village. They will start to produce the products after receiving necessary technical training from JAO, Culture, Handicraft, and Tourism Organization (CHTO), or Vocational and Technical Training Center. In addition, they will participate in exhibitions to introduce and sell their products, and grasp customers' needs and reactions in order to improve the quality of products.

According to the result of the PP, 1) cloth weaving, and 2) beekeeping are considered as priority sub-projects in the Study area. And activities which can be carried out to improve livelihood including dietary habit are 1) sewing, and 2) oyster mushroom cultivation.

A special attention should be paid on social aspects to attain supports from the family. And any activities should not be planned from September to October since women are busy for barberry and jujube harvest.

[1] Rural women save money and give loans to its members with close cooperation with JAO.

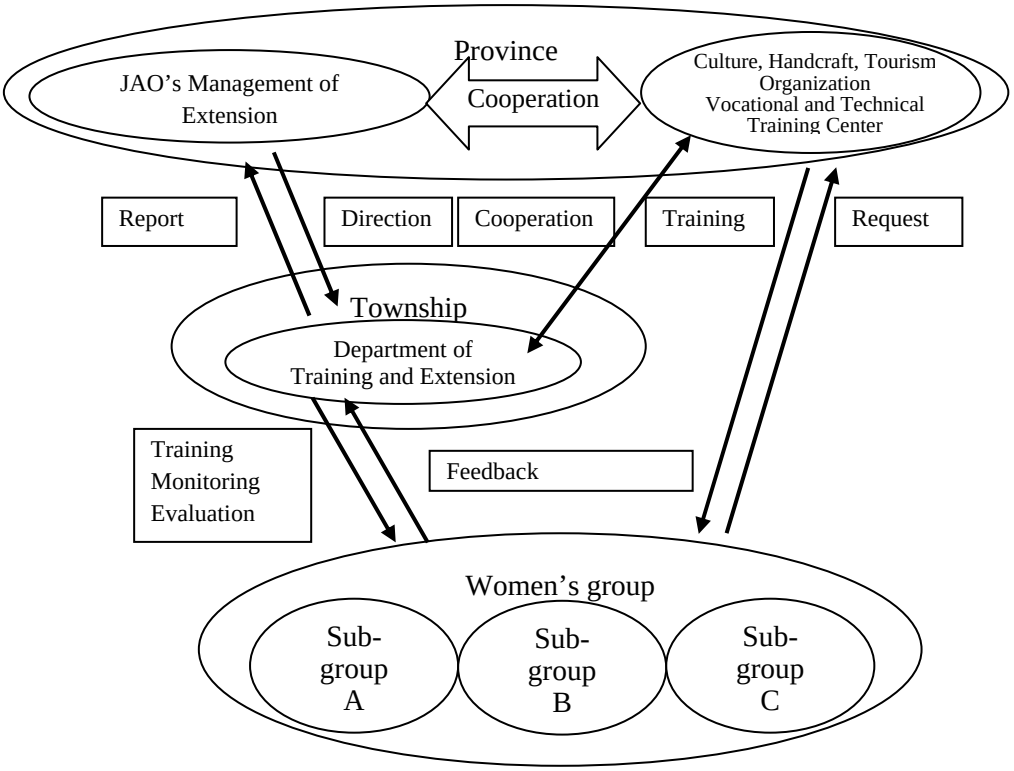


Fig. 5.6 Diagram of Project for Women's Economic Activity Support through Rural Women's Fund

ii) Activities and Actors

Activities	Major actions and actors
1. Market research	Birjand township JAO staff, women: women survey the market under supervision of JAO staff
2. Selection of products	Birjand township JAO staff, women: women choose their production with help of JAO staff
3. Loan	Birjand township JAO staff: JAO staff choose loan receivers by lottery, and manage to give loans
4. Technical seminar	Birjand township JAO staff, Culture, Handicraft, and Tourism Organization, Vocational and Technical Training Center: JAO offers agricultural technical seminars at their cost. The technical seminars of sewing will be offered by Vocational and Technical Training Center, and technical seminars of weaving etc. will be offered by Culture, Handicraft, and Tourism Organization, women should pay the fee though.
5. Sales	Sub-groups: After producing products, they start selling.
6. Participation in exhibition	Birjand township JAO staff, women's groups: women participate in exhibitions with collaboration with JAO staff.
7. Monitoring	Birjand township JAO staff: JAO staff follows about women's groups' activities, and situation of book keeping etc. by visit and/or call.
8. Evaluation	South Khorassan JAO Management of Extension, Birjand township JAO staff: to evaluate the women's economical activities.

iii) Implementation Structure

Implementation organization: South Khorassan JAO Management of Extension, Birjand township JAO Department of Training and Extension

Supporting organization: Culture, Handicraft, and Tourism Organization, Vocational and

Technical Training Center

iv) Implementation Schedule

This project will be implemented from 2013 to 2017. Targeted women's groups are existing 3 groups (Felarg, Borgeziad, Bozghong) in the Study area. First, members of 3 groups will search the market again. Then, they review produced items. In case it is necessary, they can consider producing new products, and JAO, Culture, Handicraft, and Tourism Organization, and/or Vocational and Technical Training Center offer necessary technical seminars. After the seminar, women will produce products, and sell them. In addition, they will participate in exhibitions in order to promote their products. JAO will carry out a mid-term evaluation at the end of 2015 to discuss and decide following years' (2016 to 2017) activities with women. At the end of 2017, JAO will conduct the final evaluation to plan next 5 years' activities.

Table 5.27 Implementation Schedule of the Project for Women's Economic Activity Support through Rural Women's Fund

Year / Activities	2013	2014	2015	2016	2017
1. Market research	■				
2. Selection of products	■				
3. Technical seminar	■				
4. Sales	■				
5. Participating exhibition	■	■	■	■	■
6. Monitoring	■	■	■	■	■
7. Evaluation			■		■

Table 5.28 Annual Implementation Schedule of the Project for Women's Economic Activity Support through Rural Women's Fund

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. Request inquiry									■			
2. Training during winter	■	■	■							■	■	■
3. Training during summer				■	■	■	■	■				
4. Monitoring	■	■	■	■	■	■	■	■	■	■	■	■

v) Sub-Projects

a) Cloth Weaving Revival Sub-Project

Outline: The weaving machines will be installed to produce handmade towels and bath towels. Since the PP activities prompted elder women to resume the cloth weaving; therefore, the revival of cloth weaving will be examined.

Annual schedule: All the year expect September and October when women are busy for harvest.

Table 5.29 Annual Implementation Schedule of Cloth Weaving Revival Sub-Project

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. Production	■	■	■	■	■	■	■	■			■	■

b) Barberry and Jujube Honey Production Sub-Project

Outline: Honey will be produced from barberry, jujube and other crops, which are cultivated much in the Study area, by beekeeping. Since barberry and jujube are the specialty products of South Khorassan Province, their honey is valuable and is dealt with higher price than other honey. In addition, as the honey of jujube contains low sucrose, it is known as a health honey. Accordingly this honey is valuable in terms of this aspect.

Annual schedule: The activity will be started from March, and the honey will be collected in April as the best season of barberry, in Jun for jujube, and in August for others. From October to February of following year, bees should winter.

Table 5.30 Annual Implementation Schedule of Barberry and Jujube Honey Production Sub-Project

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. Best season for barberry honey (April)												
2. Best season for jujube honey (Jun)												
3. Others												
4. Wintering (October to February)												

c) Sewing Promotion in the Village Sub-Project

Outline: In the village, women offer sewing techniques to sew, for example *chadol*, cloak (*manteau*), scarf, and hood (*maghne'eh*) etc. in order to receive technical fees. The cloth will be provided by the customers, and women sew and receive technical fees.

Annual schedule: All the year expect September and October when women are busy for harvest.

Table 5.31 Annual Implementation Schedule of Sewing Promotion in the Village Sub-Project

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. Production												

d) Oyster Mushroom Promotion in the Village Sub-Project

Outline: Oyster mushroom will be produced and sold in the village. The villagers eat natural mushrooms; there is demand on mushroom in the village. According to the result of PP, the villagers appreciate the taste of oyster mushroom; therefore, promotion of oyster mushroom may be possible. The oyster mushroom which is produced by the method of PP is valuable as organic and healthy one because no chemical is used. As a result, not only dietary habit improvement of the villagers but also sales to urban residents can be aimed at.

Annual schedule: The best season is spring (March to May) and autumn (September to December), when diseases and pests can also be best controlled. It is not suitable to cultivate in summer due to high temperature. Although the oyster mushroom can be cultivated in winter, it should be paused because heater and other costs are necessary.

Table 5.32 Annual Implementation Schedule of Oyster Mushroom Promotion in the Village Sub-Project

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Best season for cultivation												

vi) Project Cost

Table 5.33 Project Cost of the Project for Women's Economic Activity Support through Rural Women's Fund

Unit: 1,000 Rls

	2013	2014	2015	2016	2017	Total
1. Market search	2,350	0	0	0	0	2,350
2. Tech. seminars	6,300	6,300	6,300	6,300	6,300	31,500
3. Cloth weaving revival sub-project						
Initial cost	145,574	0	0	0	0	145,574
Activities cost	63,126	105,210	105,210	105,210	105,210	483,966
Sub-total	208,670	105,210	105,210	105,210	105,210	629,540
4. Barberry and jujube honey production sub-project [1)]						
Initial cost	69,735	27,600	55,200	46,200	0	198,735
Activities cost	1,650	2,700	4,800	6,900	6,900	22,950
Sub-total	71,385	30,300	60,000	53,100	6,900	221,685
5. Sewing promotion in the village sub-project						
Initial cost	50,309	0	0	0	0	50,309
Activities cost	315	630	630	630	630	2,835
Sub-total	50,624	630	630	630	630	53,144
6. Oyster mushroom promotion in the village sub-project						
Initial cost	61,580	0	0	0	0	61,580
Activities cost	213	1,278	1,278	1,278	1,278	5,325
Sub-total	61,793	1,278	1,278	1,278	1,278	66,905
7. Monitoring	4,200	4,200	4,200	4,200	4,200	21,000
Total	405,351	147,918	177,618	170,718	124,518	1,026,123

1): 5 beehives in the 1st year, 4 beehives in the 2nd year, 8 beehives in the 3rd year, and 6 beehives in the 4th year will be introduced. In addition, 1 bee box in the 2nd year, 2 bee boxes in the 3rd year, and 4 bee boxes in the 4th year will be increased by natural breeding. (beehive number: 1st year 5, 2nd year 10, 3rd year 20, and 30 in 4th year)

2) Project for Women's Activity Expansion Support through Rural Women's Mother Fund

i) Concept

This project aims to still activate women's activities through establishment of a rural women's mother fund in order to expand the scale of their activities.

The rural women's mother fund[2] is established in the way that; the rural women's funds in Birjand township gather and capitalize money as their part in order to create a fund, and a governmental organization (the specialized mother company of fund for agricultural development support) capitalize as its counterpart from 1 to 49 % of total fund establishing. After that, the mother fund gives loans to its member funds. The amount of loan of each women's fund will be increased, and it will contribute to expand the scale of sub-groups' activities. Therefore, JAO will support establishing the rural women's mother fund in Birjand township in this project.

The priority sub-projects for this project are; 1) cloth weaving, and 2) beekeeping.

[2] Currently, there are 10 mother funds in Iran, and 2 of them have been established in South Khorassan Province, namely Sarayan and Darmian townships. Each participating rural women's fund receives an amount of loan of 1.7 to 1.9 times what she contributed to the mother fund. The received fund will be distributed to its members in order to contribute employment creation and income source generation.

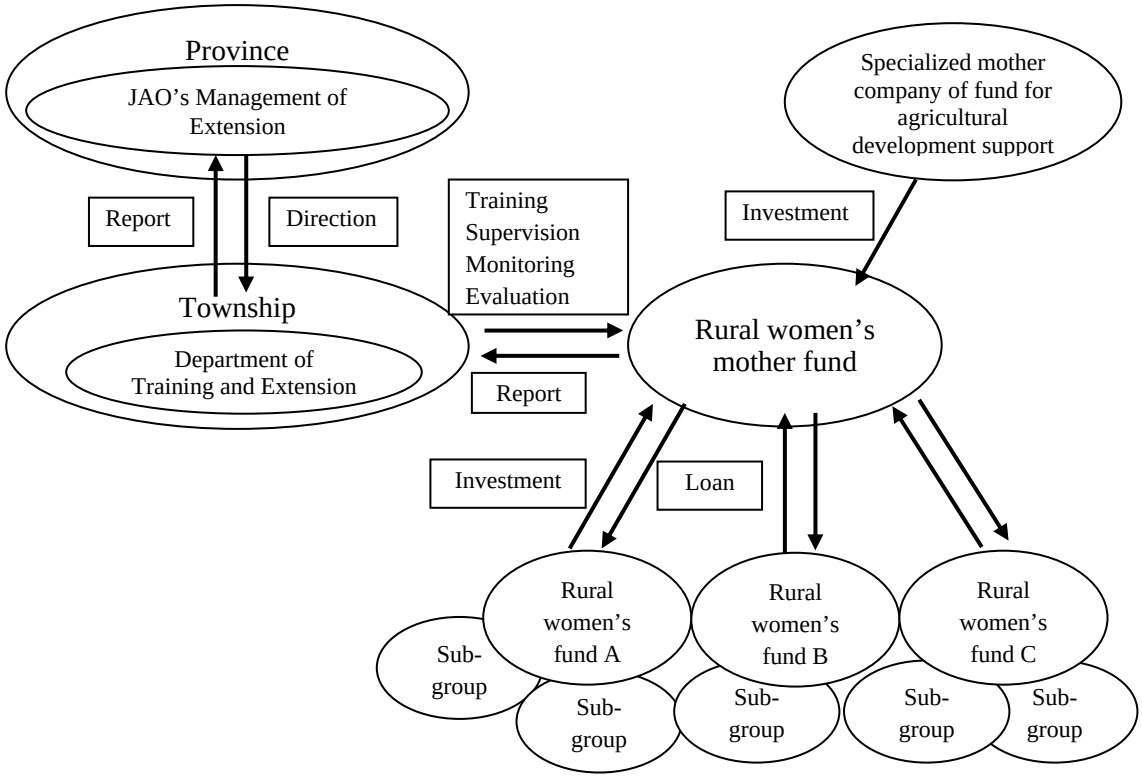


Fig. 5.7 Diagram of Project for Women's Activity Expansion Support through Rural Women's Mother Fund

ii) Activities and Actor

Activities	Major actions and actors
1. Establishment of rural women's mother fund	South Khorassan JAO Management of Extension, Birjand township JAO staff, each women's fund: Women establish the rural women's mother fund under cooperation with JAO. JAO provides necessary explanation such as objective of the mother fund, registration of members, making internal rules, and election of board members etc.
2. Training on mother fund management	Birjand township JAO staff: Conduct a training session on mother fund management.
3. Exchange trip to advanced mother fund	South Khorassan JAO Management of Extension, Birjand township JAO staff: Women visit the existing advanced rural women's mother funds in Sarayan and Darmian, and exchange their experience and learn about know-how on fund management, and visit to projects
4. Implementation of the loan	Birjand township JAO staff: JAO staff choose loan receivers by lottery, and manage to give loans
5. Monitoring	Birjand township JAO staff: JAO staff follows about women's groups' activities, and situation of book keeping etc. by visit and/or call.
6. Evaluation	South Khorassan JAO Management of Extension, Birjand township JAO staff: to evaluate the women's economic activities.

iii) Implementation Structure

Implementation organization: South Khorassan JAO Management of Extension, Birjand township JAO Department of Training and Extension, the specialized mother company of fund for agricultural development support

Cooperation organization: Rural women's mother fund in Sarayan and Darmian township

iv) Implementation Schedule

This project will be carried out from 2014 to 2017. The rural women's funds which capitalize money are 13 funds of Birjand including those of 3 funds in the Study area.

Department of Training and Extension of JAO Birjand Township will explain about establishment of the mother fund to each women's fund. After the explanation, JAO staff will lead women to prepare the internal rules, registration of members, and election of board members. In addition, a mother fund management session will be performed by the JAO staff; then, members will start to manage the fund. Consequently, each women's fund gives loans to its members.

JAO will carry out a mid-term evaluation at the end of 2015 to discuss and decide following years' (2016 to 2017) activities with women. At the end of 2017, JAO will conduct the final evaluation to plan next 5 years' activities.

Table 5.34 Implementation Schedule of the Project for Women's Activity Expansion Support through Rural Women's Mother Fund

Year / Activities	2013	2014	2015	2016	2017
1. Establishment of mother fund		■			
2. Fund management training		■			
3. Exchange trip		■			
4. Loan		■	■	■	■
5. Monitoring		■	■	■	■
6. Evaluation			■		■

Table 5.35 Annual Implementation Schedule of the Project for Women's Activity Expansion Support through Rural Women's Mother Fund

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. Request inquiry									■			
2. Training during winter	■	■	■							■	■	■
3. Training during summer				■	■	■	■	■				
4. Monitoring	■	■	■	■	■	■	■	■	■	■	■	■

v) Project Cost

Table 5.36 Project Cost of the Project for Women's Activity Expansion Support through Rural Women's Mother Fund

Unit: 1,000 Rls

	2013	2014	2015	2016	2017	Total
1. Exp. meeting @13 village	0	4,550	0	0	0	4,550
2. Exp. meeting: mother fund	0	1,080	0	0	0	1,080
3. Exchange trip	0	2,350	0	0	0	2,350
4. Tech. seminars	0	27,300	27,300	27,300	27,300	109,200
5. Cloth weaving revival sub-project						
Initial cost	0	145,574	0	0	0	145,574
Activities cost	0	63,126	105,210	105,210	105,210	378,756
Sub-total	0	208,700	105,210	105,210	105,210	524,330
6. Barberry and jujube honey production sub-project						
Initial cost	0	69,735	27,600	55,200	46,200	198,735
Activities cost	0	1,650	2,700	4,800	6,900	16,050
Sub-total	0	71,385	30,300	60,000	53,100	214,785
7. Monitoring	0	12,600	25,200	25,200	25,200	88,200
Total	0	327,965	188,010	217,710	217,810	944,495

3) Project for Women's Economical Activity Support through Rural Women Cooperative

i) Concept

The women from 15 villages of the Study area establish a rural women cooperative in order to develop the area through promotion of women's activities.

JAO and rural cooperative organization will support the establishment[3] of the cooperative, and provide appropriate advice whenever it is necessary. The rural women cooperative will offer services to its members such as saving and loan, procurement of equipment, collective collection and shipment, and technical advice services. Women enter the cooperative and start their activities by using those services. The development of Study area will be advanced by promoting women's activities through provision of several services after establishment of the cooperative.

Although projects of the cooperative are decided by consensus of members, running a confectionery factory can be a candidate project as this is a success case of Mood city women's cooperative. And also producing rose water, bread including herbs and Kashuk, managing farm restaurants and shops are the projects expected.

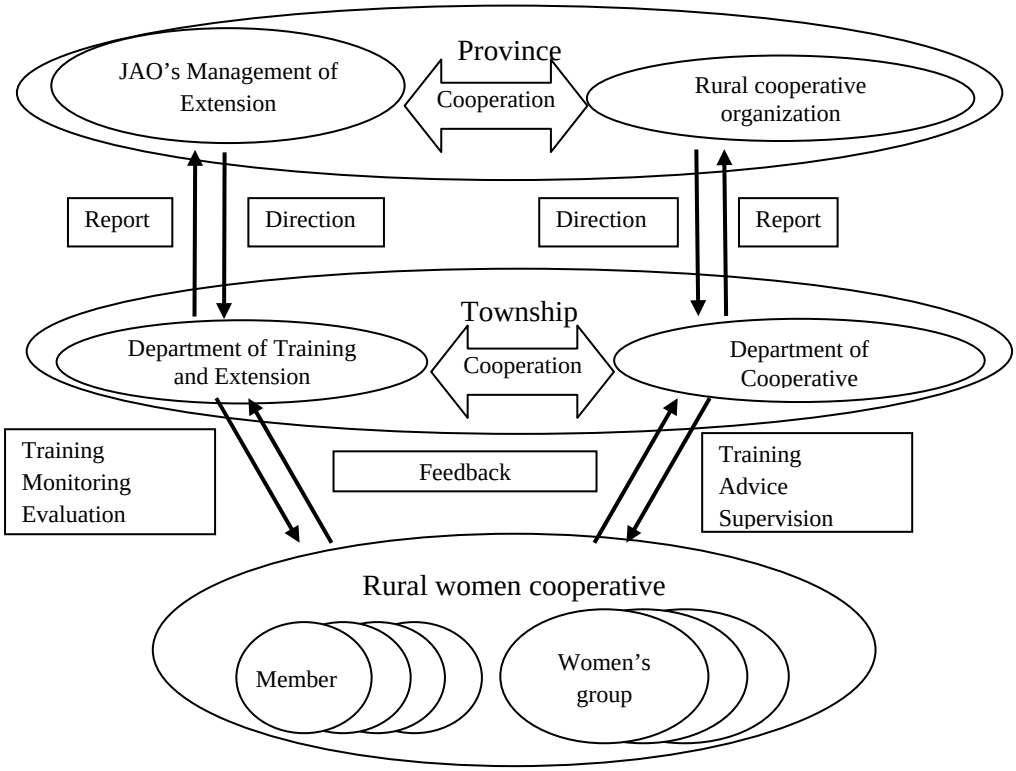


Fig. 5.8 Diagram of Project for Women's Economical Activity Support through Rural Women Cooperative

ii) Activities and Actor

Activities	Major actions and actors
1. Establishment of rural women cooperative	Rural cooperative organization, Birjand township JAO staff: Under cooperation with rural cooperative organization, and JAO, women of the Study area apply to establish a rural women cooperative. The fonder members explain the rules and regulation to members in order to obtain agreement. After this, board members will be elected for a term of 2 years. A manager will be appointed.
2. Enhancement of rural women cooperative	Rural cooperative organization, Birjand township JAO staff: The JAO staff enhances organization of the cooperative together with rural cooperative

[3] JAO has prepared the establishment of the cooperative from August 2012.

organization	organization.
3. Exchange trip to advanced women cooperative	Birjand township JAO staff: Women together with JAO staff visit the existing advanced rural women cooperatives, exchange their experience, learn about know-how on cooperative management, and visit projects of the cooperatives.
4. Technical seminars	Rural cooperative organization, Birjand township JAO staff: Technical seminars including credit management will be performed.
5. Offering services	Rural women cooperative: The cooperative starts to provide services, including provision of loans to its members.
6. Cooperative's projects	Rural cooperative organization, Birjand township JAO staff, and rural women cooperative: With the help from Rural cooperative organization and Birjand township JAO staff, rural women cooperative will proactively plan its own projects.
7. Management of the projects	Rural cooperative organization, Birjand township JAO staff, and rural women cooperative: With the help from Rural cooperative organization and Birjand township JAO staff, rural women cooperative will start the projects. Any necessary technical support will be provided by rural cooperative organization, Birjand township JAO staff.
8. Monitoring	Rural cooperative organization, Birjand township JAO staff: JAO staff follows about rural women cooperative's activities, and situation of book keeping etc. by visit and/or call.
9. Evaluation	Rural cooperative organization, South Khorassan JAO Management of Extension, Birjand township JAO staff: to evaluate the rural women cooperative's activities.

iii) Implementation Structure

Implementation organization: South Khorassan JAO Management of Extension, Birjand township JAO Department of Training and Extension, South Khorassan rural cooperative organization, and Birjand township Department of Cooperative

Cooperation organization: Rural women's cooperative union of South Khorassan Province, Rural women's cooperative in Mood city, and rural women's cooperative in Khorasshad village etc.

iv) Implementation Schedule

This project will be implemented from 2013 to 2017. First, women from 15 villages of the Study area apply the establishment of cooperative, and the cooperative will be established. JAO and rural cooperative organization will support to enhance the organization of the cooperative. The executive members of the cooperative will visit advanced women cooperatives in Mood city and Khorashad village, and exchange ideas about cooperative management.

The cooperative will provide services to its members with supports from JAO such as saving and loan, procurement of equipment, collective collection and shipment, and technical advice.

In addition, JAO has applied a grass roots grant aid project to the Embassy of Japan in Iran to construct a direct sales shop which would be managed by the rural women cooperative. If the project is approved, a direct shop with an office of the cooperative will be constructed (linkage with the grass roots grant aid project).

Any projects of the cooperative may be started from 2016 as the cooperative should have enough knowledge about project management, and it needs time to prepare. Besides, an investment fund will be required.

Table 5.37 Implementation Schedule of the Project for Women's Economical Activity Support through Rural Women Cooperative

Activity \ Year	2013	2014	2015	2016	2017
1. Establishment of cooperative					
2. Organization enhancement					
3. Exchange trip					
4. Training on management of loan					
5. Loan management					
6. Technical seminars					
7. Offering services					
8. Cooperative's projects					
9. Management of the projects					
10. Monitoring					
11. Evaluation					

Table 5.38 Annual Implementation Schedule of the Project for Women's Economical Activity Support through Rural Women Cooperative

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. Request inquiry												
2. Training during winter												
3. Training during summer												
4. Monitoring												

v) Proposed Projects

a) Confectionery Project

Outline: Mainly a traditional ginger taste cookie is baked and sold. In fact, a woman made and sold this cookie during the implementation of PP; therefore, there is a recipe in the village. In this project, this recipe will be exploited and evolved in order to promote as one of specialty products of the region. Moreover, employment creation is aimed by hiring workers.

Annual schedule: Production will be through a whole year. Particularly, the production volume should be increased as the demand will be high before nowruz (the Iranian New Year).

Table 5.39 Annual Implementation Schedule of Confectionery Project

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. Confectionery												

vi) Project Cost

Table 5.40 Project Cost of Project for Women's Economical Activity Support through Rural Women Cooperative

Unit: 1,000 Rls

	2013	2014	2015	2016	2017	Total
1. Organization enhancement	2,100	0	0	0	0	2,100
2. Exchange trip	2,350	0	0	0	0	2,350
3. Seminar on loan management	2,100	0	0	0	0	2,100
4. Tech. seminars	2,100	2,100	2,100	2,100	2,100	10,500
5. Exp. meeting: Cooperative's projects	0	0	0	350	0	350
6. Seminar on project management	0	0	0	2,100	0	2,100
7. Confectionery project						
Initial cost	0	0	0	268,200	0	268,200
Activities cost	0	0	0	239,400	478,800	718,200
Sub-total	0	0	0	507,600	478,800	986,400
8. Monitoring	4,200	4,200	4,200	4,200	4,200	21,000
Total	12,850	6,300	6,300	516,350	485,100	1,026,900

(5) Program for Basic Infrastructure Improvement

1) Project for Feeder Road Development

i) Concept

In the 7 villages in Kahshang rural municipality that are in the Study area, barberry is cultivated in about 20 ha which is about 30% of the barberry cultivation area in the Study area. Agriculture in the area is mainly carried out by the farmers living in Birjand city and those who are commuting to the Study area. The road connecting Alghourat area and Kahshang area and the roads connecting the villages in Kahshang area are developed.

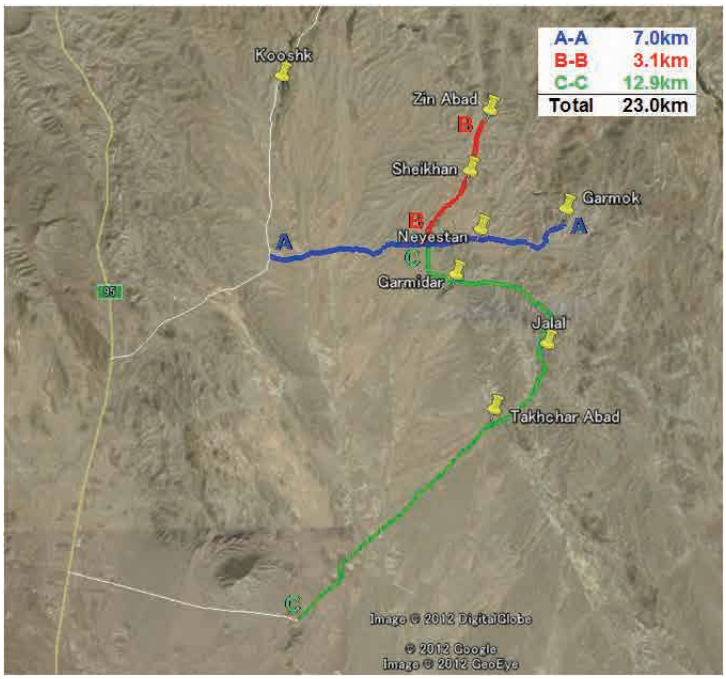


Fig. 5.9 Roads to be Developed

ii) Implementation Schedule

Table 5.41 Implementation Schedule of the Project for Feeder Road Development

Activities \ Year	2013	2014	2015	2016	2017
1. Survey					
2. Construction					

iii) Project Cost

Table 5.42 Project Cost of the Project for Feeder Road Development

	Unit Cost (1,000Rls/km)	Quantity (km)	Cost (1,000Rls)
1. Survey	25,000	23	575,000
2. Construction	1,000,000	23	23,000,000
Total			23,575,000

Table 5.43 Annual Project Cost of the Project for Feeder Road Development

Unit: 1,000Rls

	2013	2014	2015	2016	2017	Total
1. Survey	575,000	0	0	0	0	575,000
2. Construction	0	11,500,000	11,500,000	0	0	23,000,000
Total	575,000	11,500,000	11,500,000	0	0	23,575,000

5.4 Implementation Plan and Project Costs

5.4.1 Implementation Organization

The Master Plan targets the Alghourat-Takhchar Abad area of Birjand Township in South Khorassan Province. However, as explained in Chapter 6, it is also expected to be applied to other areas and townships in the Province. Therefore, the implementation organization described in this section will broadly apply the Master Plan in the Province, in which the Study area is considered as one of the target areas.

To implement the Master Plan, it is suggested a JAO Project Office shall be created consisting of the major members of JAO of this Study's C/P Technical Committee (such as Director, Township Directors, and staff members in charge of irrigation, crop cultivation, livestock, training and cooperative, extension [including support for women], marketing, and processing).

In cooperation with the JAO's township offices, the Project Office formulates an implementation plan that is suitable to the situation of each township. Based on the plan, each township implements programs and projects, with the involvement of JAO Center and Technical and Engineering Company of Consulting Services. The Project Office supervises and monitors the implementation.

The implementation organization of the Master Plan is presented in the following Figure.

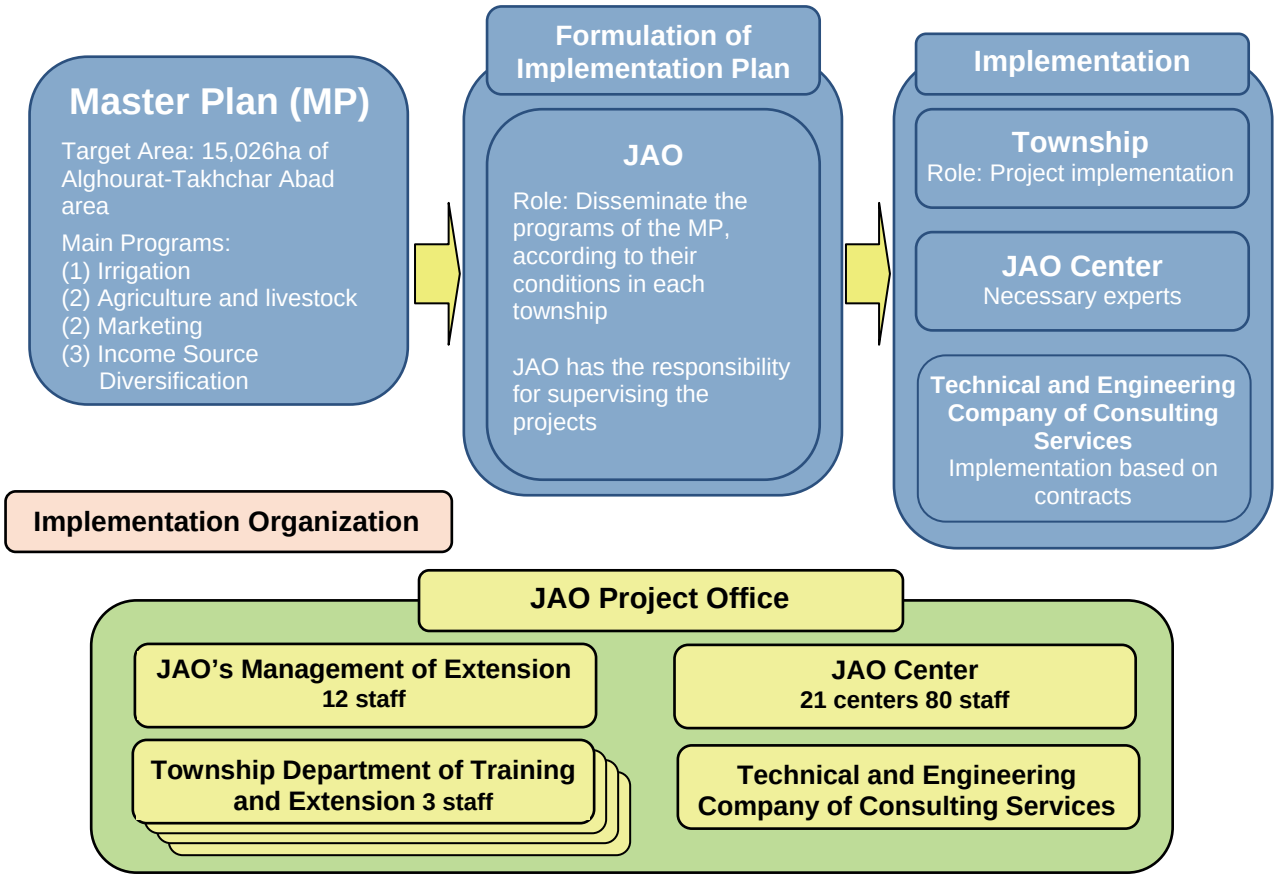


Fig. 5.10 Implementation Organization of the Master Plan

It is expected to implement the Master Plan that the above implementation organization is kept and also ability of the staff of JAO and the experts of JAO Center and Technical and Engineering Company of Consulting Services is improved more. Increase of the staff of JAO can be needed, if the number of projects implemented in the other areas and townships in the province will increase and the work of supervising and monitoring will increase. In addition, farmers' assistance by using facilitation techniques is also a useful method in the implementation of the Master Plan, although the method is already used in the extension and cooperative sectors. It is needed that ensuring the staff that can assist farmers by using the facilitation technique and other specialized techniques. Therefore, it is expected that capacity development of the extension staff including the experts of JAO Center and Technical and Engineering Company of Consulting Services is taken into the works of MOJA and JAO.

5.4.2 Implementation Plan

The implementation schedule of the Master Plan is presented below.

Table 5.44 Implementation Schedule of the Master Plan Projects

Components \ Year	2013	2014	2015	2016	2017
1. Establishment of Project Office					
2. Program for Irrigation Improvement					
Irrigation System Improvement					
Qanats conservation					
3. Program for Crop and Livestock Productivity Improvement					
Net-house					
Vegetable cultivation for self-consumption in winter					
Forage cultivation					
Small-scale chicken rearing					
4. Program for Distribution and Marketing Improvement					
Capacity development in marketing					
Diversification of marketing channel of barberry					
Promotion of small-scale processing					
Management of a direct sales shop					
5. Program for Income Source Diversification					
Women's economic activity support through rural women's fund					
Women's activity expansion support through rural women's mother fund					
Women's economic activity support through rural women cooperative					
6. Program for Basic Infrastructure Improvement					
Feeder road development					
7. Monitoring and Evaluation	→	→	→	→	→
8. Reporting					

5.4.3 Project Costs

The costs for implementing the proposed five Programs are presented in Table 5.45 including (1) Program for Irrigation Improvement, (2) Program for Crop and Livestock Productivity Improvement, (3) Program for Distribution and Marketing Improvement, (4) Program for Income Source

Diversification, and (5) Program for Basic Infrastructure Improvement (see Appendix for the details of calculation). The total cost is estimated as 34,622,865,000 Rls for five years. The Project for feeder road development accounts for 68% of the total cost.

Table 5.45 Costs of the Master Plan Projects

Unit: 1,000Rls

Components \ Year	2013	2014	2015	2016	2017	Total
1. Program for Irrigation Improvement						
Irrigation System Improvement	522,500	858,186	872,878	834,231	71,931	**3,159,726**
Qanats conservation	0	0	0	0	0	**0**
Sub-total	**522,500**	**858,186**	**872,878**	**834,231**	**71,931**	**3,159,726**
2. Program for Crop and Livestock Productivity Improvement						
Net-house	2,851	53,503	56,354	8,554	8,554	**129,815**
Vegetable cultivation for self-consumption in winter	3,195	11,009	13,005	7,188	7,188	**41,584**
Forage cultivation	1,670	1,270	1,270	1,270	1,270	**6,750**
Small-scale chicken rearing	0	18,043	18,403	721	721	**37,888**
Sub-total	**7,716**	**83,824**	**89,032**	**17,732**	**17,732**	**216,036**
3. Program for Distribution and Marketing Improvement						
Capacity development in marketing	68,500	33,600	33,600	33,600	33,600	**202,900**
Diversification of marketing channel of barberry	131,147	162,686	115,104	195,604	150,105	**754,645**
Promotion of small-scale processing	9,450	626,260	278,460	278,460	278,460	**1,471,090**
Management of a direct sales shop	22,550	655,600	522,600	522,600	522,600	**2,245,950**
Sub-total	**231,647**	**1,478,146**	**949,764**	**1,030,264**	**984,765**	**4,674,585**
4. Program for Income Source Diversification						
Women's economic activity support through rural women's fund	405,351	147,918	177,618	170,718	124,518	**1,026,123**
Women's activity expansion support through rural women's mother fund	0	327,965	188,010	217,710	210,810	**944,495**
Women's economic activity support through rural women cooperative	12,850	6,300	6,300	516,350	485,100	**1,026,900**
Sub-total	**418,201**	**482,183**	**371,928**	**904,778**	**820,428**	**2,997,518**
5. Program for Basic Infrastructure Improvement						
Feeder road development	575,000	11,500,000	11,500,000	0	0	**23,575,000**
Sub-total	**575,000**	**11,500,000**	**11,500,000**	**0**	**0**	**23,575,000**
Total	**1,755,063**	**14,402,338**	**13,783,602**	**2,787,005**	**1,894,856**	**34,622,865**

5.4.4 Risks on Implementation of the Master Plan

The risks when the Iranian government carries out the MP are exhaustively shown in the following table.

Table 5.46 Risks on Implementation of the Master Plan

Types of risk	Risks
Temperature / natural disasters	Draught would long more. The agricultural production might be damaged to a large extent due to decrease in volume of water from qanat.
Biological / environmental	There might be large scale damage on crops due to unexpected disease outbreak. As for beekeeping, the outbreak of Colony Collapse Disorder (CCD) is suspected. If it occurs, the beekeeping project will be influenced.
Market	There might be influence on price of raw materials due to rising cost in recent years. As a result, the benefit may be compressed if the sales price is not changed. In addition, consumers might hesitate buying the products if the sales price is raised.
Political / institutional	There will be influence on the projects of MP if the government changes its policy.

5.4.5 Expected Outcomes

(1) Expected Outcomes

The implementation of the Master Plan is expected to bring various outcomes with regard to its basic concepts of income increase and improvement of living environment, as well as secondary outcomes such as strengthened relationship between JAO and the residents in the target area and alleviated burden of agricultural works. Such outcomes are presented below for each Program.

Table 5.47 Expected Outcomes of the Master Plan

Program	Expected Outcomes
(1) Irrigation Improvement	1) Irrigation system improvement
	Increase in cultivated area using saved water
	Alleviation of workload related to water distribution
	Strengthened village organization through collaborative water management
	2) Qanats conservation
	Efficiency improvement in qanat maintenance and management, through establishment of specialized organization
	Accumulation of information in JAO, which contributes to qanat maintenance and management
(2) Crop and Livestock Productivity Improvement	1) Net-house
	Productivity improvement through shading and anti-pest effects of net-house, reduction in irrigation interval, dissemination of appropriate cultivation techniques, and introduction of crop rotation
	Strengthened relationship between JAO and farmers through provision of technical guidance and extension activities
	2) Vegetable cultivation for self-consumption in winter
	Improvement in dietary habit during winter through consumption of fresh vegetables, mainly leaf vegetables and sprouts
	Strengthened relationship between JAO and farmers through provision of technical guidance and extension activities
	3) Forage cultivation
	Increase in forage production through effective use of irrigation water and in-house sprout cultivation
	Strengthened relationship between JAO and farmers through provision of technical guidance and

Program	Expected Outcomes
	extension activities
	4) Small-scale chicken rearing
	Revitalization of chicken rearing activities in the target area
	Securing of source of good quality protein (chicken meats and eggs)
	Strengthened relationship between JAO and farmers through provision of technical guidance and extension activities
(3) Distribution and Marketing Improvement	1) Capacity development in marketing
	Development of marketing capacity among farmers, farmers' cooperative, and women's cooperative
	Strengthened system in JAO for supporting marketing activities
	Strengthened relationship between JAO and farmers through implementation of training on marketing and provision of information related to marketing
	2) Diversification of marketing channel of barberry
	Quality improvement of barberries through training on cultivation techniques, such as pruning and fertilizing
	Creation of trusting relationship between farmers and buyers of barberries, through increase in choices of buyers and stable supply of barberries from farmers to buyers
	Strengthened village organization through collaborative works
	Strengthened relationship between JAO and farmers through provision of training on cultivation methods and marketing and administrative orientations
	3) Promotion of small-scale processing
	Installation of small-scale processing facility
	Dissemination of processing techniques to effectively use low-quality or unused agricultural products, through adding value to them
	Strengthened organization of women's cooperative through management of processing facility
	Creation of employment opportunities for operating processing facility
	Strengthened relationship between JAO and women's cooperative through provision of training on processing techniques, market information, and support with regard to establishment of processing facility and its management
	4) Management of a direct sales shop
	Increase in value added to local products through creating brands
	Increase in prices that farmers receive through skipping intermediaries
	Strengthened organization of women's cooperative through management of direct sales shop
	Revitalization of the target area through operation of direct sales shop (including creation of employment opportunities)
	Strengthened relationship between JAO and women's cooperative through provision of supports on formulation of business plan and management of direct sales shop
(4) Income Source Diversification	1) Women's economic activity support through rural women's fund
	Development of economic activities by women (weaving, bee keeping, sewing, and cultivating mushrooms)
	Strengthened relationship between JAO and women in the target area through provision of support on fund management
	2) Women's activity expansion support through rural women's mother fund
	Establishment of rural women's mother fund in Birjand Township
	Strengthened relationship between JAO and women in the target area through provision of support on management of mother fund
	3) Women's economic activity support through rural women cooperative
	Establishment of rural women's cooperative targeting 15 villages in the Study area
	Creation of employment opportunities for operating the cooperative
	Strengthened collaboration among women in the area through operation of rural women's cooperative
	Strengthened relationship between JAO and women in the area through provision of support on establishment and management of rural women's cooperative
(5) Basic Infrastructure	1) Feeder road development
	Easier transportation between urban and rural areas for carrying agricultural products and

Program	Expected Outcomes	
Improvement		practicing weekend farming
		Increased convenience in life of residents in Kahshang Rural Municipality

(2) Impacts on Economy of Study Area

The project costs for implementing the MP were presented in Table 5.45. The Plan suggests that for each project, a part of the cost is paid by the government, and the remaining cost is paid by the beneficiary farmers themselves (see APPENDIX 1 for the share of the government and participating farmers). On the other hand, the Plan suggests that the economic benefits generated through implementation of the MP all belong to the participating farmers. This Section analyzes, first, if each project is attractive for farmers to invest in, by calculating the farmers' net benefit from each project, that is, subtracting the cost that participating farmers have to pay from the benefits that they receive (as for the project for irrigation system improvement and project for diversification of marketing channel of barberry, the analysis uses "incremental net benefits," which are values obtained by subtracting the current farmers' net benefits through producing and selling barberries from farmers' net benefits realized through implementing the projects). Second, this Section analyzes if each project is attractive for the government to invest in as a part of its rural support measures, by comparing the farmers' net benefits with the government expenditures.

The Table below presents farmers' net benefits and government payments for implementing each project. Although the MP is formulated for a five-year period, the analysis is done for 10 years, because there are projects in which the effects are to appear in a longer-term period. With regard to the project for irrigation system improvement, the analysis included only the models with introduction of drip irrigation (Cases [1]－1 and [2]－1)), excluding the model with installation of pipelines and diversion boxes (Case [1]－2)), as the calculation of benefits for this model would need much assumptions to be made. Moreover, the project for feeder road development was not included in the analysis, as enough information could not be obtained to calculate the benefits that residents in the area receive from the project.

Table 5.48 Government Payment and Farmers' Net Benefits in Each Project of Master Plan

Unit: 1,000Rls

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total	Ratio
1. Program for Irrigation Improvement												
Irrigation System Improvement												
Government payment	198,550	483,426	476,566	205,806	0	0	0	0	0	0	1,364,348	
Farmer's net benefit	-85,093	-218,134	-234,079	-19,326	30,150	288,201	116,947	592,502	218,534	798,287	1,487,990	1.1
Sub-total												
Government payment	198,550	483,426	476,566	205,806	0	0	0	0	0	0	1,364,348	
Farmer's net benefit	-85,093	-218,134	-234,079	-19,326	30,150	288,201	116,947	592,502	218,534	798,287	1,487,990	1.1
2. Program for Crop and Livestock Productivity Improvement												
Net-house												
Government payment	1,996	35,456	35,456	0	0	0	0	0	0	0	72,908	
Farmer's net benefit	11,479	6,623	16,106	28,450	28,450	28,450	28,450	28,450	28,450	28,450	233,358	3
Vegetable cultivation for self-consumption in winter												
Government payment	2,236	5,470	5,470	0	0	0	0	0	0	0	13,176	
Farmer's net benefit	5,242	4,536	6,415	6,762	6,762	6,762	6,762	6,762	6,762	6,762	63,529	5
Forage cultivation												
Government payment	1,169	0	0	0	0	0	0	0	0	0	1,169	
Farmer's net benefit	4,999	4,230	4,230	4,230	4,230	4,230	4,230	4,230	4,230	4,230	43,069	37
Small-scale chicken rearing												
Government payment	0	12,630	12,630	0	0	0	0	0	0	0	25,260	
Farmer's net benefit	0	8,207	21,466	26,518	26,518	26,518	26,518	26,518	26,518	26,518	215,297	9
Sub-total												
Government payment	5,401	53,555	53,555	0	0	0	0	0	0	0	112,512	
Farmer's net benefit	21,720	23,596	48,216	65,960	65,960	65,960	65,960	65,960	65,960	65,960	555,253	5
3. Program for Distribution and Marketing Improvement												
Capacity development in marketing												
Government payment	68,500	33,600	33,600	33,600	33,600	0	0	0	0	0	202,900	
Farmer's net benefit	0	0	0	0	0	0	0	0	0	0	0	0
Diversification of marketing channel of barberry												
Government payment	58,000	67,800	25,200	33,600	33,600	0	0	0	0	0	218,200	
Farmer's net benefit	-66,571	55,725	6,540	447,721	203,987	777,448	203,987	777,448	203,987	777,448	3,387,718	16
Promotion of small-scale processing												
Government payment	6,650	8,400	4,200	4,200	4,200	0	0	0	0	0	27,650	
Farmer's net benefit	-2,800	-257,480	86,120	86,120	86,120	86,120	86,120	86,120	86,120	86,120	428,680	16
Management of a direct sales shop												
Government payment	14,150	4,200	4,200	4,200	4,200	0	0	0	0	0	30,950	
Farmer's net benefit	-8,400	-111,400	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	53,000	2
Sub-total												
Government payment	147,300	114,000	67,200	75,600	75,600	0	0	0	0	0	479,700	
Farmer's net benefit	-77,771	-313,155	114,260	555,441	311,707	885,168	311,707	885,168	311,707	885,168	3,869,398	8
4. Program for Income Source Diversification												
Women's economic activity support through rural women's fund												
Government payment	12,850	10,500	10,500	10,500	10,500	0	0	0	0	0	54,850	
Farmer's net benefit	-176,111	289,962	321,462	389,562	435,762	435,762	435,762	435,762	435,762	435,762	3,439,447	63
Women's activity expansion support through rural women's mother fund												
Government payment	0	47,880	52,500	52,500	52,500	0	0	0	0	0	205,380	
Farmer's net benefit	0	-80,885	240,690	272,190	340,290	386,490	386,490	386,490	386,490	386,490	2,704,736	13
Women's economic activity support through rural women cooperative												
Government payment	12,850	6,300	6,300	8,750	6,300	0	0	0	0	0	40,500	
Farmer's net benefit	0	0	0	-192,600	151,200	151,200	151,200	151,200	151,200	151,200	714,600	18
Sub-total												
Government payment	25,700	64,680	69,300	71,750	69,300	0	0	0	0	0	300,730	
Farmer's net benefit	-176,111	209,078	562,152	469,152	927,252	973,452	973,452	973,452	973,452	973,452	6,858,782	23
Total												
Government payment	376,951	715,661	666,621	353,156	144,900	0	0	0	0	0	2,257,290	
Farmer's net benefit	-317,255	-298,616	490,549	1,071,227	1,335,069	2,212,781	1,468,066	2,517,082	1,569,653	2,722,867	12,771,424	5.7
Discounted Present Value (r=10%)												
Government payment	342,683	591,456	500,843	241,210	89,971	0	0	0	0	0	1,766,163	
Farmer's net benefit	-288,413	-246,790	368,557	731,663	828,973	1,249,057	753,350	1,174,237	665,686	1,049,783	6,286,103	3.6

Note: The most right-hand side column shows the ratio of farmers' net benefit to the government payment.

The projects promising high farmers' net benefits are project for women's economic activity support through rural women's fund (a total of 3.4 billion Rls for 10 years), project for diversification of marketing channel of barberry (3.4 billion Rls), and project for women's activity expansion support through rural women's mother fund (2.7 billion Rls). It is expected that the other

projects will also have positive farmers' net benefits in total of 10 years, except for the Project for capacity development in marketing, which does not generate any direct financial benefit to participating farmers. These results almost do not change if calculation is done using the present values discounted at 10% (in the Table above, at the bottom, the present values discounted at 10% are shown for the total of all the projects). Therefore, it can be judged that these projects are attractive for farmers, in terms of the profitability.

Looking at the results program-by-program, farmers' net benefits from Program for Irrigation Improvement and Program for Crop and Livestock Productivity Improvement are smaller, compared to the farmers' net benefits from Program for Distribution and Marketing Improvement and Program from Income Source Diversification. This is because, as for the Program for Irrigation Improvement, it takes time for newly planted barberries to grow and their yield to reach the maximum level, leading that the effects of the project do not appear in full in 10 years. As for the Program for Crop and Livestock Productivity Improvement, this is because the program is smaller in scale, and the number of participants is also smaller, compared to the other programs.

The next analysis is a comparison between farmers' net benefits and government payments. For all the projects, except for Project for capacity development in marketing, the total farmers' net benefit in 10 years exceeds the total government payment in the same period. The ratio of the farmers' net benefit to the government payment varies from 1.1 to a maximum of 63, and it is expected to be 5.7 for the MP as a whole, and 3.6 for its present value discounted at 10%. This means that if the Government of South Khorassan Province this year allocates 1.8 billion Rls out of its budget for rural support and uses it for the Study area to implement the MP, the farmers this year receive a net benefit of 6.3 billion Rls, an amount 3.6 times higher than the amount that the government spends, while if instead the government directly distributes the same 1.8 billion Rls to the farmers, as it is done in the direct cash transfer through the Targeted Subsidy Reform Act, the farmers simply receive the same amount of net benefits (1.8 billion Rls) (See the lowest rows in the Table).

Moreover, as farmers receiving the direct cash transfer are likely to use it to supplement their living costs, the government would need to secure the budget for this support every year, as long as the government wants to continue it. On the other hand, if the same amount of budget is used for implementing the MP, through the activities of each project, the farmers will not only enjoy the above-described economic benefits, but they could also improve the human, physical, and social capitals in the area, such as improving knowledge and skills, obtaining agricultural equipment and other infrastructures (for example, processing workshop and direct sales shop), and strengthening the village organization. In the medium- to long-term, such farmers will no longer need any assistance from the government, and it will lead to reduction in the government expenditures. These indicate that the MP is highly effective as a rural support measure.

(3) Impacts on Economy of Small-scale Agricultural Households

1) Household Economy Model

While the current situation of farmers' income and expenditures in the Study area was described in Chapter 4, based on the results of the household survey conducted in 2010, today's Iran is experiencing a rapid inflation. Therefore, to analyze as accurately as possible on the impacts of each project of the Master Plan on the economy of small-scale households, economic situations of average agricultural households in the Study area were updated by implementing an additional household survey in 2012, targeting the participants of the pilot projects (among 55 households interviewed, data from two households with missing information and seven households earning an overwhelmingly larger-than-average annual income [higher than 100 million Rls] were excluded, and data from the remaining 46 households were used for analysis). The results are as described below:

With regard to the family structure, the average number of household members was 4.0 (man below

18 years old: 0.7; woman below 18 years old: 0.5; man between 18 and 60 years old: 1.0; woman between 18 and 60 years old: 1.2; man of 60 years old or higher: 0.3; and woman of 60 years old or higher: 0.2). People living inside the village were significantly larger in number than people living outside the village, with a ratio of 11 to 1. Based on these results, the family structure of the model small-scale agricultural household in the Study area is set up as follows:

The family structure of the small-scale agricultural household in the Study area: husband and wife (both are below 60 years old) and two children (both are minors), all living inside the village

The annual income of the model household was derived based on the average annual income of the 46 households. Table below shows that the largest income source is the governmental direct subsidy, which currently pays every month 455,000Rls to each Iranian citizen, within the framework of the national subsidy reform policy. The total amount of this subsidy for a family of four members amounts to 21,840,000Rls a year, accounting for 41% of the whole annual income of the model household. Agricultural income, which mostly consists of income from barberry and jujube, amounts to 9,079,000Rls, accounting for only 17% of the total annual income. Among the people who are engaged in non-agricultural self-employment or wage labor, about 30% are farm laborer and about 20% are construction worker. The average income from non-agricultural self-employment and wage labor is 19,849,000Rls (37% of the total annual income). In total, the annual income of the model agricultural household is 53,883,000Rls.

Table 5.49 Economy of Model Agricultural Household in the Study Area

Annual income (1,000Rls)							
Agriculture				Non-agricultural self-employment / wage labor	Support		Total
Barberry	Jujube	Other crops	Livestock		Government subsidy	Other	
5,938 (11%) [33]	2,112 (4%) [30]	269 (1%) [13]	760 (1%) [12]	19,849 (37%) [33]	21,840 (41%) [46]	3,115 (6%) [15]	53,883 (100%) [46]
9,079 (17%) [39]					24,955 (47%) [46]		

Note: Due to data limitation, figures are not net income, but gross income (i.e., costs paid to conduct each economic activity have not been subtracted); figures in [ ] represent the number of households earning income from that activity.

Source: JICA Study team (2012), calculated based on the data obtained from 46 households participating in the pilot projects.

2) Estimated Impacts of Each Program on Economy of Small-scale Agricultural Households

The estimated impacts of implementing each program of the MP on the economy of above-defined model household are discussed below. (However, Program for basic infrastructure improvement is excluded from the analysis, as its impact on the household economy is indirect).

i) Program for Irrigation Improvement

As explained above, it would be possible to expand the cultivated area of barberries up to three times larger than the current area, depending on the conditions, through the water saving effects of Project for irrigation system improvement. Therefore, the impacts of increase in produced and sold amount of barberries, led by the increase in cultivated area, on the household economy were analyzed and presented below. On the other hand, the impacts of Project for qanat conservation were not analyzed here, because the project intends to develop a system that contributes to effectively maintain and manage the qanats in the whole Province, based on a long-term perspective, and its contribution to individual agricultural households would be to allow them to continue their agricultural activities in the future.

Table 5.50 Impacts of Program for Irrigation Improvement on Economy of Model Agricultural Household in the Study Area

Expansion rate of barberry cultivated area	Impact (1,000Rls/year)			Annual Income (1,000Rls/year)				
				Agriculture		Non-agricultural self-employment / wage labor	Support	Total
	Production increase	Program costs	Income increase	Barberry	Others			
Current				5,938 (11%)	3,141 (6%)	19,849 (37%)	24,955 (46%)	53,883 (100%)
1.5 times	2,975	1,963	1,012	6,950 (13%)	3,141 (6%)	19,849 (36%)	24,955 (45%)	54,895 [x 1.02]
2 times	5,948	2,617	3,331	9,269 (16%)	3,141 (5%)	19,849 (35%)	24,955 (44%)	57,214 [x 1.06]
3 times	11,886	3,925	7,961	13,899 (22%)	3,141 (5%)	19,849 (32%)	24,955 (40%)	61,844 [x 1.15]

Assumption:

[1] Model agricultural household can increase the cultivated area of barberries, without influencing the production of other crops, by transforming currently unused upland crop fields into barberry fields. Increase in production and sold values occur at the same rate as increase in the cultivated area. Selling price of barberries is stable.

[2] Program costs include costs of installing, operating, and managing drip irrigation facilities (but do not include the cost of agricultural inputs). The facilities' life period is assumed to be ten years. The Program cost is derived by multiplying the cultivated area after the Program implementation to the estimated per-hectare, per-year, and per-household cost.

If cultivated area of barberries becomes three times larger than the current area, and if the sold value triples as well, income from barberries is expected to significantly increase up to 13,899,000Rls. However, it would lead only 1.15 times increase in the whole annual income, which would remain at 61,844,000Rls. This is because, in the current situation, the cultivated area of barberries is small, as is its production, and therefore, the contribution of the sales of barberries in the household economy is relatively small. This indicates that, while expansion of cultivated area of barberries through Program for irrigation improvement undoubtedly contributes to the economy of small-scale agricultural households, it alone could not significantly improve the household economy as a whole, and therefore other measures need to be introduced at the same time to increase income from barberries, such as improvement in productivity and selling price.

ii) Program for Crop and Livestock Productivity Improvement

Impacts of Program for crop and livestock productivity improvement on the economy of agricultural households consist of, first, reduction in expenditures for buying vegetables and increase in agricultural income for selling surplus products, through Project for net-house and Project for vegetable cultivation for self-consumption in winter, and second, reduction in expenditures for buying livestock feeds and chicken eggs and meats and increase in agricultural income for selling surplus eggs and chickens, through Project for forage production and Project for small-scale chicken rearing. The contribution of the program to the household economy is estimated as follows. To make the analysis simpler, reduction in expenditures is treated as the increase in income of the same amount.

Table 5.51 Impacts of Program for Crop and Livestock Productivity Improvement on Economy of Model Agricultural Household in the Study Area

Project	Impact (1,000Rls/year)			Annual Income (1,000Rls/year)					
				Agriculture			Non-agricultural self-employment / wage labor	Support	Total
	Value of products	Production cost	Income increase / expenditure decrease	Barberry and jujube	Other crops	Livestock products			
Current				8,050 (15%)	269 (1%)	760 (1%)	19,849 (37%)	24,955 (46%)	53,883 (100%)
Net-house	2,467	1,776	691	8,050 (15%)	960 (2%)	760 (1%)	19,849 (36%)	24,955 (46%)	54,574 [x 1.01]
Vegetable cultivation for self-consumption in winter	775	516	259	8,050 (15%)	528 (1%)	760 (1%)	19,849 (37%)	24,955 (46%)	54,142 [x 1.00]
Forage cultivation	550	131	419	8,050 (15%)	269 (0%)	1,179 (2%)	19,849 (37%)	24,955 (46%)	54,302 [x 1.01]
Small-scale chicken rearing	2,724	477	2,247	8,050 (14%)	269 (0%)	3,007 (5%)	19,849 (35%)	24,955 (44%)	56,130 [x 1.04]
Total of 4 projects	6,516	2,900	3,616	8,050 (14%)	1,219 (2%)	3,426 (6%)	19,849 (35%)	24,955 (43%)	57,499 [x 1.07]

Assumption:

[1] Net-house: from April to September, cultivate tomato using all the area ($25m^2$) and intercrop radish from April to about July and carrot from July to October or November (crop rotation). Production costs include costs for net-house materials, irrigation equipment, and agricultural inputs. With regard to the materials and equipment, their life period is ten years (except for net, which lasts five years), and their purchase prices are divided by the life periods and added to the production costs.

[2] Vegetable cultivation for self-consumption in winter: between October and June, cultivate lettuce and spinach in the vinyl house and harvest four times each, and in sprout cultivation, harvest mung beans and barley ten times each. Production costs include costs for vinyl house materials, sprout cultivation materials, and agricultural inputs. With regard to the materials, their life period is ten years, and their purchase prices are divided by the life period and added to the production costs.

[3] Forage cultivation: for the open field cultivation, plant sorghum and barley once a year in a field of $25m^2$ each. For the sprout cultivation, like in the Project for vegetable cultivation for self-consumption in winter, harvest mung beans and barley each ten times a year. Production costs include costs for sprout cultivation materials and agricultural inputs. Only for the container to cultivate sprouts, the life period is ten years, and its purchase price is divided by the life period and added to the production costs.

[4] Small-scale chicken rearing: keep a situation in which ten matured chickens (2 roosters and 8 hens) are constantly held and surplus chickens (20 per year) are sold. The number of eggs laid by eight hens is 996 a year, of which 677 are self-consumed or sold, 219 are given to others as gifts, and the remaining 100 are to be hatched for reproduction. Production costs include costs for purchasing chickens, chicken house construction, rearing materials, and purchasing incubators. With regard to the materials, their life period is set to be 5, 10, or 15 years, depending on their specifications, and their purchase prices are divided by the life period and added to the production costs. In addition, the incubator is commonly managed by ten households, thus the cost per household is one-tenth of the purchase price. For the chickens that are bought at the beginning of the project, one-third of the purchase price is added to the production costs, as their annual cost.

As shown in the table above, increase in agricultural income (and reduction in food expenditures) from each project is estimated to be 691,000Rls/year for Project for net-house, 259,000Rls/year for Project for vegetable cultivation for self-consumption in winter, 419,000Rls/year for Project for forage production, and 2,247,000Rls/year for Project for small-scale chicken rearing. The result of analysis confirms that chicken rearing would be highly profitable, with expected low cost and high return. However, even if these four projects are implemented all together, increase in the household's annual income as a whole is limited, as it would become only 1.07 times larger than the current annual income. This indicates that to further increase the contribution of the program to the household economy, it is necessary in the long run to scale up the proposed activities. Moreover, the program is expected to bring secondary effects that do not appear in the financial analysis, such as improvement in dietary habits through increased consumption of eggs

and vegetables and use of carrot and radish leaves as livestock feeds. Furthermore, all the projects can be carried out by elders and women, as they do not require heavy workload (except for when installing facilities). Therefore, it is to a large extent meaningful to implement the program in the Study area.

iii) Program for Distribution and Marketing Improvement

Impacts of Program for distribution and marketing improvement on the economy of agricultural households mainly consist of increase in income from selling barberries through Project for diversification of sales channel of barberry (for individual farmers, the other projects are considered to assist diversification of sales channel, through development of marketing capacities and creation of new buyers of the product, such as processing workshop and direct sales shop). The impact of diversification of sales channel of barberries on the economy of agricultural households is estimated as follows, as of an on-year of barberries after five years of project implementation.

Table 5.52 Impacts of Program for Distribution and Marketing Improvement on Economy of Model Agricultural Household in the Study Area

	Annual income (1,000Rls/year)				
	Agriculture		Non-agricultural self-employment / wage labor	Support	Total
	Barberry	Other			
Current	5,938 (11%)	3,141 (6%)	19,849 (37%)	24,955 (46%)	53,883 (100%)
After Project	6,846 (12%)	3,141 (6%)	19,849 (36%)	24,955 (46%)	54,791 [x 1.02]

The breakdown of barberry income is as follows.

Table 5.53 Impacts of Program for Distribution and Marketing Improvement on Economy of Model Agricultural Household in the Study Area (breakdown)

Buyer		Current (1,000Rls)				After Project (1,000Rls)			
		Quantity sold (kg)	Income	Selling cost	Balance	Quantity sold (kg)	Income	Selling cost	Balance
(Self-consumption)		22.5				13.5			
Broker (fresh)		67.4	674	0	674	58.5	585	0	585
Broker (dried)		74.2	4,823	0	4,823	39.6	2,574	0	2,574
Retail shop in the Province (dried)		4.9	441	0	441	19.8	1,782	39	1,743
Retail shop outside the Province (dried)		0				9.9	1,188	90	1,098
Wednesday market (dried)		0				4.9	490	81	409
Direct sales shop (dried)		0				4.9	392	31	361
Processing workshop (fresh)		0				4.5	45	0	45
Processing workshop (dried)		0				3.0	30	0	30
Total	Fresh	89,9	5,938	0	5,938	76.5	7,086	241	6,846
	Dried	79.1				82.1			

Assumption:

[1] Table estimates the situation in an on-year of barberries after five years of project implementation.

[2] "Fresh" refers to harvested barberry fruits still attached to branches, and "dried" refers to dried barberry fruits already removed from branches. The weight ratio between these two used in the calculation is 1:0.22, derived based on the sample weighing tests carried out by the Study team.

[3] "Self-consumption" includes barberries given to others (such as relatives) for free and barberries discarded due to low quality. The weight of self-consumed dried barberries is converted to fresh weight, using the above-defined ratio, and added to the weight of self-consumed fresh barberries. After the project implementation, the amount of self-consumption

is smaller compared to the current situation, because barberries that cannot be sold due to the quality problem and discarded in the current situation are used for processing in the proposed program.

[4] The ratios of the amount sold to each category of buyers after the project implementation are set up as follows (in fresh weight): self-consumption: 3%, broker (fresh): 13%; broker (dried): 40%; retail shop in the Province: 20%; retail shop outside the Province: 10%; Wednesday market: 5%; direct sales shop: 5%; processing workshop (fresh): 1%; and processing workshop (dried): 3%.

[5] Selling costs include costs for purchasing packaging materials, transportation, gathering information, obtaining sales permission for Wednesday market, and purchasing a barberry cleaning machine.

As a result of diversification of sales channel, it is estimated that barberry income increases from the current amount of 5,938,000Rls/year to 6,846,000Rls/year, or an increase of 15%. Similar to the Program for irrigation improvement, as the share of barberry income in the total annual income is originally small, this increase of 15% leads to only 1.02 times larger annual income. In addition, such a result is also due to the assumption that after the project implementation, more than half of the harvests (53%, with both fresh and dried products counted) are still sold to brokers, as is the case today. As described above, selling to brokers has been accepted by farmers, as a labor saving way that allow them to get rid of paying transportation costs and working hard on cleaning and packaging. Therefore, it would be realistic to expect that after the project implementation, at least for short to mid-term period, a large part of production remains to be sold to brokers.

Implementing this program with Program for irrigation improvement generates synergetic effects. For example, as presented above, when the program is implemented alone, the barberry income of the model agricultural household is estimated to increase from 5,938,000Rls/year to 6,846,000Rls/year, or an increase of 908,000Rls/year, and when Program for irrigation improvement is implemented alone and the cultivated area of barberries doubles, the barberry income is estimated to increase by 3,331,000Rls/year. These increases in income add up to 4,239,000Rls/year. On the other hand, if these two programs are implemented at the same time, the barberry income is estimated to increase from 5,938,000Rls/year to 11,278,000Rls/year, or an increase of 5,340,000Rls/year. This occurs because the additional production of barberries by Program for irrigation improvement is sold at a higher average price through this program, compared to when Program for irrigation improvement is implemented alone. Therefore, it is recommended to carry out both the programs at the same time, whenever possible.

iv) Program for Income Source Diversification

Impacts of Program for income source diversification on the economy of agricultural households are mainly brought by Project for women's economic activity support through rural women's fund. (Project for women's activity expansion support through rural women's mother fund intends to increase the number of households in which women are involved in economic activities, and therefore, it does not affect the annual income of a household that is already participating in Project for women's economic activity support through rural women's fund. Likewise, impacts of Project for women's economic activity support through rural women cooperative on the economy of agricultural households are brought only when a member of the household is hired as a paid worker by the project, or when the dividend is paid to the cooperative members after its activities has grown enough. Therefore, impacts of this project are not analyzed here.) Impacts of each sub-project of Project for women's economic activity support through rural women's fund on the economy of the model agricultural household is estimated below, as of fifth year of the project implementation.

Table 5.54 Impacts of Program for Income Source Diversification on Economy of Model Agricultural Household in the Study Area

Sub-project	Impact (1,000Rls/year)			Annual income (1,000Rls/year)			
	Produced value	Production cost	Income increase	Agriculture	Non-agricultural self-employment / wage labor	Support	Total
Current				9,079 (17%)	19,849 (37%)	24,955 (46%)	53,883 (100%)
Cloth weaving revival	21,000	8,955	12,045	9,079 (14%)	31,894 (48%)	24,955 (38%)	65,928 [x 1.22]
Barberry and jujube honey production	12,240	3,110	9,130	9,079 (14%)	28,979 (46%)	24,955 (40%)	63,013 [x 1.17]
Sewing promotion in the village	1,732	713	1,019	9,079 (17%)	20,868 (38%)	24,955 (45%)	54,902 [x 1.02]
Oyster mushroom promotion in the village	1,680	906	774	9,079 (17%)	20,623 (38%)	24,955 (46%)	54,657 [x 1.01]
4 sub-projects total	36,652	13,684	22,968	9,079 (12%)	42,817 (56%)	24,955 (32%)	76,851 [x 1.43]

Assumption:

[1] Table estimates the situation in the fifth year of the project.

[2] Cloth weaving revival: produce and sell 30 sets of towel (60 pieces) per month for ten months a year. Sub-group consists of five members. The cost for technical training is divided by the number of members. Initial investment costs, such as technical training and purchase of weaving machine, are divided by five (number of the project years), and added to the annual production cost. The cost for materials is one-third of the sales value.

[3] Barberry and jujube honey production: sub-group of five members manages 30 bee hives. Honey is extracted three times a year, one time each from the following three sources: jujube, barberry, and other flowers. Extracted amount each time is 4kg per hive. Annual production costs per household are derived by dividing all the costs by the number of sub-group members, and further dividing the initial investment costs, such as bee keeping materials, by five (number of the project years).

[4] Sewing promotion in the village: sub-group of five members annually receive orders from four families to produce a set of clothes for daily use, such as chadol, shirt, pants, and pajama. Annual production costs per household are derived by dividing all the costs by the number of sub-group members, and further dividing the initial investment costs, such as technical training, by five (number of the project years).

[5] Oyster mushroom promotion in the village: sub-group of five members annually works on six cycles of production, with a harvested amount of 14kg per cycle. Annual production costs per household are derived by dividing all the costs by the number of sub-group members, and further dividing the initial investment costs, such as preparation of cultivation facility, by five (number of the project years).

Increase in income through sub-Project for cloth weaving revival is estimated to be about 12,000,000Rls/year, and increase in income through sub-Project for barberry and jujube honey production is estimated to be about 9,000,000Rls/year. Both sub-projects are highly profitable. On the other hand, impacts of sub-Project for sewing promotion in the village and sub-Project for oyster mushroom promotion in the village on the economy of the model agricultural household are limited, if they are implemented in production scales proposed by the program. Therefore, it would be necessary to gradually scale up these sub-projects, to increase their contributions.

Although sub-Project for cloth weaving revival is expected to contribute the most to the household economy among the four sub-projects, its production cost is also high, which makes it difficult for farmers to start the business with their own financial resources. Therefore, it is crucial to use loan from rural women's fund, as proposed by the program. According to the hearing survey conducted in Khorashad village, which is located about 20km south-east of Birjand and famous for its cloth weaving, of their average annual income of 108,450,000Rls, 26,928,000Rls (or 25%) came from weaving (based on data collected in 2012 from 46 member households of the women cooperative; the same as for the model agricultural household in this Section, both figures are gross income before subtracting the costs paid). While the program

expects that the value of woven products amounts to 21,000,000Rls/year, the case of Khorashad village indicates that it could be further improved, if the activity develops well.

3) Project Combinations

The MP aims that its implementation increases the farmers' income up to the level of income of urban residents, and through it, prevents the migration of population from rural to urban areas. While impacts of each project on the economy of the model agricultural household were estimated in the previous section, as the number of members of the model household is limited to four (including two children), it is impossible for the household to carry out all the projects, due to time and labor constraints. Therefore, based on the estimation in the previous section, this section shows how much the annual income of the model agricultural household will increase by implementing different combinations of projects, and compare the improved annual income with the average annual income in the urban area, to analyze if the goal of the MP can be achieved.

Data on the average income in the urban area of the South Khorassan Province, obtained throughout the Study, is limited to that of 51,160 thousand Rls in 2007, shown in Table 4.8. Therefore, the average annual income in the urban area of the Province for the same period as the data based on which the economy of the model agricultural household was constructed (the survey was conducted in 2012, and information on household economy in 2011 was collected), was estimated using the following formula:

$$Y_{u2011} = Y_{u2007} \times \{(Y_{r2011} - S) / Y_{r2007}\} + S$$

In the formula above, Y_{u2011} represents average annual income in the urban area of the Province in 2011; Y_{u2007} represents average annual income in the urban area of the Province in 2007; Y_{r2011} represents average annual income in the rural area of the Province in 2011; S represents direct cash transfer from the government; and Y_{r2007} represents average annual income in the rural area of the Province in 2007. Of these, data on average annual income in the rural area in 2011 could not be obtained, and the annual income of the model agricultural household was used as its approximate value. The result of calculation was 88,811 thousand Rls. Therefore, if the annual income of the model agricultural household increases from the current level of 53,883 thousand Rls to a level exceeding 80,000 thousand Rls, through implementation of the MP, it could be judged that the goal of realizing an annual income comparable to that of urban areas has been achieved.

Annual incomes of the model agricultural household after implementing different combinations of the projects are estimated and presented in the Table below. If participating in all the projects, depending on the degree of expansion in the cultivated area of barberries through Project for irrigation system improvement, the annual income of the model agricultural household would reach 82,934 thousand Rls (when the area becomes 1.5 times larger) to 91,540 thousand Rls (when the area becomes 3 times larger), which are at the same level as the annual income in the urban area. An example of more realistic combinations of the projects would be that the man participates in Project for irrigation system improvement and all the four projects of Program for crop and livestock productivity improvement, while the woman participates in Project for diversification of sales channel of barberry of Program for distribution and marketing improvement and sub-Project for cloth weaving revival and sub-Project for barberry and jujube honey production of Program for income source diversification. In this case also, the Table shows that the annual income will exceed 80,000 thousand Rls, if the cultivated area of barberries becomes more than 1.5 times larger through Project for irrigation system improvement.

Table 5.55 Combinations of Master Plan Projects and Annual Income of Model Agricultural Household after Implementation

				Increase in cultivated area of barberries through Project for irrigation system improvement					
				1.5 times larger		2 times larger		3 times larger	
				Project for diversification of marketing channel of barberry					
				Do not participate	Participate	Do not participate	Participate	Do not participate	Participate
Project for women's economic activity support through rural women's fund Participating sub-projects	Cloth weaving only	Program for crop and livestock productivity improvement Participating projects	Do not participate	66,940	68,395	69,259	71,269	73,889	77,001
			Crop 2 projects only	67,890	69,345	70,209	72,219	74,839	77,951
			Livestock 2 projects only	69,606	71,061	71,925	73,935	76,555	79,667
			All 4 projects	70,556	72,011	72,875	74,885	77,505	80,617
	Bee keeping only		Do not participate	64,025	65,480	66,344	68,354	70,974	74,086
			Crop 2 projects only	64,975	66,430	67,294	69,304	71,924	75,036
			Livestock 2 projects only	66,691	68,147	69,010	71,020	73,640	76,752
			All 4 projects	67,641	69,097	69,960	71,970	74,590	77,702
	Cloth weaving and bee keeping		Do not participate	76,070	77,525	78,389	80,399	83,019	86,131
			Crop 2 projects only	77,020	78,475	79,339	81,349	83,969	87,081
			Livestock 2 projects only	78,736	80,192	81,055	83,065	85,685	88,797
			All 4 projects	79,686	81,142	82,005	84,015	86,635	89,747
	All 4 sub-projects		Do not participate	77,863	79,318	80,182	82,192	84,812	87,924
			Crop 2 projects only	78,813	80,268	81,132	83,142	85,762	88,874
			Livestock 2 projects only	80,529	81,984	82,848	84,858	87,478	90,590
			All 4 projects	81,479	82,934	83,798	85,808	88,428	91,540

Note: annual incomes exceeding 80,000 thousand Rls are highlighted.

The Table also shows that it would be difficult to increase the annual income up to the level of annual income in the urban area, if not participating in both sub-Project for cloth weaving revival and sub-Project for barberry and jujube honey production. However, as most women in the Study area are not currently engaged in wage labor, they are most likely be able to allocate their time to participate in these activities.

Based on the discussion above, it could be judged that through the proposed MP, it is possible for an average household in the Study area to increase their annual income up to the level of annual income in the urban area, by selecting and implementing a combination of the projects that they can handle within the range of time and labor force endowed to them.

It should be noted that while the analysis in this section has been done exclusively based on the economy of the model agricultural household, the situations that households in the Study area face are not necessarily homogenous. For example, while there are households in which men have a stable work outside the village, having little time to be involved in economic activities in the village, there are other households in which men are involved in seasonal paid works in the area, having much time for economic activities in the village. Furthermore, although no elder member is included in the model household, as a result of deriving an average feature of the households participating in the pilot projects, it is a fact that many elders are living in the Study area. These households facing different situations must have difference in their current annual income, their target annual income, and the combination of the projects that they can handle. Therefore, when implementing the MP, it is important to carefully explain each project to participating households, in terms of not only technical but also economic aspects, and assist participants to select a tailor-made combination of the projects that are the most suitable to the situation of each household.

4) Influence of Risks

When implementing the MP, there are different risks as raised in Section 5.4.4. If such risks become real, it is possible that the positive effects of each project on the annual income of participating

households be reduced, through increase in the project costs, due to reasons such as increase in the prices of equipment and materials, or through decrease in the project benefits, due to reasons such as decrease in production and selling price. Therefore, this section analyzes how much the above-derived increase in annual income of the model agricultural household would be influenced, if the cost of each project increases by 10% or if the benefit of each project decreases by 10%. The results are presented in the Table below.

Table 5.56 Change in Increase in Annual Income of Model Agricultural Household by Each Project, Following 10% Increase in Costs or 10% Decrease in Benefits

Project	Plan	Cost 10% increase		Benefit 10% decrease		Remark
	Increase in annual income (1,000Rls)	Increase in annual income (1,000Rls)	Ratio to Plan	Increase in annual income (1,000Rls)	Ratio to Plan	
Program for Irrigation Improvement						
Area 1.5 times larger	1,012	816	-19%	126	-88%	1
Area 2 times larger	3,331	3,069	-8%	2,138	-36%	2
Area 3 times larger	7,961	7,568	-5%	6,183	-22%	3
Program for Crop and Livestock Productivity Improvement						
Net-house	691	513	-26%	444	-36%	
Winter self-consumed vegetable cultivation	259	208	-20%	182	-30%	
Forage cultivation	419	406	-3%	364	-13%	
Small-scale chicken rearing	2,247	2,199	-2%	1,975	-12%	
4 projects total	3,616	3,326	-8%	2,965	-18%	
Program for Distribution and Marketing Improvement						
Diversification of marketing channel of barberry	908	884	-3%	693	-24%	4
Program for Income Source Diversification						
Cloth weaving revival	12,045	11,150	-7%	9,945	-17%	
Barberry and jujube honey production	9,130	8,819	-3%	7,906	-13%	
Sewing promotion in the village	1,019	948	-7%	846	-17%	
Oyster mushroom promotion in the village	774	683	-12%	606	-22%	
4 sub-projects total	22,968	21,600	-6%	19,303	-16%	

Remark:

1. For the 10% decrease in benefits, it is assumed that the cultivated area of barberries become 1.5 times x 0.9 = 1.35 times larger.
2. For the 10% decrease in benefits, it is assumed that the cultivated area of barberries become 2 times x 0.9 = 1.8 times larger.
3. For the 10% decrease in benefits, it is assumed that the cultivated area of barberries become 3 times x 0.9 = 2.7 times larger.
4. For the 10% decrease in benefits, it is assumed that the selling prices for the new marketing channels through the project, such as Wednesday market and direct sales shop, become 10% lower.

In most projects, a 10% increase in the costs is likely to bring a less than 10% decrease in the planned increase in annual income. However, in Project for irrigation system improvement (case in which the cultivated area of barberries increases to 1.5 times larger), Project for net-house, Project for vegetable cultivation for self-consumption in winter, and sub-Project for oyster mushroom promotion in the village, the increase in annual income decreases with a higher rate than increase in the costs. This means that if the price of construction materials for net-house or other facilities exceeds the budgeted level, it will have a large negative impact on the profitability of the projects. This indicates that it is important to procure low-cost and durable materials for these projects.

In all the projects, a 10% decrease in the benefits is expected to bring a more than 10% decrease in the planned increase in annual income (all the other conditions unchanged, this result is mathematically inevitable). This indicates that when implementing the MP, it is necessary to especially pay attention to factors that can cause decrease in the benefits, such as decrease in

productivity and selling price. When implementing Program for irrigation improvement and Project for net-house, for which decrease in benefits is expected to bring especially great impact on increase in annual income, it would be required to pay attention for the cultivated area to be smoothly expanded after installation of water-saving irrigation facilities, and carefully provide technical assistances to maintain the yield of net-house cultivation high.

Chapter 6 Toward Practical Use of the Master Plan in Similar Areas

6.1 Foreword

The Master Plan proposed in this report was formulated for the Alghourat-Takhchar Abad area, but care has also been taken to make it applicable to similar areas within South Khorassan Province. This chapter provides a simple explanation of guidelines for application to similar areas. Thus, this is a guideline for the South Khorassan Province JAO (the C/P agency for the Study) on how to apply and extend the MP within the province, with the adaptation to local situations.

The MP presented in Chapter 5 consists of four main programs (irrigation, agricultural production, distribution and marketing, and income source diversification), and a number of small-scale projects are allocated to each program. The implementation of multiple numbers of these small-scale projects is expected to yield synergistic effects, however the projects can also be implemented individually.

6.2 Concept and Future for the Diffusion and Extension of the Master Plan

For diffusion and extension of the four component programs of the MP, their activities should be supported with the following image especially after the implementation of the activities.

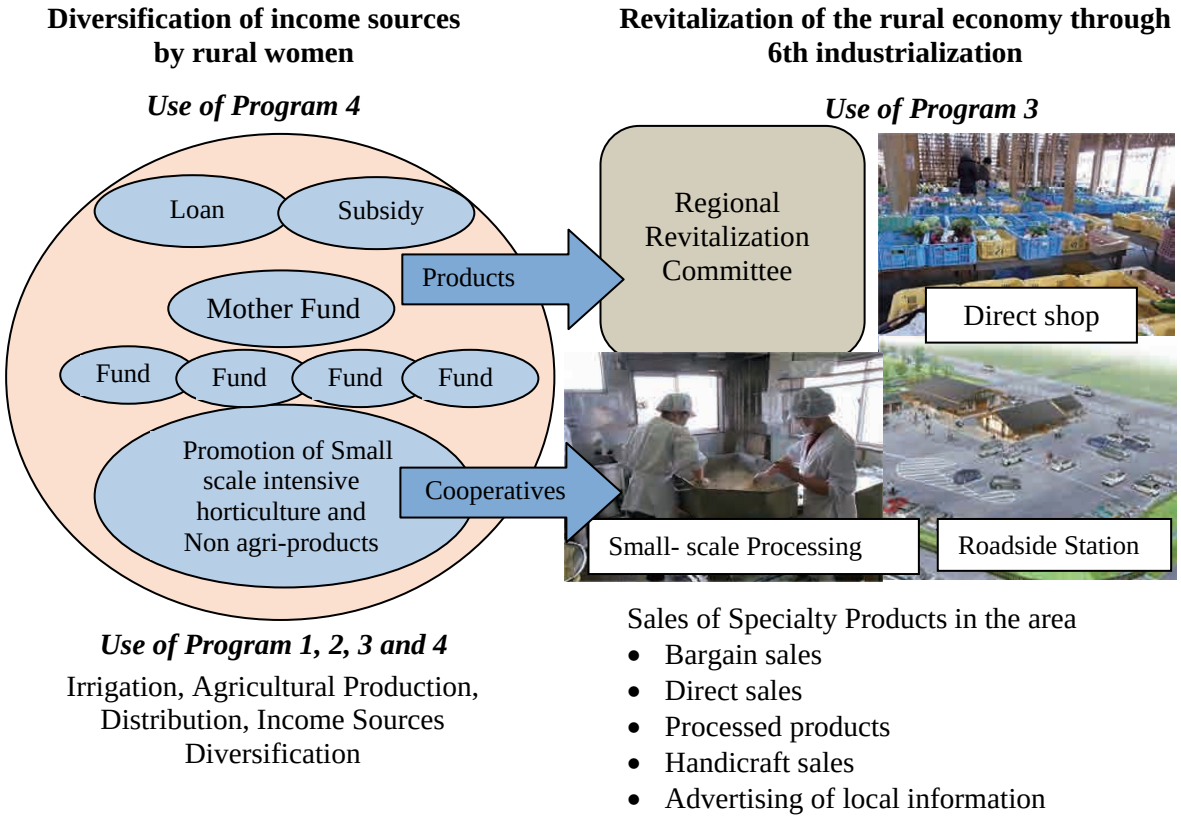


Fig. 6.1 Future Concept for the Diffusion and Extension of the Master Plan

6.3 Toward Practical Use of the Master Plan in Similar Areas

6.3.1 Natural, Socioeconomic and Agricultural Characteristics

In general, promotion of rural development requires an adequate understanding of the natural environment, society, agricultural conditions, and other aspects of the target area. Each township JAO should perform a SWOT analysis, as was used in the Study, to identify the characteristics of the area, and then set a direction for development. However, there are similarities between the target area of the

Study and other townships within the province, and hence there is a high possibility for general application of using this MP.

Table 6.1 Natural, Socioeconomic and Agricultural Characteristics

	Characteristics of the study area	Characteristics of other areas within the province
Natural conditions	- This is an arid region. - Summer is hot and winter is extremely cold. - It is situated in mountains area	- This is an arid region. - Summer is hot and winter is extremely cold. - It consists of both flat and mountains areas.
Social conditions	- The registered population is approximately 2,000, with approximately 1,000 residing in the Study area, and the half residing in Birjand city. - Most of the farmers have small farms, and mainly combine farming with other work - The area is adjacent to the provincial capital, Birjand - The development of water supply, electrification and roads is advancing, but the areas of marginal villages are undeveloped. - Half of the 15 villages are marginal villages. - The aging of the farming population is progressing. - The young people leaving agriculture is progressing.	- The population of the province is approximately 600,000. - Most of the farmers have small farms, and mainly combine farming with other works - Most of the villages are isolated from trunk roads
Agricultural and economic conditions	- The main crops are barberry and jujube. - The only water sources are qanats. - Mostly farming is done in a very small scale. - Preparations have begun for establishing women's cooperatives. - In the target area, the economic spheres of the villages are weak, partly because of the "straw effect", and they are under the influence of Birjand's economic sphere.	- The main types of agricultural produce differ between areas, and are diverse, including wheat, barley, pistachio, barberry, saffron, pomegranate, and sugar beet etc. - The diverse water sources include pumping of groundwater, qanats, and springs - There are large farms on flat area, but the farming in mountainous areas is estimated to be very small scale. - There are 17 women's cooperatives and a federation. - There are packing centers for agricultural produce.

(1) Development Tailored to Constraints of Small-scale Farmers

Table 6.2 Percentage of Small Scale Farmers

Township	%
Birjand	85
Qaen	80
Nehbandan	80
Sarbishe	90
Darmian	80
Sarayan	80
Boshroyeh	80
Ferdows	85

Source: JAO

Among the farmers in South Khorassan Province, at least 80% in any township are small-scale farmers. As described in Chapter 4, Section 4.7 "Poverty in Arid Area", the constraints of small-scale farmers are 1) constraints of water, 2) constraints of land, and 3) constraints of workforce etc. For small-scale farmers to raise their farming incomes, which are based around farming and other rural activities, amid such constraints, they must raise the productivity of their land and water. It means the raising the added value of agriculture, and in the process of raising added value, they can be

expected to create job opportunities.

(2) Raising Added Value of Specialty Products

The "raising the added value of agriculture" mentioned above should start with attaching added value to specialty products. In the surveyed area, the main sources of agricultural income are barberry and jujube, and hence the MP proposal emphasizes on raising the added value of barberries and jujube.

The local specialty products (agricultural produces), as heard from JAO staff in each township, are as follows: Other than barberries and jujube, there are saffron, pistachio, pomegranate, sugar beet, wheat, cotton, and others. Therefore, each township JAO should work to stimulate its local economy by raising the added value of specialty products suitable for the area.

Table 6.3 Specialty Products by Townships

Rank	Study area	Birjand	Qaen	Nehbandan	Sarbishe	Darmian	Sarayan	Boshroyeh	Ferdows
1st	Barberry	Barberry	Saffron	Wheat	Jujube	Barberry	Wheat	Cotton	Pomegranate
2nd	Jujube	Jujube	Barberry	Pistachio	Barberry	Wheat	Cotton	Barberry	Saffron
3rd	-	Saffron	Wheat	Dates	Saffron	Sugar beet	Pistachio	Pistachio	Pistachio

(3) Demand and Consumer Needs

When selling the local specialty products with added value, it is important to perform a macro-scale analysis of whether the market is already established, or if the sales will cover a wider area. If the sales will be confined to a more limited area, it is essential to understand the consumer needs by performing the kind of "survey of consumer needs in cities of neighboring regions" and "test marketing such as Wednesday market in Birjand", which were conducted in this study.

In the base line study results from 2010, barberries were specialty products accounting for 64% of farming income of the farmers in the target area. Hara[1] reported that with the increasing consumption of rice by Iranians, the volume of barberry production has also increased, and its value has risen. Data on barberries is very limited, and hence, the barberry demand is examined by examining the trend in rice consumption, instead. In Iran, rice consumption rose rapidly in the 1960s and '70s, and has been stable, since the '80s. Barberries are expected to be in stable demand for the use in rice cuisine, as juice, a cake ingredient, and other purposes. Meat consumption has also been rising in Iran, since the 1970s, and the consumption of poultry in particular has been rising sharply since the 1990s. Egg consumption is also rising and poultry/eggs are favored by consumers as a good protein source. Another notable trend is the rapid growth in consumption of vegetables, since the 1980s. Figure 6.2 shows that tomatoes are the leading vegetable, and demand for vegetables can be expected to grow. Based on these consumption trends and the PP results of this study etc., arid regions such as South Khorassan should advance with barberries and

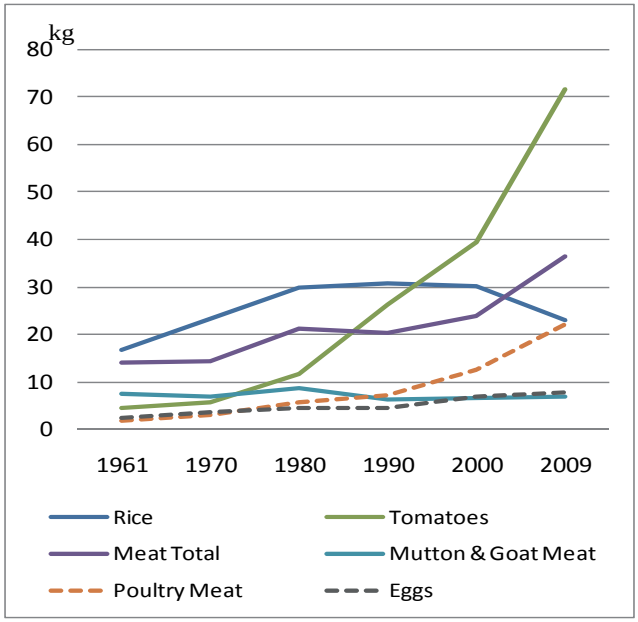


Fig. 6.2 Major Food Consumption per Person per Year in Iran

[1] HARA Ryuichi 'Water and Social in Iran', Kokinshoin, 1997 : p165

other fruit trees and vegetables that are highly water economical, and with small-scale poultry farming and other practices with low water demand.

(4) Development Adapted to Irrigation Water Sources

In the target area, small-scale farming depends on qanats in mountainous areas. In the province, groundwater is pumped in rural flat land areas, which are engaged in large-scale production of wheat, cotton and saffron. However, farming in mountainous parts of the province is on a very small scale, and often depends on qanats, and the lessons obtained from this area are applied.

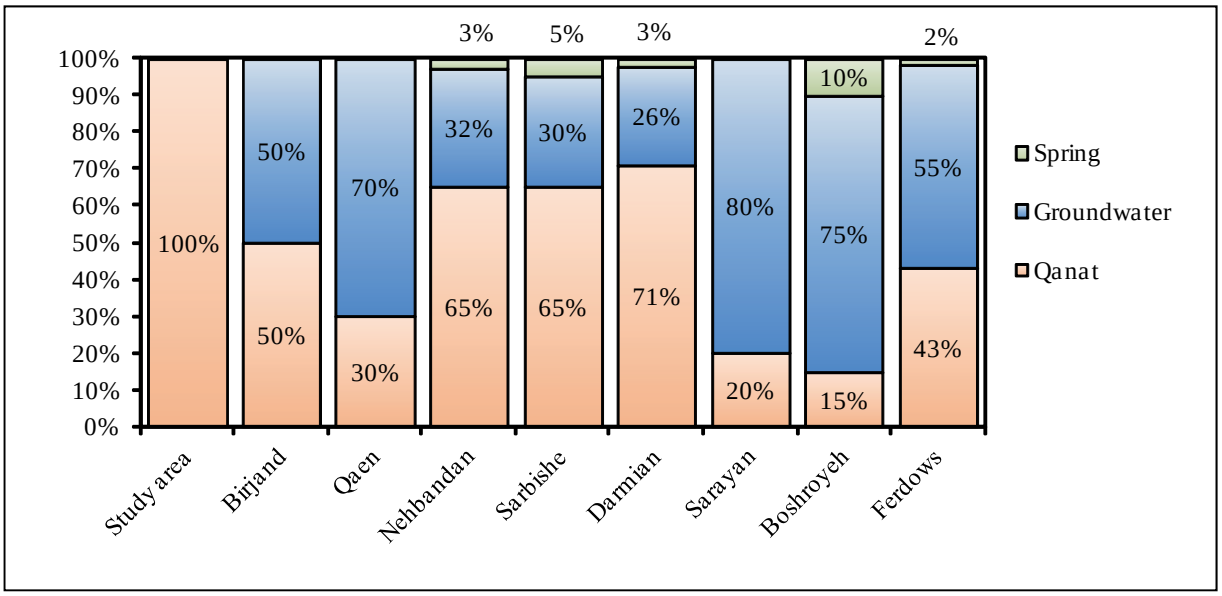


Fig. 6.3 Irrigation Water Sources by Townships

6.3.2 Matrix of Priority Projects

Table 6.4 shows the matrix of priority projects for each township, to facilitate extension of the M/P to townships in the province. This table provides one guideline to apply for the case of implementing the 13 projects shown in the M/P.

Irrigation system improvement projects will introduce small-scale water-saving irrigation systems that are suitable for the topography of mountainous areas, with the purpose of establishing irrigated agriculture that makes effective and efficient use of water. The target areas will be those that have strategic irrigated crops that will be grown in greater volumes in future, and have some degree of stable access to water from qanats. Such areas will be selected in each township, with reference to the project contents stated in “Chapter 5, 5.3.7 Program”. This project is expected to yield synergistic effects from integrated implementation of the various projects within the M/P distribution and marketing program. The townships which should be prioritized for implementation are Nehbandan, Sarbishe, and Darmian, which are highly dependent on qanats as their irrigation water sources.

In the qanat maintenance project, new organizations and systems will be established to handle qanat maintenance work, and to contribute for the stronger qanat maintenance. In this project, qanats in the province will be investigated and information will be collected, and a qanat maintenance and operation & management project plan will be prepared. It is the reason that the areas which are highly dependent on qanats should be prioritized. However, as there are over 6,000 qanats in the province, new organizations will perform a field survey in each township, and work with local residents to identify qanats that should be prioritized, to prepare the maintenance plan.

In the net house project, net houses and water-saving irrigation systems will be introduced for

vegetable production, which is at a lower level of productivity under the current irrigation systems. Simple technical improvements will be applied to raise the productivity. Since the scale of this project is small, and does not require a large amount of irrigation water or farm land, it could be applied to mountainous areas, flat areas, and even to urban areas. It has the potential to raise income through the installation of multiple net houses. Therefore, this project shall be implemented in every area and township, rather than in selected locations. However, if it is implemented in every township, JAO will cooperate with the farmers to set up model farms to disseminate the techniques to the neighboring farmers.

The winter vegetable cultivation for home consumption project will target people who are relatively poor and landless, even within townships, residents who have no rights to use irrigation water, and the women of farming households, so that they will be able to eat fresh vegetables and herbs even in winter. Therefore, this project is proposed to be implemented in every township.

The small-scale poultry farming project will target relatively poor farmers with the aim of securing home consumption of protein for them, while also meeting booming demand for chicken meat and eggs. It will be accompanied by the introduction of barley and bean sprout cultivation to raise the self-sufficiency rate in feed supply. In areas where there are no poultry farms, the project will promote small-scale poultry farming, and link to the formation of poultry cooperatives, when there are enough poultry farmers. This project is proposed to be implemented in every township.

The marketing capacity development project will provide support for marketing skills, so that small farmers are not left behind as market-oriented farming progresses. Marketing capacity is positioned as an extremely important element for farmers and the area in future. Therefore, this project consists mainly of skills training, and this project is proposed in every township. In the distribution and marketing program, this project should be implemented before, or in parallel with, the other projects.

Barberry sales channel diversification project is a repetitive activity to gradually increase sales channel options for small farmers beyond selling whole harvests to brokers, and provide training on how to obtain more business opportunities. As such, this project is applicable to crops other than barberries. It should be implemented first in townships where the barberries are their specialty products.

The promotion of small scale processing projects will attach added value to conventional produce, and create new products by processing unused agricultural produce. As business acumen is important in processing projects, this project should be implemented together with the above-mentioned marketing capacity development. The matrix in the following table prioritizes this project for township producing small volumes of a wide range of orchard fruits and agricultural produce, which are numerous in mountainous areas, but its extension should center on rural women and cooperatives even in flat rural areas.

The direct shop operation project is based on the assumption that it will be linked to grassroots grant aid from the Japanese government in the study area. It is proposed to be implemented with reference to this project in highly populated townships and townships along the trunk roads. However, it is necessary to secure produce to sell at direct shops, and to have a varied lineup, and it is recommended targeting women's groups and cooperatives with experience in product creation.

The income source diversification program comprises three projects: The sequence for project implementation should be 1) women's economic activity support projects through the rural women's fund, 2) Expansion support projects using the rural women's parent fund, and 3) women's economic activity support projects through women's cooperatives, according to the level of experience of economic activity among the targeted women's groups. Thus, the groups with little experience of economic activity should start with 1) women's economic activity support projects through the rural women's fund.

Women's economic activity support projects through the rural women's fund promote economic

activity by women throughout the province, so they should be implemented in every township. It is proposed that the poverty index preparation surveys that are used by JAO be used to narrow down the candidate women's groups and villages within townships.

The "expansion support projects using the rural women's mother fund" should target the two townships where parent funds have already been established (Darmian and Sarayan), and successful models should be created by strengthening fund usage systems and business activities. Next, a mother fund will be established in Birjand Township, where the most funds have been set up in the province (13), to provide the same kind of support.

"Women's economic activity support projects through women's cooperatives" will propose activities for newly-established women's cooperatives in the study area. There are 17 existing women's cooperatives in the province, of which three (Khorashad, Kowsar Khousf, Alzahra Mood) are highly active, and this project will target the others, to stimulate them with measures including reorganization with reference to the activities included in the project.

The projects described above could be used within the One Village One Project program that is currently under way in the province under the JAO.

A practical approach for advancing the stimulus of village economies would be to make multiple projects into packages and work with the JAO for each village, to select the package that best suits the characteristics of each village and the wishes of its residents. Therefore, road maps as proposed in Chapter 5 should be drawn up in collaboration with JAO project offices and each township, to promote the made-to-order adaptation of the MP for each area. In this procedure, it is recommended to examine if, in addition to the risks in MP implementation described in Section 5.4.4, there are risks specific to each township, which may cause to decrease the effects of the MP, and to study how to avoid such risks, if any.

Table 6.4 Matrix for Priority Projects in Townships

Program \ Townships	Study area	Birjand	Qaen	Nehbandan	Sarbishe	Darmian	Sarayan	Boshroye	Ferdows
1. Irrigation Program									
Irrigation system improvement	○	○		○	○	○			○
Qanat Maintenance	○	○		○	○	○			○
2. Agriculture Production Program									
Net house	○	○	○	○	○	○	○	○	○
Winter vegetable cultivation	○	○	○	○	○	○	○	○	○
Forage cultivation	○	○	○	○	○	○	○	○	○
Small-scale poultry	○	○	○	○	○	○	○	○	○
3. Distribution and Marketing Program									
Capacity development of marketing	○	○	○	○	○	○	○	○	○
Diversification of barberry sales	○	○	○		○	○		○	
Promotion of small-scale processing	○	○	○		○	○			○
Management of direct shop	○	○	○	○	○				
4. Income source diversification									
Rural women's fund	○	○	○	○	○	○	○	○	○
Rural women's mother fund		○				○	○		
Rural women's cooperatives	○	○	○	○	○	○	○	○	○

Note: ○ Priority

Chapter 7 Implementation of the Pilot Projects

7.1 Plan of the Pilot Projects

7.1.1 Objectives of the Pilot Projects

The objectives of the PP are "verification of validity and effectiveness of the activities contributing poverty reduction" for the projects proposed in the formulation process of the MP in the preceding chapter and "extraction of lesson learned for future project implementation in the Province". Besides, securing initiative of Iranian side including the residents, feasibility and sustainability on project scale and implementation system were important notes on selection and implementation of the PP.

7.1.2 Selection of the Pilot Projects

Based on the objectives and discussion with organizations concerned, activities in the MP were comprehensively considered from various points of view as listed below.

(a) Importance on poverty reduction

(b) Feasibility and sustainability after the Study

(c) Possibility of spread to other areas in the Province

(d) Possibility to obtain the verification results (outcomes) within the PP period

Validity and effectiveness to be verified, expected outcomes, scale and duplications of activities were confirmed and the contents of the activities were re-considered. As a result, below 11 activities which were necessary for formulation of the MP were selected to examine in the PP duration.

Table 7.1 The Master Plan and the Activities of Pilot Projects

MP	Main Activities of PPs
Program for crop and livestock productivity improvement	
Project for irrigation system improvement	Verification of water saving efficiency
Project for qanats conservation	
Project for net house	Net house
Project for vegetable cultivation for self-consumption in winter	Vinyl tunnel, sprout cultivation
Project for forage cultivation	Production of forage
Project for small scale chicken rearing	Production of livestock for self-consumption
Program for distribution and marketing improvement	
Project for capacity development in marketing	Participatory market survey
Project for diversification of marketing channel of barberry	Trial making of commodities
Project for promotion of small scale processing	Sales promotion activities
Project for management of a direct sales shop	
Program for income source diversification and livelihood improvement	
Project for women's economic activity support through rural women's fund	Seminar for organization
Project for women's activity expansion support through rural women's mother fund	Usage and reservation of women's fund
Project for women's economic activity support through rural women cooperative	Technical seminars (sewing, mushroom, etc.)

Considering target groups of above selected activities and efficient implementation of the PPs, the activities were arranged based on programs of the MP, and PPs were formulated.

Table 7.2 Pilot Projects

Name of pilot project	Target	Main activities
1. Pilot Project for improvement of agriculture and livestock techniques	Farmers	Verification of water saving efficiency
		Improvement of vegetable cultivation techniques
		Improvement of forage production
		Extension of small livestock rearing
2. Pilot Project of distribution and marketing (fruits)	Farmers	Participatory market survey
		Trial making of commodities
		Seminar for sale promotion activities
		Seminar for fruit cultivation techniques
3. Pilot Project of income source diversification and livelihood improvement activities	Women in rural area	Seminar for organization
		Extension of mushroom cultivation
		Extension of handicraft production activity
		Extension of packaging techniques for agricultural products

7.1.3 Implementation Plan of the Pilot Projects

Regarding implementation of the PPs, management and monitoring were done in collaboration with JICA Study team and C/Ps and the implementation methods of the PPs, techniques, knowledge and information were shared among the Study team and C/Ps to develop capacity of JAO staff including C/Ps. The implementation plans of PPs are shown below.

Table 7.3 Main Activities of the Pilot Projects

Pilot project	The second year Sep. 2011 – Jan. 2012	The third year Jun. 2012 – Oct. 2012
Agriculture and livestock techniques	· Selection of the participants · Kickoff workshop · Starting sprout cultivation, tunnel cultivation, forage cultivation, chicken rearing · Preparation of irrigation trial	· Verification of water saving efficiency · Increasing vegetable productivity by net houses · Forge production through effective water usage · Extension of small scale chicken rearing · Monitoring and evaluation
Distribution and marketing	· Kickoff workshop · Participatory market survey · Technical seminar for barberry cultivation · Trial making of commodities packaged	· Trial making of commodity samples · Formulating sales strategy · Sales promotion activities · Monitoring and evaluation
Income source diversification and livelihood improvement	· Kickoff workshop · Seminar for group management · Participatory market survey · Technical seminars (sewing, mushroom, beekeeping) · Reserving group's fund	· Seminar for group management · Group leaders training · Exchange trip to advanced women's cooperative · Technical seminars (sewing, mushroom, beekeeping, waving) · Planning and implementation of activities by group's fund

7.2 Implementation and Outcomes of the Pilot Projects

7.2.1 Trial of Water Saving Irrigation

(1) Background and the Objectives

Introduction of water saving irrigation by effective and efficient usage of water resources is necessary to contribute for the improvement of crop productivity in the Study area. Therefore, this trial was implemented as a part of the "Pilot Project for Improvement of Agricultural and Livestock Techniques" with the following objectives.

(a) The irrigation efficiencies of the current irrigation methods (furrow or basin irrigation), and the new water saving irrigation method (drip irrigation) are made clear, and the effectiveness of the water saving irrigation is verified.

(b) The results are fed back to the project for irrigation system improvement in the MP, and the water saving irrigation system suitable for the area is proposed.

(c) The suitable irrigation techniques (water requirement, irrigation interval, etc.) are transferred to the villagers in the area through the C/P by implementation of the trial together with the C/P.

(2) Implementation Schedule

Table 7.4 Implementation Schedule of the Trial of Water Saving Irrigation in 2011

Activities	1390																	
	6			7			8			9			10					
	2011															2012		
	9			10			11			12			1					
1) Selection of the trial field and installation of the facilities																		
2) Monitoring																		

Table 7.5 Implementation Schedule of the Trial of Water Saving Irrigation in 2012

Activities	1391																	
	1			2			3			4			5			6		
	2012																	
	4			5			6			7			8			9		
1) Selection of the trial field and installation of the facilities																		
2) Monitoring																		

(3) Contents and Results of the Activities

1) Selection of the Trial Fields

The trial fields were selected based on the criteria mentioned below.

a) There is a water tank near the fields to temporally store the irrigation water from the qanat.

b) The access to the fields is easy.

c) The owner of field understands the objectives of the trial, and cooperates in the trial.

As a result, the trial fields in Alghor and Felarg were selected in October 2011 and June 2012, respectively. The trial field in Alghor is on a gentle slope with a fruits garden (about 500m^2) of mainly barberry, plum and apricot which are generally not so high. The barberry area is about 50m^2 and the trees are 2 to 3 years old. There is a personal water tank (made of concrete; about 12m^3) adjacent to the field. The irrigation water is taken from the qanat channel once in two weeks, and supplied to the field once in a week. The current irrigation method followed is basin or furrow irrigation.

The trial field in Felarg is located on the northern side (Mehdi Abad) of Felarg on a slightly steep slope. The elevation of the field is higher than that of the qanat of water source. There is a personal water tank (made of concrete; about 8m^3). The irrigation water is conveyed from the qanat pool to the water tank once in twelve days, and is stored in the water tank. The irrigation water is conveyed from the water tank to the field by the pipes, and barberry is irrigated by furrow irrigation method. The trial field is barberry garden of about 700m^2 area, and the barberry is 3 to 4 years old.

2) Installation of the Trial Facilities

The facilities were installed in the trial field in Alghor in October 2011. The drip irrigation system was adapted for the trial, and the irrigation water was conveyed from the water source by pumping from the existing water tank, since the topography was flat with no head. The drip emitters consisted of 2 types; bubbler (10ℓ/hr x 1) and dropper (4ℓ/hr x 2).

The facilities were installed in the trial field in Felarg (Mehdi Abad) in June 2012. The trial system adapted was that the irrigation water was conveyed from the qanat to the water tank by pump, and was irrigated by the drip irrigation system using gravity pressure. Although elevation of the existing water tank was 7m higher than the trial field, a new water tank (made of iron, 6m^3) was installed at a higher place for the trial system, since the hydraulic head of the existing water tank was not enough for the drip irrigation (minimum 10m). The deference of elevation between the trial field and the new tank was kept at about 15m including water pressure to prevent the clogging of a filter. The emitters consisted of 4 types of droppers (4ℓ/hr), and the performance of the droppers was compared. In addition, the pressure gauges were installed to confirm the minimum required pressure for the drip irrigation.

3) Monitoring

The following items were monitored in both the trial fields. The monitoring was done by the Study team and the C/P in cooperation with the owners of the trial fields.

- Quantity of irrigation water
- Time of irrigation
- Irrigation interval
- Water pressure in the pipe
- Soil moisture
- Quantity of the fuel used for the pump

4) Results of the Trial

i) Quantity of the Irrigation Water and Irrigation Interval

The irrigation interval in the trial field in Alghor was fixed as 7 days, which was the same as the current irrigation interval. The current quantity of irrigation water applied at one time by the basin/furrow irrigation was estimated at 24mm, and this quantity was equivalent to 3.4mm/day. On the other hand, the quantity of irrigation water by the drip irrigation was 10 – 11mm at one time (1.4 – 1.6mm/day) in July, and 8.0mm at one time (1.1mm/day) in August for the whole field including barberry and other kinds of fruits trees. In case of only for barberry, the quantity

of irrigation water increased a little, and it was 20mm at one time (2.8mm/day) in July, and 12 – 20mm at one time (1.7 – 2.8mm/day) in August. The quantity of irrigation water applied was fixed by the owner of trial field.

Simultaneously, the tensiometers were installed to consider the suitability of quantity of irrigation water. The soil moisture contents were estimated from the values of pF. The values of pF periodically measured in the irrigation period were 1.5 – 2.7 near the barberry tree and 2.2 – 2.8 near the apricot tree, and it was decided that the values were in the range not to affect the growth of trees. In general, the soil texture of the field in Alghor is sandy clay loam (SCL) and the depletion of moisture content for normal growth was estimated at about pF3.0.

In the trial field in Mehdi Abad, the irrigation interval was changed from the usual 12 days to 4 days for the trials. The current quantity of irrigation water by furrow irrigation was 35.6mm at one time, and it was equivalent to 3.0mm/day. On the other hand, the quantity of irrigation water by drip irrigation was 1.2mm/day on the average from the middle of June to the begging of October. It was the value for the whole area of the trial field, and it was estimated that this quantity was equivalent to about 4.0mm/day for the actual wetting area by the irrigation (Percentage of wetting area was assumed as 30%). Since the soil of the field was sandy loam, the barberry trees were surrounded by mound with diameter of 1m and irrigated by the emitters to increase irrigation efficiency.

Similar to the trial fields in Alghor, the tensiometers were installed, and the pF values were measured to understand the soil moisture content. Although the measurement period was short (from the beginning of August to the beginning of October), most of the values were within the range of pF2.7 – 2.8. It was decided that the field was under dry condition, since the quantity of irrigation water at one time of application was little and the soil was sandy. It is said that the depletion of moisture content for normal growth is sometimes lower than pF3.0 in sandy soils, and it was understood that the soil moisture content in this trial was close to such a condition.

ii) Function of the Irrigation Facilities

The discharge pressure of the emitters was enough in the trial field in Alghor, since the pump was used for the drip irrigation system (1.3 – 1.5bar at the farthest end point of the drip tube). Although the large volume bubblers and the standard droppers were used as the emitters, both of them didn't have problems such as clogging. The salinity (EC) of water of qanat water source was about 0.8mS/cm, which was low.

The irrigation system of distribution tank method was tried in the trial field in Mehdi Abad. The elevation of the distribution tank installed was about 15m higher than the trial field, and the discharge pressure for the several emitters (bubblers) was enough. The water pressure at the furthest point of the drip tube was kept at 0.2 – 0.6 bar. Since the irrigation water was not mixed with soil, there was almost no difference of the water pressure between before and after the filter to avoid clogging. The four kinds of bubblers tried were not clogged, and worked normally.

(4) Evaluation and Lessons Learned

1) Evaluation of the Drip Irrigation

The following items were confirmed through trial of drip irrigation in the trial fields in Alghor and Mehdi Abad.

i) Shortening of the Irrigation Interval

The irrigation interval needs to be shortened, since the quantity of irrigation water per one time of application is decreased by the introduction of drip irrigation in comparison with the normal

method. Therefore, the irrigation intervals of 7 days in Alghor and 4 days in Mehdi Abad were tried in this trial. Although the trial period was short and not enough, the water saving irrigation by drip by the irrigation interval of 4 – 7 days could be applied to barberry.

ii) Saving of the Quantity of Irrigation Water

The quantities of irrigation water in this trial were 1.7 – 2.8 mm/day in Alghor and 1.2 mm/day in Mehdi Abad. These quantities mean that the water was saved by 18 – 30% in Alghor, and by 60% in Mehdi Abad in comparison with the current basin/furrow irrigation. However, the quantity of irrigation water in Mehdi Abad might be too little. It is clear that water saving is possible by the drip irrigation and the water saving efficiency can be increased more by closely irrigating fruit trees in spots. This practice leads to possibility of the enlargement of the cultivation area of barberry, which is a specialty product of the area.

iii) Hydraulic Head of the Drip Irrigation

The necessary hydraulic head for the drip irrigation is about 15m in case of small scale irrigation of few hectors area. The emitters used in the trial were several types which could be procured in the province. In addition, low pressure droppers (0.5bar) are also sold, and the drip irrigation is possible if the low pressure droppers are used, even when the hydraulic head is lower than 10m. Therefore, there are considerably suitable areas in the Study area for the gravity pressure irrigation which uses the difference of elevation for the drip irrigation under the topographically sloped conditions.

iv) Operability of the Irrigation System

The current basin/furrow irrigation method takes time for the distribution of the water. Especially, only one person manages the water in the most cases. In case of the drip irrigation system in the trial, the water was distributed only by the operation of valves, which was easier to operate and the management is very easy. (Both of the owners of the trial fields said the same impressions.)

2) Lessons Learned

The quantities of irrigation water in the trial were decided by the owners of the trial fields. A special consideration was made on the quantity of water, since there is a limitation of water intake (water quantity entitled) from the qanats. As a result, the water quantity was slightly little, and there is some doubt whether the quantity of irrigation water was suitable for the fruits (barberry). This was the case for the trial field in Mehdi Abad. Although the trial period (from June to October) was 5 months and shorter, it can be pointed out that implementation of trials based on trial and error is necessary in consideration of the water requirement.

In case of trial field in Alghor, the irrigation system of pump and direct-conveyance method needed to be installed, since the field was flat. The Study area is generally sloping and the topography which has much difference of elevation is the characteristic of the Study area. The irrigation system cannot be recommended from the economical aspects if the running costs such as fuel cost for the pump are considered. Although the drip irrigation system using only the gravity pressure from the water source to the field needed to be examined, it could not be implemented because of time, and land condition (complicated field condition mixing with other owners' fields), etc.

7.2.2 Pilot Project for Improvement of Agriculture and Livestock Techniques

(1) Background and Objectives

The pilot project was implemented on a small scale based on the development strategies which were formulated for the crop and livestock production improvement. The main objective of the

implementation of the pilot project is to examine the possibility that they can achieve the development vision of the Master Plan. The pilot project implemented in 2011 and 2012 are as follows:

(a) Vegetable cultivation: Vegetable cultivation in net houses in summer (2012), Vegetable cultivation for self-consumption in winter (2011), Sprout cultivation (2011)

(b) Livestock: Chicken rearing (2011, 2012), Forage crop cultivation (2011, 2012)

The outline of the implementation is shown in the figure below.

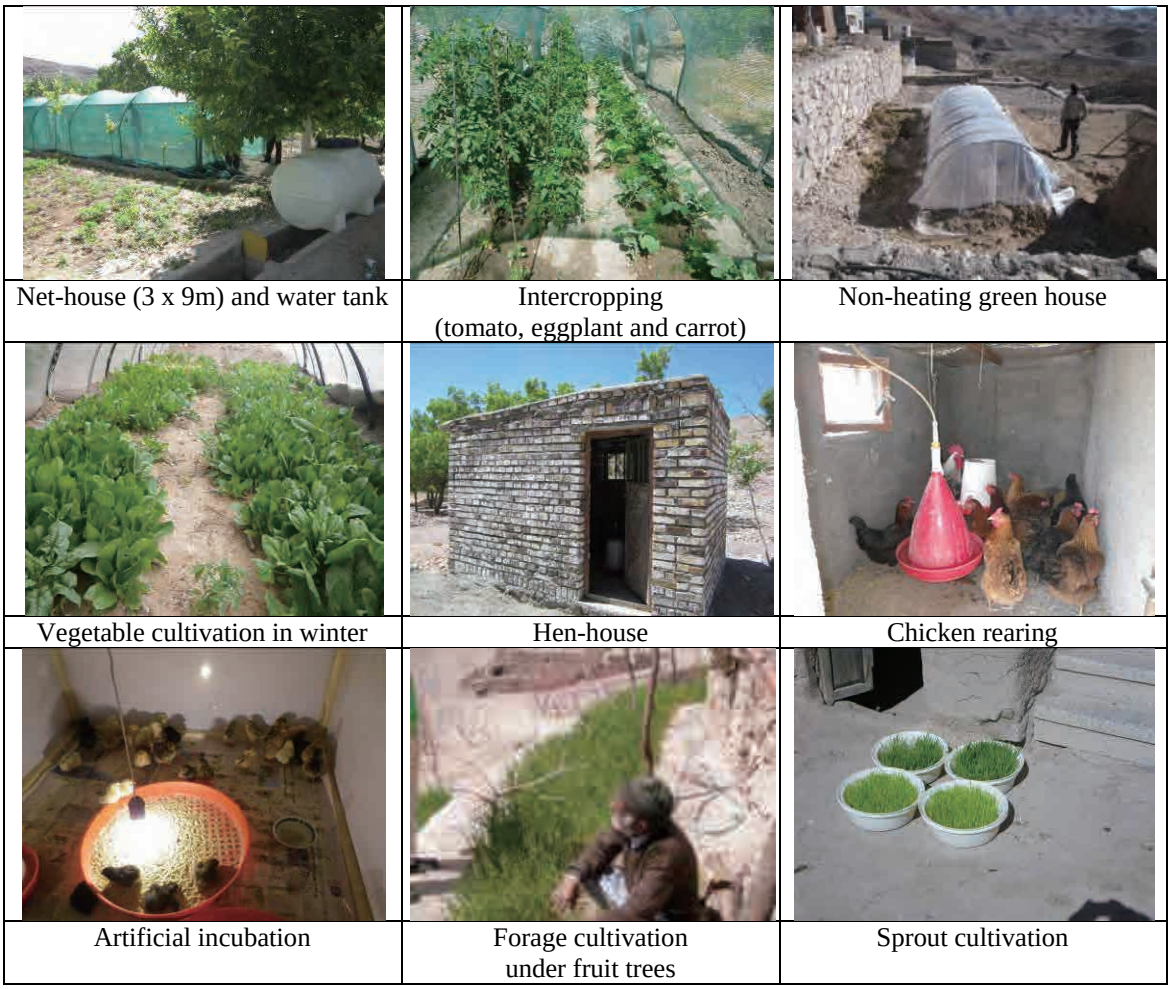


Fig. 7.1 Outline of the Pilot Project

1) Vegetable Cultivation

According to the agricultural statistics, the yield of vegetables in South Khorassan province is much lower than that of the national average. According to the results of the baseline survey and the field survey implemented by JICA study team, the annual crop yields of vegetables and grains are far below than the average of the province. In the face of this situation, possibility of more stable vegetable production in the Study area through improvement of cultivation techniques was verified.

i) Project of Vegetable Cultivation in Summer

Possibility of reduction of food expenditure and improvement of livelihood by improvement of productivity of vegetables and stable production of food for self-consumption was verified through introducing the following techniques.

- Shortening of irrigation interval,
- Improved irrigation method,
- Net-house
- Improved basic cultivation techniques.
- Intercropping system

ii) Project of Vegetable Cultivation in Winter

Possibility of the following items was verified through introducing vegetable cultivation in vinyl tunnels and sprout cultivation

- improvement of food habits by extension of vegetable cultivation for self-consumption

2) Livestock Rearing

Livestock rearing has played an important role in the household income sources and supplied protein food for self-consumption in the Study area. However, the number of animals has been decreased due to deterioration of natural pasture land caused by the decrease of rainfall. To improve this situation, possibility of the following items was verified.

- Increase of production of superior protein food for self-consumption through extension of small scale chicken rearing
- Extension of forage crop cultivation

i) Project of Small Scale Chicken Rearing

Feasibility of the following items was verified in this project.

a) The small scale chicken rearing is extended to produce protein food for self-consumption and the surplus is sold to diversify income sources.

b) Incubators are introduced to increase efficiency of chicken propagation for the purpose of extending chicken rearing to the villagers and enhancing the productivity.

c) The sprout cultivation of bean and barely, and forage crop cultivation in irrigated areas are introduced to extend feed production for the chicken.

ii) Project of Forage Crop Cultivation

Possibility of recovering natural pasture was verified by sowing natural pasture seed around the villages to produce feed for the livestock.

Possibility of extension of forage crop cultivation by using the area under perennial crops was verified to produce feed for the livestock with effective usage of the irrigation water.

(2) Implementation Schedule

The implementation schedule of the pilot project by year is shown as follows.

1) Pilot Project Implemented in 2011

The main activities implemented in 2011 are shown in the table below.

Table 7.6 Implementation Schedule of Pilot Project for Improvement of Agriculture and Livestock Techniques in 2011

	Vegetable cultivation in winter	Chicken rearing	Sprout cultivation	Forage crop cultivation
Beginning of October	Kick-off workshop			
Middle of October	-	Distribution of the materials	Starting of the cultivation	Starting of the seeding
End of October	-	Construction of hen-house	-	-
End of November	Construction of 4 vinyl tunnels Starting of cultivation	Distribution of chicken	-	-
Beginning of January	Construction of two vinyl tunnels	-	-	Seeding pasture seeds
Beginning of March	Starting of harvesting	Starting of laying-eggs	-	-

2) Pilot Projects Implemented in 2012

The main activities were implemented as shown in the table below.

Table 7.7 Implementation Schedule of Pilot Project for Improvement of Agriculture and Livestock Techniques in 2012

	Vegetable cultivation	Chicken rearing
Middle of May	Kick-off workshop	
End of May	Starting of net-house construction	Starting of hen-house construction
Beginning of June	Transplantation of nursery	Distribution of chicken
Middle of June	Re-transplantation of nursery	Staring of laying-eggs
Beginning of July	Seeding for intercropping (Carrot etc.)	-
Middle of July	Implementation of technical seminar and mutual exchange meeting of villagers	
Beginning of August	Implementation of technical seminar	
Middle of August	Implementation of evaluation seminar	
End of August	Starting of harvesting	-

(3) Contents and Results of the Activities

The results of the activities are summarized as follows.

1) Summary of the Results in 2011

The number of participants by project and village is shown in the table below. The Study team asked each village head to select the candidates of the project from the villagers who live in the village, and have land and irrigation water to grow vegetables. The Study team selected the participants after confirming their qualification to join the project.

Table 7.8 Participants of Pilot Project for Improvement of Agriculture and Livestock Techniques by Village in 2011

Pilot project	Vegetable cultivation in winter	Chicken rearing	Sprout cultivation
Number of participants by village	Alghor (2) Mafriz (2) Sang Abad (2) Bozghong (2)	Alghor (2) Mafriz (2) Sang Abad (4) Bozghong (2)	Alghor (1) Mafriz (2) Sang Abad (4) Bozghong (3)
Total	8	10	10

In regard to the pilot projects of 2011, questionnaire and reconnaissance surveys were conducted in May, 2012. The main findings of the survey are summarized in the following table.

Table 7.9 Results of the Pilot Project for Improvement of Agriculture and Livestock Techniques in 2011

Pilot project	Results
Cultivation in vinyl tunnels	The crops were cultivated for two times on an average by May, 2012. The main crops cultivated were lettuce and spinach.
Chicken rearing	As of May, 2012, 68% of chicken survived and the monthly average egg production was 49 per household in March and April, 76 in May, and 99 in June. All the eggs were used for self-consumption.
Sprout cultivation	Sprout was cultivated for 5.5 times on an average. About half of them were consumed for food and the others were used as feed for chicken. 70% of all the participants answered that it was possible to use sprouts as a substitution of vegetables in winter.
Forage crop production	Barely was seeded in fruit-growing area and the products were used for feed.
Natural pasture	Grass seeds were sown in Sang Abad and Alghor. Although the germination was confirmed, the germination rate was very low, because there was almost no rain in the area during that period.

2) Summary of the Results in 2012

The selection of participants was carried out in the same way as 2011. The participants by village are shown in the table below.

Table 7.10 Participants of Pilot Project for Improvement of Agriculture and Livestock Techniques by Village in 2012

Pilot project	Vegetable cultivation	Chicken rearing
Number of participants by village	Alghor (3) Kooshk (2)	Alghor (4) Borgeziad (4) Kooshk (2)
Total	5	10

The results summarized in the following table include the data collected on the pilot project implemented in 2012, results of monthly monitoring, and the results of questionnaire survey conducted in August, and the field survey conducted by the JICA study team.

Table 7.11 Results of Pilot Projects for Improvement of Agriculture and Livestock Techniques in 2012

Pilot project	Results
Vegetables cultivation in net houses	- The transplanting of tomato and eggplant was delayed by 1.5 months of the usual cultivation time, and many of the nurseries died soon. After that many kinds of varieties of tomato were cultivated by mixing with local varieties, since it was too late to collect the same variety. - Tomato and eggplant could be harvested by the middle of October and the yield of tomato was very high. - The quantity of irrigation water of the current cultivation was 1.6mm per day, and it was 0.8mm per day for the pilot project. The results show that the water saving rate of the pilot project was 50 % lower than that of the current cultivation[1]. - As a result of questionnaire survey, all the participants answered that the cultivation method of the pilot project required less quantity of water and more yield could be attained compared to the existing method of cultivation. - The temperature in the net house was 6°C lower than the outside, and the soil temperature was 5.5°C lower. - Carrot and radish could germinate in summer due to the reduction of temperature. It is clear that carrot and a radish are possible to grow between tomato and egg-plant from July and August because of the reduction of temperature, if they are cultivated from April. - Carrot can be harvested during October and November. The products have potential to be sold at a high price in the market, because there is no harvesting of vegetables around the area during the period. The intercropping is promising as a new income source.
Chicken rearing	- As of end of August, 8 chickens out of 40 died of disease in Alghor, and there was a survival rate of 100% of the 60 chickens distributed to the other villages. - A half of the produced eggs were consumed by the households of the participants and about the 20% were sold in the village. The selling price ranged was from 2,000 to 2,500 Rls per egg. - The remaining eggs were presented to the other villagers and the participants received other kinds of food items from the villagers in return. It can be said that the project contributed to the nutrition-improvement for not only the participants, but also the villagers. - 33 chicks hatched in Kooshk in the middle of August, and 32 chicks hatched in Alghor in the beginning of September. The participants in Borgeziad tried to breed with an incubator in July and August, but the eggs did not hatch, because most of them were unfertilized eggs. - 80% of the participants of the project answered that the sprout cultivation was effective for the feed production of chicken rearing. - The average sprout cultivation was 4.6 baskets of barely, and 4.4 baskets of green beans per participant. In the questionnaire survey, they responded that the production quantity was not sufficient. - 80% of the participants wanted to continue the sprout cultivation, because it is effective for feed shortage in winter and they can grow for the short period. - 60% of the participants answered that the forage crop cultivation was effective for feed production for chicken and they are interested to continue it. Irrigation water shortage was mentioned as the reason for not being interested to grow the forage crops.

3) Results of Monitoring

i) Vegetable Cultivation

The results of monitoring until the middle of October when the field survey was completed are

[1] Quantity of current irrigation water was calculated based on observation in the field and 12 days irrigation interval. Quantity of irrigation water in the PP was based on an actual measurement.

summarized as follows. Although most of the tomato was harvested, the others such as carrot and eggplant etc. were not harvested, because they did not ripen by the project period.

Tomato is widely cultivated in South Khorassan province, and the yield of the pilot project was recorded at about 2.4 times of the average of the province. There is some possibility to attain more yields by improving the following conditions.

a) Most of the crops were affected by the low temperature before maturing in September and October, because the start of cultivation was delayed to June.

b) Since many varieties of tomato such as mini and local varieties were re-transplanted in the area, the yield was affected.

c) Yield of Participant E mentioned below was extremely low, because he was not supplied with the nurseries, and cultivated only the local variety.

Table 7.12 Yield of Tomato and Eggplant*

Unit: t/ha

	Alghor			Kooshk		Average Yield	South Khorassan
Participant	**A**	**B**	**C**	**D**	**E**		
Tomato	73.5	19.3	39.7	34.0	3.5	32.4	13.6
Eggplant	0.9	1.5	2.2	1.9	0.2	1.3	-

*: the average yields per ha were calculated based on the harvested amount and remaining number of fruits as of the middle of October, and the plant density per ha, tomato 24,000 per ha and eggplant 9,000 per ha,

ii) Chicken Rearing

The results of the monitoring of chicken rearing are summarized in the table below. Although many chickens died in Alghor just after the starting of the project, other chickens grew well and laid eggs after that. Egg production fluctuated by month, and half of them were used for self-consumption, about 15% were sold, and about 35% were used as gifts and for hatching.

Table 7.13 Results of Monitoring of Chicken Rearing

	Kooshk			Alghor			Borgeziad			Total		
No. of participants	**2**			**4**			**4**			**10**		
Month	**6**	**7**	**8**	**6**	**7**	**8***	**6**	**7**	**8**	**6**	**7**	**8**
No. of dead chicken	0	0	0	4	4	0	0	0	0	4	4	0
No. of egg production	142	281	234	265	323	223	237	415	369	644	1019	826
No. for Self-consumption	45	93	121	182	235	221	89	99	169	316	427	511
No. of sold eggs	20	25	39	10	10	10	115	45	116	145	80	165
Others	77	163	174	85	88	2	33	271	84	193	522	160
No of egg production /HH	71	141	117	66	81	74	59	104	92	64	102	83
% of self-consumption	32	33	52	70	73	99	38	24	46	49	42	62
% of sold eggs	14	9	17	4	3	4	49	11	31	23	8	20
% of other	54	58	31	30	27	1	13	65	23	30	51	19

*: 3 participants

(4) Evaluation and Lessons Learned

1) Evaluation

The following aspects of the pilot project were evaluated by all the participants.

- The contents of the project,
- Effect on the livelihood improvement,
- Quantity of the production in the food consumed,
- Reduction effect for food expenditure,

- Intention to continue the activity.

The results by year are summarized as shown in the following Tables.

i) Evaluation of 2011

Table 7.14 Results of Evaluation in 2011

Unit: %

Project	Evaluation of the project 1)			Effect to living 2)			Quantity of the product 3)			Decrease in food expense 4)			Intension of continuation 5)		
	G	Av	NG	Yes	No	6)	Yes	No	6)	Yes	No	6)	Yes	No	6)
Cultivation in vinyl tunnel	60	20	20	100	0	0	60	40	0	40	60	0	40	0	60
Chicken rearing	78	11	11	100	0	0	56	33	11	22	56	22	100	0	0
Sprout cultivation*	100	0	0	83	17	0	67	33	0	40	60	0	75	20	0

*: Including forage crop production

1) G: good; Av: average; NG: not good
2) If the project is effective for living and nutrition improvement in winter.
3) If quantity of the product is enough or not.
4) If the expenses to buy food is decreased by the product.
5) If you want to continue the project or not.
6) Unclear.

a) Many of the participants highly evaluated the contents of the project. Of the three projects, the vegetable cultivation for self-consumption in winter was evaluated as comparatively low, because crops could not be grown in some vinyl tunnels because of the damaging of vinyl covering the tunnels, and the start was delayed.

b) As for the improvement of the living conditions, the participants evaluated that the three projects were effective to improve the living conditions. Especially, all the participants of the vegetable cultivation in winter and the chicken rearing answered that they were effective.

c) As for the quantity of production, more than half of the participants answered that they were appropriate. However, the participants who had many family members answered that the quantity was insufficient.

d) As for the food expenditure, many participants answered that there was no effect to food expenditure because they did not buy vegetables in winter.

e) All the participants of chicken rearing answered that they wanted to continue the activity. As for cultivation in vinyl tunnels (vegetable cultivation), participants who were interested to continue were only 40% because of the low quality of tunnel materials.

ii) Evaluation of 2012

Table 7.15 Results of Questionnaire Survey

Unit: %

Project	Evaluation of the project 1)			Effect to living 2)			Quantity of the product 3)			Decrease in food expense 4)			Intension of continuation 5)		
	G	Av	NG	Yes	No	6)	Yes	No	6)	Yes	No	6)	Yes	No	6)
Net house	100	0	0	80	0	20	60	20	20	80	20	0	100	0	0
Chicken rearing	80	10	10	100	0	0	100	0	0	90	10	0	90	10	0

1) G: Good, Av: Average, NG: No good.
2) If the project is effective to improve their livelihood.
3) If quantity of the product is enough or not for their family.
4) If expenses to buy food is decreased by the product.
5) If you want to continue the project or not.
6) Unclear.

a) The participants of the two projects evaluated that the contents of the projects were good and

the effects for livelihood improvement were high.

b) All the participants of chicken rearing and 60% of the vegetable cultivation answered that the production was sufficient for self-consumption. Some of the eggs were sold in the village.

c) 90% of the participants of the chicken rearing and 80% of the vegetable cultivation answered that the household food expenditure was decreased by 4% and 8% on the average, respectively.

d) All of the participants of vegetable cultivation and 90% of the chicken rearing answered that they wanted to continue the activities. The reason for not being interested to continue the chicken rearing was that the activity was economically not feasible because the feed was very expensive. On the other hand, the reasons to continue were as follows: 1) the vegetable cultivation using the net house can produce a high yield; and 2) the participants of chicken rearing can work in the village and earn income.

2) Lessons Learned

i) Vegetable Cultivation

a) It is clear that the vegetable cultivation using the net house is effective to increase the productivity dramatically compared to the current condition. However, the net house needs some construction cost. To disseminate the technique, it is necessary that the equipment should be simple and cheaper.

b) The main causes of the high productivity are not only the prevention of bird damage and shortening of irrigation interval, but also the improvement of the three phases distribution of soil and decreasing temperature in the net house. Therefore, these factors should be well considered to improve the net house facility.

c) Considering the result of the yield and the growth situation of the pilot project, it is possible to attain a much higher yield than that of the pilot project by introducing high yield variety, intercropping and appropriate cultivation period. Therefore, it is recommended that the examination of the suitable cultivation period and the intercropping system should be continued in order to increase the productivity and enhance the possibility as a new income source.

ii) Chicken Rearing

a) The hatching rate in Borgeziad was very low, because most of the eggs produced in Borgeziad were unfertilized. It is recommended that rate of fertilized egg should be enhanced to expand chicken rearing.

b) To enhance the rate of fertilized egg, it is important to give higher quality feed for chicken. Therefore, it is recommended that participants should be organized to get the quality feed cheaply.

c) It is possible to sell the eggs produced by local chicken in town by establishing the marketing channel, because the eggs produced by the local chicken are very popular. It is recommended that the producer should be organized to collect many eggs for selling in the town.

iii) Sprout cultivation

a) To extend the sprout cultivation, it is recommended that the crops of sprout cultivation are cultivated in fields during summer to produce the seeds, and the seeds are used for the sprout cultivation.

7.2.3 Pilot Project of Distribution and Marketing

(1) Background and Objectives

Although dried barberry and jujube are produced and sold as specialty products in the Study area, these agricultural products are mainly sold to brokers coming to the villages and the farmers negotiate and sell them individually. The agricultural products are sold to the brokers in bulk or in big box, after that the products are cleaned, transported to cities and sold to retail shops by the brokers. According to interview survey with famers, low sales prices of the agricultural products are one of major problems in agriculture. It is assumed that limited marketing channels, packaging style and quality are main reasons of the low prices.

Under this situation, famers in Felarg in the Study area were targets of this PP and considering items below through technical training was the aim of the PP.

(a) Measures regarding increase of productivities and income by diversifying marketing channels of major fruits such as barberry through improvement of production techniques, adding value and marketing activities

(2) Implementation Schedule

Table 7.16 Implementation Schedule of PP of Distribution and Marketing (2011)

Activities	1390																	
	6			7			8			9			10					
	2011															2012		
	Sep.			Oct.			Nov.			Dec.			Jan.					
1) Meeting for opening explanation			■															
2) Seminar for market survey				■														
3) Market survey 1					■													
4) Meeting for consideration of commodity and sales					■													
5) Improvement of barberry production																		
5-1) Seminar for cultivation techniques						■			■		■							
5-2) Improvement of drying method				■	■	■	■	■	■									
6) Trial of making sample commodities						■				■	■		■	■				

Table 7.17 Implementation Schedule of PP of Distribution and Marketing (2012)

Activities	1391																	
	3			4			5			6			7					
	2012																	
	Jun.			Jul.			Aug.			Sep.			Oct.					
7) Meeting for sales promotion	■	■																
8) Training for processing and sales		■	■								■							
9) Market survey 2			■	■	■													
10) Trial of sales			■						■		■	■						
11) Meeting for improvement of the commodities and sales				■									■					
12) Meeting for reviewing the activities													■					
13) Seminar for barberry production			■															

(3) Contents and Results of the Activities

The activities below were implemented with the participants.

1) Meeting for Opening Explanation

Outline of the Study, present situation of production and sales of barberry etc., the objectives and the activities of this PP were explained to about 50 farmers in Felarg in September 2011. After discussion on the explanation, the will of farmers to participate in this PP was confirmed and 27 people had participated in this PP. Eight people in the 27 participants were women and they selected one representative among them.

2) Seminar for Market Survey

The seminar for market survey was held in Felarg in October 2011 and about 15 people participated in the seminar. In this seminar, objectives and methods of market survey which would be held later were explained. Therefore, it was explained that meaning of the market survey, importance of understanding commodities which customers demand and that can be sold at higher price and improvement of commodities and sales based on the understanding. In addition, survey method and question items (expected quality, price, major consumers, packages, etc.) were explained to implement market survey in retail shops of dried fruits in Birjand.

3) Market Survey 1

This market survey aimed at understanding the retail shops' needs, price, etc. for the participants to produce and sell dried fruits such as barberry and jujube. Three participants of the seminar above visited several retail shops in Birjand city and interviewed in October 2011. The participants collected information through discussion with the retail shop keepers, observation of packaged commodities sold and confirmation of the prices.

4) Meeting for Consideration of Commodity and Sales Method

The participants shared the results of market survey and discussed future production and sales method in October 2011. The main contents discussed were below.

a) Color, size and sweetness of the products which the retail shops required may be coped with by improvement of harvesting time and drying methods. Harvesting before proper time creates problems on the taste and size and drying under sunlight creates problems on the color and preservation period. The participants were interested in improving cultivation methods such as fertilizer application and pruning.

b) Regarding sales methods, the participants understood that the selling price to brokers was lower than the selling price to retail shops. However, famers can sell barberry to brokers before drying them, since some brokers can buy fresh barberry and sell them to retail shops after drying them by themselves. Therefore, farmers who need cash earlier must sell to brokers. It is important to select good brokers in case of selling barberry to brokers including selling dried one. On the other hand, it is difficult to sell packaged barberry and jujube to retail shops in Birjand city, since the retail shops want to buy barberry and jujube in bulk. However, there is possibility to directly sell packaged barberry and jujube to consumers in the Wednesday market and to retail shops in other provinces. In case of mulberry and plum, there is possibility to sell packaged one to retail shops in Birjand city. Therefore, sales method of packaged mulberry and plum in Birjand city is continuously considered.

5) Improvement of Barberry Production

Improvement of Barberry Cultivation Techniques

An expert of JAO explained barberry cultivation techniques to the participants in October 2011. After the explanation, videos of barberry cultivation that were made by MOJA were shown to the participants. Fertilizer application (November 2011) and pruning method (December 2011) of barberry were demonstrated in a barberry field in Felarg.

Improvement of Drying Method of Barberry

The participants visited a drying room of barberry of an advanced farmer in Felarg and discussed improvement of drying barberry in October 2011. The advanced farmer established shelves in a room and dried barberry. It was shared that the drying method was good for improving quality of barberry.

6) Trial of Making Sample Commodities

The participants recognized importance of package through observation of the several package styles in the market survey. Therefore, selection of package materials and trial of packaging were stared in October 2011. At first, prepared several kinds of plastic box and labels of the rural cooperative were shown to the participants. Packaging method was demonstrated by using these materials and capacities of each box were measured.

After the first demonstration, the participants tried to acquire the packaging method of agricultural products through using several kinds of agricultural products and packaging materials in several times.

7) Meeting for Sales Promotion

More detailed activities for future sales promotion were discussed in June 2012 since the participants already had experiences of elementary activities regarding marketing such as understanding of market needs, packaging method, etc. Before the discussing, the participants collected information and opinions regarding quality, sales method, sales targets, etc. from local brokers to get ideas for improvement of commodities and sales methods.

Dried barberry, dried jujube and herbs were targeted as main commodities to be sold in consideration with results of activities performed and opinions of the brokers. In addition, lavashak of barberry and jujube were targeted as processed commodities to be sold. It was discussed that several packaging styles of each commodity would be made and the commodities would be sold to the sales targets. In addition, it was discussed that the participants would try selling the commodities mainly in Wednesday market in Birjand province and in open markets and retail shops in other provinces.

8) Seminar on Processing and Sales

As a result of the meeting for sales promotion, production and sales of lavashak were newly taken up as processed commodities in addition to simply packaged commodities. Therefore, the seminars for production and packaging of lavashak of barberry and jujube, simply packaging method for other commodities and method of sales trial was given to the participants in June and September 2012. As the results, items below were made as samples. Through the seminars, the participants began to become independence from technical assistance of the PP since the participants could make the lavashak and pack the commodities.

Table 7.18 Commodities and the Package Form Made in the Trial

Commodities	Package Form
Barberry lavashak	50 g sheet, 140 g package
Jujube lavashak	50 g sheet, 140 g package
Dried barberry	100 g box, 500 g box, 250 g package, 500 g package, 1 kg package
Dried jujube	100 g box, 500 g box, 250 g package, 500 g package, 1 kg package
Almond	500 g package, 1 kg package
Herbs	30 g bag

Fig. 7.2 Commodities Made

9) Market Survey 2

The participants took the samples simply packaged to retail shops in Birjand city, Yazd city and Zahedan city in June and July 2012. And they collected information on commodities demanded and opinions and buying intension on the commodities. The major results clarified in the market survey are blow.

i) Evaluation of the Commodities

Quality of the barberry in the Study area was evaluated highly in all retail shops. However, the jujube was evaluated that the size was smaller than one from other areas. Major factors to decide the quality of barberry were color, size, sweetness and softness. In case of jujube, size and softness were important for the quality. Little foreign matters and hygienic were also factors to decide quality of the commodities.

ii) Sales of the Simply Packaged Commodities to Retail Shops

Big scale retail shops which were famous and specializing in dried fruits and nuts didn't have high wills to buy the simply packaged barberry and jujube. Therefore, the possibility to sell the commodities the retail shops was low. On the other hand, some groceries and small scale shops specializing in dried fruits and nuts evaluated the simply packaged commodities highly. It showed that there was possibility to sell the commodities at a few quantities (5 to 10 packages in a shop).

However, the selling prices per weight of the simply packaged commodities were almost same as that selling in weight in retail shops in Birjand city. Commercially packaged barberry is sold in souvenir shops in Teheran. The price per weight of the commercially packaged barberry (about 200,000 Rls/kg) is higher than that selling in weight (about 140,000 Rls/kg). The quality of design and package materials is too high for farmers to produce easily. It shows that very high quality of the package is required for souvenirs and gifts in areas of wealth residents to sell commodities added value by packaging. Therefore, it is difficult to increase value-added by

simple package in case of sales to retail shops in Birjand city.

On the other hand, most retail shops wanted to buy in bulk. In case of sales to retail shops, selling in bulk is more effective, since selling quantity at a time is more (30 to 50 kg).

iii) Sales of Processed Commodities to Retail Shops

There were the retail shops which wanted to buy lavashak made from jujube and barberry in the seminars in Birjand city. However, expected price of the retail shops was not shown. On the other hand, demand for the lavashak in Yazd city and Zahedan city may be lower since there were few retail shops which wanted to buy the lavashak.

iv) Sales to Outside of South Khorassan Province

The most retail shops wanted to buy the agricultural products in bulk in both of Yazd city and Zahedan city where the market survey was conducted. Therefore, demand for the agricultural products was expected in sales in bulk. However, their expected buying prices were not shown in the survey and they were not clear. In addition, jujube was not popular in Yazd city and the demand might be low. On the other hand, demand for the simply packaged commodities was expected in open markets as same as Birjand city although the demand of the retail shops was very low.

10) Trial Sales

i) Trail Sales in the Wednesday Market

The lavashak and simply packaged agricultural commodities were sold in the Wednesday market in Birjand city as trial sales in June and September 2012. In addition to sample commodities produced in the seminars, commodities which the participants made by themselves were sold. As the results, the participants recognized that they could sell their commodities directly to consumers by themselves through the experience of selling several commodities. The selling prices of simply packaged commodities and processed commodities (lavashak) were almost same as retail prices in shops. Therefore, it showed that the simply packaged commodities were effective when the farmers had sold their products directly to consumers in the Wednesday market. The results of sales are shown below.

Table 7.19 Results of the Sales in the Wednesday Market

	Items	Quantity	Unit Price (Rls)	Total (Rls)
First time (total of three persons)	Simply packaged dried barberry (500 g/box)	5	60,000	300,000
	Simply packaged dried jujube (500 g/box)	15	25,000	375,000
	Simply packaged jujube powder(250 g/bag)	11	15,000	165,000
	Barberry lavashak (140 g/package)	11	10,000	110,000
	Jujube lavashak (140 g/package)	17	10,000	170,000
	Simply packaged almond (1 kg/package)	4	25,000	100,000
	Simply packaged almond (500 g/package)	2	13,000	26,000
	Simply packaged dried plum (500 g/package)	13	30,000	390,000
	Others (herbs, bread, etc.)			1,092,000
			Total	2,728,000
Second time (one person)	Jujube lavashak (50 g/sheet)	2	5,000	10,000
	Plum lavashak (50 g/sheet)	1	5,000	5,000
	Herb pickles (1 kg/bottle)	3	15,000	45,000
	Others (herbs, etc.)			87,500
			Total	147,500

ii) Trial Sales to Retail Shops

According to the results of market survey, it was expected that the demand of retail shops for simply packaged commodities was low. In addition, it was difficult to prepare and sell the major agricultural products in the PP since the most retail shops wanted to buy new products right after harvesting. However, the participants tried selling the lavashak and the simply packaged almond after harvest in August and September 2012, since experiences of negotiation and sales to the retail shops were necessary to consider diversification of the market channels.

Through the negotiation with the retail shops, simply packaged almond was sold to one retail shop (6 packages, total 126,000Rls). As same as expectation based on the market survey, the demand of retail shops for the simply packaged commodities was low. In addition, the prices which the most retail shops proposed were low and the commodities were not sold since the participants could not accept them. It was one of the causes of low sales quantities including the lavashak. Some retail shops rejected the lavashak since the lavashak didn't have the certification of hygienic standard. Therefore, necessity of the certification of hygienic standard was pointed out.

The prices have seasonal fluctuation and sales motivation of farmers and needs of retail shops change in connection with the seasonal fluctuation of the agricultural products. It is expected that the sales will be promoted in several months after harvesting when the demand will increase and it is good time for selling agricultural products. However, business manner such as communicating with retail shops in advance, confirming commodities and price proposed in advance, making an appointment with decision makers of the retail shops, are also factors to promote the sales and it was expected to improve the business manner.

11) Meeting for Improvement of the Commodities and Sales

The participants discussed good points and necessary improvement of the commodities noticed through the trial making and sales of the commodities in July and October 2012. The major issues discussed in the meeting are below.

a) The simply packaged dried jujube and barberry, herbs were commodities which they could sell in the Wednesday market. However, selling them to retail shops was difficult.

b) Good quality jujube and barberry were used for the lavashak. And the lavashak were made when the prices of jujube and barberry were high. Therefore, the cost of lavashak was high and some lavashak were unsold. Low quality materials should be used for making the lavashak.

c) Transportation is necessary to carry the commodities to the retail shops although transportation cost is not needed to sell products to brokers in villages. Selling to brokers is economical when selling prices to retail shops are low.

12) Meeting for Reviewing the Activities

The participants reviewed the activities of the PP and discussed what they learned, meaningful activities, future activities, etc. in October 2012. The participants recognized that all of they got something new knowledge such as making lavashak, simple packaging, cultivation techniques, etc. They thought that the knowledge had leaded to improvement of the commodities and sales. And also, they thought that improvement of sales and increase of income had been expected by continuing the activities in future. The major opinions are below.

a) Making method of lavashak, simply packaging method, pruning method and controlling method of diseases and insects for barberry were newly learned and they were useful.

b) It is important to effectively use low quality agricultural products through processing

c) The method of explanation of the commodities and sales promotion were learned through selling in the Wednesday market and visiting the retail shops. Observing the explanation of the commodities by the expert to consumers was the good lesson. Although selling simply packaged commodities to retail shops were difficult, selling in bulk is possible. The participants wanted to be trusted by the retail shops by continuing to visit the retail shops in future.

d) Selling in the Wednesday market can be continued in future. When the agricultural products will be available, the participants want to sell them in the Wednesday market.

e) The participants started thinking how they could sell their products at higher prices through the activities of the PP. The activities need to be patiently continued although the participants cannot get the effect in short term.

(4) Evaluation and Lesson Learned

1) Evaluation of Simple Package and the Sales

The participants could understand the simple package methods using existing plastic packages and self-made labels. Number of items packaged could be easily increased since this package method can be widely used and various agricultural products can be packaged by same materials. This simple package method is evaluated as effective since the method has an advantage that the sales to consumers who want to buy small amount is easy and the method can be used for the sales. However, the simple package could not add value to increase the selling price. High quality package materials designed and made by specialized companies are required to increase value-added by package. It is very difficult for farmers to start the activities by paying the cost by them.

Selling simply packaged commodities to retail shops was difficult because of low demand although the participants could sell them directly to consumers in the Wednesday market. Therefore, the effectiveness was calculated on trial.

The sales profits from one kg of barberry and jujube were calculated by subtracting cost of package materials from the selling price in the Wednesday market. As the result, the sales profit increased by 80 % in comparison with sales to brokers. It means that the profits of 50,800 Rls/kg in barberry and 20,800 Rls/kg in jujube increase. These amounts are about 40 % of the selling price in the Wednesday market.

Table 7.20 Trial Calculation of the Sales Profit of Simply Packaged Commodities in the Wednesday Market (per one kg)

	Farm-gate price (1)	Cost of package material (2)	Selling price in the Wednesday market (3)	Sales profit (3) - (2) = (4)	Increased amount of sales profit (4) - (1) = (5)
Dried barberry	65,000	4,200	120,000	115,800	50,800
Dried jujube	25,000	4,200	50,000	45,800	20,800

On the other hand, sales cost such as transportation cost, registration fee for the Wednesday market, rental fee for tables and chairs, etc. are needed in case of selling in the Wednesday market. The cost is about 600,000 Rls in one time. The increased amount of sales profit in one time must be more than the sales cost to increase income by selling in the Wednesday market. Since the increased amount of sales profit is about 40% of the sales amount, the increased amount of sales profit is more than the sales cost and income increases by selling commodities in the Wednesday market if the sale amount at one time would be more than 1,500,000 Rls.

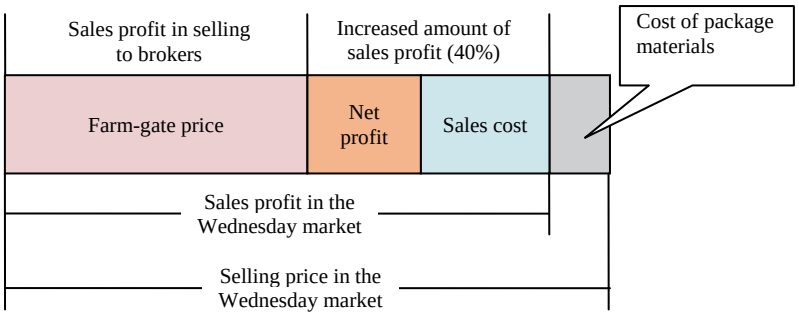


Fig. 7.3 Price Elements Structure of the Simply Packaged Commodities in the Wednesday Market

In case of selling only barberry, 13 kg should be sold at one time, or in case of only jujube, 30 kg should be sold at one time. Therefore, selling 1,500,000 Rls by only one item may be difficult. However, three participants sold about 2,700,000 Rls by selling various commodities such as barberry, jujube, almond, plum, etc. in the first trial sales. If 40% (1,080,000 Rls) of the sales amount would be the increased amount of sales profit, remaining 480,000 Rls after subtracting the sales cost was the net profit in the day.

According to the above result, selling simply packaged agricultural products in the Wednesday market leads diversification of the market channels and increase of income.

In addition, some participants independently brought and sold various agricultural products simply packaged in the Wednesday market. The participants have thought that it is possible to continue making simply packaged commodities and to sell them in the Wednesday market. Therefore, selling simply packaged commodities in the Wednesday market has sustainability and high possibility of spread effect to other agricultural products.

On the other hand, the most participants have thought that selling the simply packaged commodities to retail shops was difficult since it was difficult to sell them to the retail shops in the PP. However, according to the market survey, the most retail shop wanted to buy the agricultural products in bulk. And the participants have thought that they can sell them when the products are available. The participants recognized that selling to the retail shops was efficient and the promising sales channel since the retail shops would buy much quantity in one time. In addition, some participants have said that they want to continue sales promotion to the retail shops since the sales will increase through continuously visiting the retail shops and building a relationship of mutual trust. Therefore, selling to retail shops is in bulk. And the sales activities have high possibility to be continued although it takes longer time to enlarge the sales scale.

In case of selling to the outside of South Khorassan province, the most participants thought that they could sell in bulk because of the result of the market survey. Especially, the most participants said that selling to the areas where barberry had not been produced was more effective since the demand was more. However, the major opinions were that they had to ensure the transportation means and enough quantity to sell and also they had to build a relationship of mutual trust. Therefore, it is suggested that the participants are highly interested in selling to the outside of South Khorassan province although building sales system and a relationship of mutual trust take longer time.

2) Evaluation of Processing and the Sales

The participants learned the method to produce lavashak by processing barberry and jujube and they could produce and simply package the lavashak. They could also sell the lavashak directly to consumers in the Wednesday market. However, they could not sell them to retail shops because of the price. Therefore, the effectiveness of the sales of the lavashak in the Wednesday market was calculated on trial.

According to the market price of lavashak, the selling price of lavashak is 100,000 Rls/kg. If more than 40% of the selling price is be ensured as sales profits, the cost of processing and materials need to be less than 60,000 Rls/kg. Therefore, the cost of materials needs be less than 50,000 Rls/kg since the cost of processing such as gas, water, etc. is about 10,000 Rls/kg. Three kilograms of dried barberry or 1.5 kg of dried jujube are needed to produce 1 kg of each lavashak. As the result, the unit prices of dried barberry and dried jujube are needed to be less than about 15,000 Rls/kg and 30,000 Rls/kg.

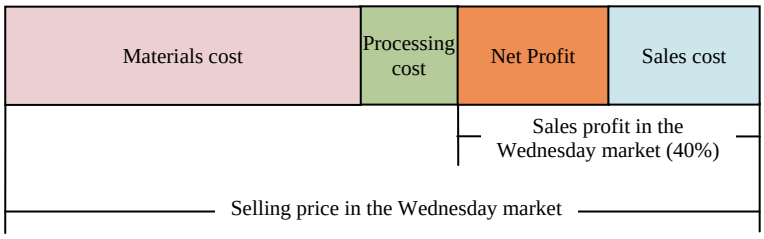


Fig. 7.4 Price Elements Structure of the Processed Commodities in the Wednesday Market

The price of dried barberry which is sold to brokers is from 60,000 to 70,000 Rls/kg. If the lavashak is made from the general barberry, the production of lavashak is not economical. However, barberry harvested passes for one year after the harvest, the price decrease since the quality deteriorates and newly harvested barberry appears in market. It is suggested that producing lavashak used the unsold barberry is one of methods for the processing commodities. On the other hand, small size jujube is sold to brokers at 20,000 Rls/kg. It means that the small size jujube is added value and sold at higher price, if the jujube is processed to the lavashak,

As the results mentioned above, it was suggested that low price of low quality materials could be added value and sold, if the materials are processed to lavashak. However, the most participants thought that they wanted to produce the lavashak for self-consumption for the moment. The main reason was that using usual barberry for the processing and selling was not profitable. In addition, certification of hygiene standard was important when the processed commodities were sold to retail shops. However, it is difficult for individual households to prepare processing facilities authorized. Therefore, it was suggested that ensuring unused agricultural products and processing facilities authorized would be important on production and sales of processed commodities.

3) Lesson Learned

i) Building Relationship of Mutual Trust

It was cleared through the trial sales that the sales quantity and price depended on the relationship of mutual trust between the farmers and the customers in the trade of private sector. If the relationship is built, the famers can easily get trade information and the possibility to sell in good condition on the quantity and price become high. Therefore, building the relationship of mutual trust between farmers and customers has priority to find and diversify marketing channels. It is important to closely communicate with customers and to keep quality, quantity and package style which the customers require. In addition, improvement of basic business manner is necessary for improvement of sales activities. Education activities are needed for farmers to recognize the agricultural activities including sales activities as business.

Activities of farmers in cooperation have an advantage in the sales activities. However, farmers easily misunderstand each other since the sales activities include managing money such as sales. If there is no trust among the farmers, the activities in cooperation would not be sustainable. Therefore, a system is needed to share results of the activities in cooperation and to keep transparency.

ii) Importance of Existing Marketing Channels

Selling to brokers that is the present major marketing channel is the very easy sales method since it doesn't require costs of transportation and package and much works to cleaning. In addition, the relationship of mutual trust has been kept between the farmers and brokers that keep the trade for many years. And farmers can easily get information of market price and sell their agricultural products when the market prices are high. Selling to good brokers in this manner has advantages such as ease, low cost, choice of selling price, etc. Therefore, it is valuable to keep the marketing channel to brokers as an important marketing channel.

iii) Improvement of Sales Techniques

The farmers have sold their agricultural products to brokers and they have not had opportunities to sell directly to retail shops and consumers up to the present. Therefore, they don't have enough experience to explain and sell their agricultural products to customers. The farmers sometimes cannot explain goodness and sales points of their agricultural products well. In addition, it is difficult for farmers to set selling prices and negotiate based on consideration of cost elements structure although the farmers refer market prices. As the results, the farmers cannot sometimes negotiate well since they cannot set appropriate selling prices at each distribution stage. Therefore, providing techniques and knowledge regarding sales to farmers is needed.

It is suggested that learning sales techniques through having experience with advanced persons is effective. In case of setting selling prices, it is suggested that basic information such as cost elements structure, etc. will be provided in trainings of marketing, etc.

iv) Activities at Proper Time

The prices of dried agricultural products have seasonal fluctuation and there are good seasons for farmers to sell their products. Convenient items and seasons for the trail sales need to be confirmed to the farmers and the activities need to be coordinated in advance for implementing the sales trials. Advanced coordination is important since the participants can learn much through the sales experience although items and quantity to be sold might not be much and various kinds of items might not be ensured at same time.

7.2.4 Pilot Project of Income Source Diversification and Livelihood Improvement Activities

(1) Background and Objectives

According to the result of base-line survey, there have been no economic women's groups in the Study area. On the other hand, the Iranian government has promoting rural women's involvement in development through their organization. In addition, development supports through women's group are important in terms of gender consideration.

Based on the development strategies, this PP was implemented with objectives below after forming women's groups such as;

(a) Verifying enhancement of women's capacity through group management

(b) Verifying a possibility of income source diversification through income improvement activities

(2) Implementation Schedule

Table 7.21 Implementation Schedule of PP of Income Source Diversification and Livelihood Improvement Activities (2011)

Activities	1390																	
	6			7			8			9			10					
	2011															2012		
	Sep.			Oct.			Nov.			Dec.			Jan.					
(1) Kickoff workshop																		
(2) Seminar on organization management																		
(3) Research activity by participants																		
(4) Planning and presentation workshop																		
(5) Technical seminars																		
5-1) Sewing																		
5-2) Mushroom cultivation																		
5-3) Beekeeping																		
(6) Workshop on review and planning for 2012																		

Table 7.22 Implementation Schedule of PP of Income Source Diversification and Livelihood Improvement Activities (2012)

Activities	1391																	
	1			2			3			4			5			6		
	2012																	
	Apr.			May.			Jun.			Jul.			Aug.			Sep.		
(1) Explanatory meeting																		
(2) Accounting training																		
(3) Exchange trip																		
(4) Trial sales at Wednesday market																		
(5) Technical seminars																		
Sewing																		
Weaving																		
(6) Review and evaluation workshop																		

(3) Contents and Result of the Activities

In this PP, activities below were performed in Felarg, Bozghong, and Borgeziad.

(a) Seminar on group management

(b) Market Research Activity

(c) Technical seminars to sub-groups

(d) Interim evaluation

(e) Accounting training

(f) Exchange trip

(g) Trial sales at Wednesday market

(h) Technical seminars

(i) Follow-up on rural women's fund

(j) Holding a workshop of evaluation on PP's activities

1) Seminar on Group Management

First of all, women's groups, which are the main activity bodies to this PP, were organized, and a seminar on group management was performed to each group.

The situation of participation in the group activity is shown below;

Table 7.23 Situation of the Participation in the Group Activities in Each Village

Village	Group name	Participants	Sewing	Mushroom	Beekeeping
Felarg	Kosar	31	9	14	0
Bozghong	Zeynab	18	16	11	2*
Borgeziad	Fateme Zahra	18	12	12	12

*As there were a few women who wanted to practice beekeeping in Bozghong, this activity had not been considered to perform in this village, but some more women expressed their interest later.

For activities of sub-groups, sewing and mushroom were highly demanded while beekeeping was not, because 1) disliking to be picked by bees, 2) some villagers were stolen their bee hives, and 3) beekeeping is hassle as they saw this activity in the past. Villagers eat natural and commercially available mushrooms; therefore, it was reaffirmed that there is a market for mushroom in the village.

The economic group activity is the first experience for all women who participate. During the seminar, the participants made a list of attendants and minutes for 2 to 3 times by themselves, and those were checked by the expert. In addition, the book also was checked, ant the expert instructed to correct some mistakes. At the end of this seminar, the expert instructed how to manage meetings without a facilitator.

2) Preparation for Market Research Activity

In order to carry out a market research activity by women, 4 times of seminar on business activities were performed.

i) Cookie Baking

During this seminar, the cookie baking was mentioned as new business idea by many women. Accordingly, the expert of this seminar proposed the cookie baking as a future business plan. Therefore, he explained some points to remember for the cookie baking such as shown below. In fact, the cookie baking has its advantage such as low labor cost since there are many women in the village, and easy to bake with cooking device.

- ✓ To whom and why to bake?
- ✓ What kind and quality of cookies are there? Whether or not to bake local or urbanized cookies.
- ✓ Are there any advantages to the product against cookies which are sold in the town?
- ✓ A pot and oil etc. are needed to bake cookies.
- ✓ How many people would participate, how much can be collected? 100,000 Rls/person or 1,000,000 Rls/person?

- ✓ Where is the market?
- ✓ Ways of packaging should be discussed.

ii) A business Plan in Borgeziad

A woman of Borgeziad presented her business plan during the seminar. Among her ideas, some of them were calculated on cost and sale price in detail. For example, as for quilt cover, she calculated the production cost as 30,000 Rls in 2 to 3 days, and expected to sale it by 100,000 Rls. Therefore, it is clear that some women showed effects of the seminar.

As a result of this seminar regarding business activities, women's eyesight about business activities was widened because they thought many things throughout this seminar.

3) Market Research Activity and Reflection

i) Market Research Activity

After preparation of research activity, women went to the market research. They visited the direct sales shop of women's cooperative of Khorashad in Birjand city, a handicraft shop, dry-salter and material shop in the Birjand's bazaar.

In the direct shop of women's cooperative of Khorashad, women studied about the display place and packaging of products, and comparison between expected price by them and price at the shop. In the handicraft shop, the shop owner explained about popular products, such as woven cloths and decorated glasses, mentioning that the hand-woven carpets are still popular. In the bazaar, they investigated the price of materials which are necessary to make handicrafts. Some of them said that; 'I feel that I have had a loss because I knew I had be able to sell barberry with better price than selling to brokers,' and 'I am surprised that I could sell mulberry which I used to give to animals if I brought to the bazaar.'

ii) Reflection

After the market research activity, the participants reflected on what they had learned. Some participants said 'I thought we could do,' 'small cotton utensils wiping towel can be well sold,' and 'I want to try to make an ornament to put on the wall', and so on. It can say that many of them were stimulated to a degree.

As for concrete activities, many women wanted to carry out cloths waving by machine. This is because; 1) they have experienced to wave in the past, 2) easier than sewing, 3) easier and more profitable than carpet waving, 4) aged people know about cloths waving, and 5) it can be practiced during agricultural off-season, etc.

4) Accounting Seminar

A technical seminar on rural women's fund management had been held to executive members (president, secretary, and accountant) of the fund in 3 villages by an officer of extension department of JAO in February 2012, while the Study team was absent. Followed this, an accounting seminar was held in June, 2012 as an activity of PP. However, women had many concerns on book keeping; therefore, the lecturer gave useful advices to this issue. As a result, women were able to manage the issue.

5) Exchange Trip

Total of 36 women, 12 women from each village, visited advanced rural women cooperative in Mood city and Khorashad village in June, 2012 in order to exchange experience among them. Women from the Study area were explained about the history of cooperative, their affaires etc. in each place, and visited cloth weaving, rose water, and confectionery affaires.

Ms. Hemmadpoor, President, explains about activities of rural women cooperative

The participants observed that the women of advanced cooperatives 1) were seriously working on their affaires, 2) solid, and 3) opened and kind to people from outside of the world and gave useful advice. Some of them were enlightened because they heard the story of the President of Mood rural women cooperative that she started baking cookies from small ovens to scale up. In addition, another member of cooperative said "people in the city prefer the handcrafted cloth. They will directly order the cloth someday."

After the trip, the President of women's group of Felarg said that there is some limitation of actions by women in the village while there is no such limitation in Mood and Khorashad to emphasize that there are differences in village's society and gender issues at home among Felarg, Mood, and Khorashad. Furthermore, she moaned that her husband did not positively react when she goes to a meeting of PP. People say that Felarg village is particularly devoted to Islamic belief among villages in the Study area; this might be related to the reaction of the husband. However, she says "6 to 7 women, who participated to the trip, hold well together, and are active and committed. It is important to have a work space for women like in advanced region. We also want to make such a place by asking a loan." Another woman in Felarg said that she would invite representatives from Mood and Khorashad if they could have a work place.

6) Trial Sales at Wednesday Market (Twice)

i) First Trial (30th May, 2012)

Participants of PP tried to sell their products in the Wednesday market in Birjand city. Earlier, women had obtained several kinds of packaging container and plastic bags to wrap their products. Participants were 10 people in total (3 from Felarg, 3 from Bozghong, 4 from Borgeziad), and they sold their products from 7 a.m. until 5:30 p.m.

Their opinions after the trial can be summarized as below;

a) It was the first experience that they directly sell their products to consumers

b) They were uncertain until they start selling whether they could well sell or not.

c) Despite that, they were surprised that eggs and homemade bread were well sold.

d) They would continue sales activities

The first experience of sales at Wednesday market

The result of sales was; Felarg: 1,464,000 Rls (60 items), Bozghong: 1,478,000 Rls (44 items),

Borgeziad: 1,741,000 Rls (53 items).

ii) Second Trial (19th September, 2012)

As for the second time, it was organized after that the technical seminar on cloth weaving had finished, and women began to start producing their products. Therefore, the handmade towels from each village, which women produced, were sold together with other products on a trial basis. In addition, homemade cookies (Borgeziad), herb pickles (Felarg), and dried oyster mushroom powder (Bozghong) were also sold. This might be as a result of the examination of above mentioned cookie production, and stimulation of exchange trip to the advanced cooperatives.

The participants were 5 people in total (1 from Felarg, 1 from Bozghong, 3 from Borgeziad). And the feature of the second time was that almost all the participants brought their own products unlike the previous time. Therefore, some of them could negotiate the sales price with customers.

The homemade bread was well sold the same as the last time. In addition, it was understood that customers like to buy seasonal fresh food such as undried fresh jujube. Furthermore, dried herbs in light small packaging got their popularity because of high quality and low price. On the contrary, the sales of handmade towels were not well. This can be due to low quality of the products and relatively high price at the Wednesday market.

The result of sales was; Felarg: 279,000 Rls (19 items), Bozghong: 815,000 Rls (24 items), Borgeziad: 435,000 Rls (19 items).

7) Technical Seminars

i) Sewing

The seminar on sewing was carried out to whom who wants to learn sewing from November to December 2011. Each session was 2 hours long and 6 sessions were performed. The participants learned about making a dress pattern of a skirt and jacket, and how to sew them.

Participants who practice sewing

However, women could not learn enough knowledge ant technique during those sessions; therefore, the sewing technical seminar was performed for 360 hours between June and July in 2012. As they completed, they can apply to the qualification test of the Vocational Training Organization if they continue to be trained 120 hours more. The zeal for learning technique differs among villages and participants, participants who continue to practice the learned techniques after the seminar were observed.

In this seminar, patterns of *chadol*, cloak (*manteau*), trousers, skirts, hood (*maghne'eh*), coat, and dress were taught. At the beginning, the participants had been puzzled about sewing, but their skills were improved as the seminar progressed. Although some of them who are good at their hands could firmly sew, they could not reach at a level that they produce sewing products which can be sold in the city.

ii) Cloth Weaving

As a result of above mentioned market survey activity in 2011, and consideration with C/P, a cloth weaving technical seminar was performed, regarding high demand from women, technical level, and profitability. The seminar was given to 110 hours from June to July, 2012.

Training in Bozghong

After the seminar, the participants took a qualification test (primary level) of Culture, Handicrafts, and Tourism Organization. 27 people (7 from Felarg, 9 from Borgeziad, 11 Bozghong) took the test, and all of them passed. As a result, they will be able to receive loans from the governmental bank, participate in exhibitions, and sell their products.

Likely the sewing technical seminar, the zeal for learning technique differs among villages and participants, some participants have independently continued to practice the learned techniques after the seminar. A 90 cm long towel can be sold at 50,000 Rls, and 8 to 10 towels can be produced a day if a skilled woman weaves. Therefore, this can be seen as one of promising income sources.

A woman has particularly well learned, and her towels bear comparison with those of Khorashad village, a famous village as cloth weaving. In fact, she is a carpet weaver; therefore the techniques of carpet weaving may be applied to cloth weaving.

The participants can reach at higher level if they continue to practice.

iii) Beekeeping

Since the preparation of beekeeping sessions had begun in 2011, full-dress classes and practical sessions started from May, 2012. The contents of classes and sessions are shown as below. At the beginning, women had been afraid of bees, but they soon became familiar with them. Finally, they could deal with hive frames with their bare hands.

Practical training in the field

During the seminar, women tried to extract honey on 17th July and 26th August, 2012. The result is shown as below:

Table 7.24 Quantity of Honey Extracted

Date	Quantity
17th July	11.5 kg
26th August	6.0 kg
Total	17.5 kg

According to a participant, the extracted honey was sold in the village at 300,000 Rls/kg, and total amount was about 4,000,000 Rls. Although they are beginners, they could extract honey and sell it in the village; therefore, it can be said that beekeeping is one of promising income sources.

As winter approaches, they have to prepare bees to winter. Although they learned about wintering and how to make feed cakes, they have to be prudent, because this is their first-time experience. The Study team set a matching meeting between the participants and the managing director of beekeepers' cooperative in Birjand, in order to exchange their ideas on future dealing and any technical supports from the cooperative. In case women want, they can ask the cooperative to transport bee hives to a warmer place for wintering.

iv) Oyster Mushroom Cultivation

The class on oyster mushroom cultivation was held in December 2011, and advantages of usage of oyster mushroom, necessary materials for cultivation, cultivation environment, and harvesting method, etc. were explained. The participants tried to cultivate the oyster mushroom in the following practical sessions. The result of cultivation in each village is shown as follows;

Table 7.25 The Result of Oyster Mushroom Cultivation

	Felarg	Borgeziad	Bozghong
First	20th January, 2012, 3kg harvested	16th January, 2012, about 10 kg harvested	December, 2011, 0 kg (all 5 bags were rot off)
Second	3rd February, 2012, 3kg harvested (1/4 bags was rot off)	9th April, 2012, 1 kg harvested (14/15 bags were rot off)	30th March to 6th April, 2012, 9.5kg harvested from 7 bags
Third	—	—	Jun, 2012, 15 kg harvested from 4 bags

The result of the first and second time in each village differs, but participants succeeded in cultivation by the second time. Particularly, participants of Bozghong succeeded at the second trial although they perished all the bags. Moreover, they only tried the trial for the third time and they showed progress in techniques as they harvested more oyster mushroom.

Verification of mushroom by the lecturer

On the other hand, it is difficult to find a place where people can cultivate the oyster mushroom in a permanent way. For example, it is said that the place where participants cultivated it was far from the centre of village, and it was an obstacle.

Though some women succeeded to cultivate the oyster mushroom, they like to cultivate the button mushroom instead. According to the lecturer, there is no technical problem on temperature and moisture control between oyster and button mushroom, but it would be harder to cultivate the latter because the equipment used is little bit complicated and expensive.

It is rare to see the oyster mushroom in Birjand because it is not produced. However, the produced mushroom by the PP has a value as organic and healthy one because any chemical materials were not used. Therefore, there can be much possibility to sell the oyster mushroom as health and organic mushroom.

8) Situation of Each Group's Fund

At the beginning, women's group of Felarg was inexperienced in accounting, but that situation has been improved as JAO and the Study team followed and guided them. In addition, the situation of raising money has also been stabilized comparing to the first several months. As the amount of the

fund became enough, a lottery to choose loan receivers carried out in September, 2012.

The women's group of Bozghong has firmly managed to keep book keeping, and its feature is that the amount of money they collect is the largest among 3 groups. In addition, many women have participated to the fund after establishment of the fund and the speed of raising money is the fastest; therefore, this group carried out the lottery in May, 2012 as the first group among 3 groups.

As for the women's group of Borgeziad, managing book keeping is firm, but number of participants is the least among 3 groups; hence, the speed of raising money was most slow. Despite this, the participants constantly save their money, and the amount of fund eventually reached at an enough level to give the loan. As a result, a lottery was carried out to choose loan receivers in September, 2012.

The situation of 3 groups' fund is shown as below:

Table 7.26 The Situation of Amount of the Rural Women's Funds

Month	Felarg		Borgeziad		Bozghong	
	Saved	Total	Saved	Total	Saved	Total
2011 Oct	1,210,000	―	1,250,000	―	2,440,000	―
2011 Nov	750,000	1,960,000	450,000	1,700,000	2,750,000	5,190,000
2011 Dec	450,000	2,410,000	390,000	2,090,000	1,120,000	6,310,000
2012 Jan	260,000	2,670,000	560,000	2,650,000	2,500,000	8,810,000
2012 Feb	850,000	3,520,000	500,000	3,150,000	1,890,000	10,700,000
2012 Mar	740,000	4,260,000	1,040,000	4,190,000	3,050,000	13,750,000
2012 Apr	830,000	5,090,000	910,000	5,100,000	3,530,000	17,280,000
2012 May	1,490,000	6,580,000	1,240,000	6,340,000	2,390,000	19,670,000
2012 Jun	300,000	6,880,000	220,000	6,560,000	1,440,000	21,110,000
2012 Jul	1,480,000	8,360,000	440,000	7,000,000	3,070,000	24,180,000
2012 Aug	1,100,000	9,460,000	3,480,000	10,480,000	1,590,000	25,770,000
2012 Sep	610,000	10,070,000	1,090,000	11,570,000	1,520,000	27,290,000
Total	10,070,000	―	11,570,000	―	27,290,000	―

9) Follow-up on Rural Women's Fund by C/P

i) Explanation Meeting to Members of Rural Women's Fund

JAO decided to support and enhance 3 women's group, established by PP in 2011, together with existing other 37 funds in Province. Accordingly, the department of extension of JAO together with the Study team explained about management rule and its method to the members of 3 villages' funds. As a result, women formed sub-groups which will deal small scale economic activities using money of the fund (see the table below).

Table 7.27 The Sub-Groups of Small Scale Economic Activities

Felarg	Sheep fattening (2), carpet and picture carpet (9), agricultural inputs sales business (3)
Borgeziad	Sheep fattening (4), sewing (5), carpet (3)
Bozghong	Sheep fattening (8), carpet and picture carpet (2), packaging and agro-transformation (2 groups, 12 people)

ii) Carrying Out a Lottery

After the meeting, as mentioned above, JAO decided to give loans to members of fund of Bozghong in May, 2012. Therefore, an officer in charge of women's fund from JAO Birjand Township and a member of the Study team visited to Bozghong, and managed lottery in order to choose loan receivers. In addition, the lottery was carried out in Borgeziad at 25th September, and Felarg at 26th September respectively since the amount of money of these funds had sufficiently risen.

JAO Birjand Staff manages the lottery

The receiver will receive 2,000,000 Rls with 4 % of interest rate (this interest rate is still below the minimum interest rate of the agricultural bank such as 7 %). After the lottery, each receiver will submit a loan request form to JAO, and the fund will be delivered to her. Then, she will repay 200,000 Rls/month.

iii) Follow–up for Rural Women's Fund

The Rural Women's Fund will be followed-up by call and/or visit by JAO staff. Each fund should submit a monthly report to JAO. If the JAO staff found any problems in the report, she calls to members of fund to give advice. The JAO Birjand staff visited to 3 funds between Jun to August, 2012, and called several times to follow-up.

10) Reviewing the Contents of the Pilot Project

As the PP finishes, a reviewing workshop about PP's activities was held in each village. C/P, related personnel of the subcontracting company, and lectures of sewing and weaving technical seminars also attended.

Many women who attended to the workshop generally satisfied the technical seminars given during 2012. Moreover, they satisfied the result of the trial sales at Wednesday market to a large extent. Therefore, they declare their willingness to continue those activities. Particularly, many women strongly want to continue weaving.

The lecturers appreciate that participants generally well learned about techniques, but they also emphasized that women should continue to practice learned techniques. The lecturer of sewing said that women could not reach at a level that they produce clothes which can be sold in the city. Despite this, a woman declared that she wanted to be trained to higher technical level if she had to pay the fee, and return to the village afterwards.

In addition, the lecturer pointed out that the sales price of the towel at Wednesday market was expensive, but she also advised that the consumers would want to buy a bath towel. Moreover, participants shared the fact that the demand of plum was high for references for women.

Finally, C/P confirmed women's willingness to continue, and many women made sure this even if they have to bear the fee, as mentioned above.

(4) Evaluation and Lessons

1) Oyster Mushroom Cultivation

i) Technical Evaluation

The technical achievement of women who participated in oyster mushroom cultivation in winter was evaluated by interviewing with participants and observation of cultivation site together with the lecturer. The result of technical achievement is as follows;

a) The quality of produced oyster mushroom is good.

b) Although it was difficult to firmly control temperature and moisture during the trial in winter, the participants performed a good cultivation result.

c) It is fair to evaluate that the participants obtained enough technical level which can produce vendible quality mushroom.

As a result, women obtained the oyster mushroom cultivation technique to produce vendible mushroom.

Table 7.28 Technical Evaluation Result of Oyster Mushroom Cultivation

	Performance	Contents	Check
Oyster	High	Production of vendible quality mushroom	☑
	Medium	Consumption and sales of mushroom in the village	
	Minimum	Acquirement of mushroom cultivation techniques	

The easiness of technical acquisition by women can be seen as easy, because they obtained techniques to produce vendible mushroom in a short term.

Although oyster mushroom cultivation is profitable and easy to obtain, many women less want to continue; therefore, the spread effect may be low. Despite this, there is a demand for oyster mushroom, and it can be a new nutritional source; thus, this technique can be concluded as one can contribute to dietary habit improvement in the village.

2) Sewing

i) Technical Evaluation

The lecturer evaluated technical achievement of each village's women as "providing sewing services in the village and gaining income."

Table 7.29 Technical Evaluation Result of Sewing

	Performance	Content	Check
Sewing	High	Accomplishment of vendible products and their sales	
	Medium	Providing sewing services in the village and gaining income	☑
	Minimum	Acquirement of sewing techniques at home level	

As seen above, women's achievement level is medium through 360 hours of lectures; it is difficult to learn sewing techniques in a short term. However, since a degree of completion of *chadol*, cloak (*manteau*), scarf, and hood (*maghne'eh*) was high, women can learn a primary level of sewing techniques in a short term.

While it is easy to learn the primary level of sewing technique, women should be trained on high technique for long time; hence, the spread effect might be low. On the other hand, many

participants have continued, then it can be said that the sustainability is high. A household will be able to save the expenditure on sewing products if a woman in the household learns sewing. In addition, that woman will be able to provide sewing services in the village; therefore, the sewing technique can be concluded as a livelihood improvement technique.

3) Cloth Weaving

i) Technical Evaluation

According to the lecturer, the technical achievement of women in Bozghong is high, that of Borgeziad is medium, and that of Felarg is at primary level. In general, their technical level has reached at "being able to make relatively quality products."

Table 7.30 Technical Evaluation Result of Cloth Weaving

	Performance	Contents	Check
Weaving	High	Accomplishment of vendible products and their sales	
	Medium	Being able to make relatively quality products	☑
	Minimum	Acquirement of basic weaving techniques	

The difference of performance among 3 villages is due to the attendance rate to seminar. The rate was very low in Felarg, while that was high in Borgeziad and Bozghong. Despite this, the evaluation of performance to Borgeziad was medium as there is still room to improve. Eventually, the acquisition of this technique may be easy because all women who took the qualification test passed through 110 hours of seminar.

It is easy to obtain weaving techniques and the profitability is positive. As the elder women resumed the weaving (this will be reported later), the spread effect can be high. In addition, many women have continued the weaving; the sustainability is also high. Therefore, this will be seen as a prioritized activity in the MP.

4) Beekeeping

i) Technical Evaluation

The lecturer evaluated to each detailed technique. The result of this is shown as below:

Table 7.31 Technical Evaluation Result of Beekeeping

	Contents	Minimum	Medium	High
Beekeeping	Production of vendible quality honey		☑	
	Acquirement of bees breeding and wintering techniques	☑		
	Acquirement of honey extraction techniques	☑		

As mentioned above, the beekeeping techniques can be easily learned by women, and they also acquired honey collection and production techniques in a short term. If women succeeded to winter bees, they can increase bees according to their capacity, then, they can expand honey production.

It is easy to obtain beekeeping techniques and the profitability is positive. The demand for beekeeping is high in other villages; the spread effect may be high. Since the participants of this PP strongly want to continue, the sustainability is also high. Therefore, this will be seen as a

prioritized activity in the MP.

5) Summary of Technical Seminar Evaluation

In conclusion, the technical seminars were mainly evaluated in terms of the degree of acquisition. Besides, it can be said that there is no jeopardy. As for the water requirement, sewing and weaving do not require water at all. Moreover, beekeeping requires little water; this can be a valuable agricultural income source in the Study area, where there is a severe water restriction. Likely, the oyster mushroom requires a little water. All those evaluation can be summarized as below;

Table 7.32 Technical Evaluation Results

	Tech-nique	Profita-bility	Spread effect	Sustainability	Jeopardy	Water requirement	To MP
Oyster	Easy	+	Low	Low	Non	Very low	Improving dietary habit
Sewing	Easy (primary)	+	Middle	High	Non	―	Livelihood improvement
Weaving	Easy	+	High	High	Non	―	Prioritized
Beekeeping	Easy	+	High	Very high	Non	Little	Prioritized

(5) An Attitude Survey about Usage of Income Generated

An assumption of usage of income which women would generate was studied. By this survey, the Study team has intention to suppose the impact on expenditure by income generation. All answerers were 36 people; 12 married women, 23 unmarried women, and 1 widow. (Since there was only one widow, she was not counted.)

1) The Situation of Management of Family Income

In the present state, 34 answerers (unmarried 23, married 11) said that husband (in case of unmarried, father) mainly manage the family income, while 1 person (married) said she manages the family income. Hence, it can be understood that husband or father mainly manages the family income in a household.

Table 7.33 The Situation of Management of Family Income

	Husband or father	Own	Other family members
All answerer	34 (97%)	1 (3%)	0 (0%)
Unmarried	23 (100%)	0 (0%)	0 (0%)
Married	11 (92%)	1 (8%)	0 (0%)

As for the estimated proportion of income distribution, the average of all answerers was that 74 % (unmarried 75 %, married 73 %) of income would go to husband or father, 18 % (unmarried 14 %, married 25 %) are for her, and 9 % (unmarried 10 %, married 7 %) go to other family members. It can be understood that women have little control over the family income unlikely the men.

Table 7.34 The Situation of Income Distribution in the Family

	Husband or father	Own	Other family members
All answerer	74.41 %	18.29 %	9.56 %
Unmarried	75.00 %	14.35 %	10.43 %
Married	73.18 %	25.83 %	7.73 %

2) The Attitude for Estimated Usage of Income Gained

As for estimated use of income gained by own economic activities, the average of all answerers for oneself was 62 % (unmarried 60 %, married 64 %), while 38 % (unmarried 39 %, married 35 %) was for husband or father.

Table 7.35 Usage of Income in the Family

	Husband or father	Own
All answerer	38.14%	62.14%
Unmarried	39.57%	60.87%
Married	35.42%	64.58%

In addition, the result of estimated use of income gained is given as follows;

Table 7.36 Usage of the Income by Items

Kind	Items	Total	Unmarried	married
Staples	Barley grain	81 %	87 %	67 %
	Barley meal/flour	100 %	100 %	100 %
	Wheat flour	100 %	100 %	100 %
	Rice	100 %	100 %	100 %
	Irish potatoes	100 %	100 %	100 %
	Other staples (any)	100 %	100 %	100 %
Non-Staple Fresh Food	Chicken	100 %	100 %	100 %
	Meats (any)	100 %	100 %	100 %
	Fish	100 %	100 %	100 %
	Beans	100 %	100 %	100 %
	G. nuts	100 %	100 %	100 %
	Peas	100 %	100 %	100 %
	Vegetable/Fruits (any)	100 %	100 %	100 %
	Eggs	97 %	96 %	100 %
	Dairy products (any)	100 %	100 %	100 %
Non-Fresh Food Items	Sugar	100 %	100 %	100 %
	Salt	100 %	100 %	100 %
	Cooking oil/Ghee	100 %	100 %	100 %
	Coffee/Tea	100 %	100 %	100 %
	Drinks	100 %	100 %	100 %
Non-Food Items	School fee, textbooks, etc	58 %	61 %	58 %
	Medical care	97 %	100 %	92 %
	Transportation	100 %	100 %	100 %
	Clothing/Shoes	100 %	100 %	100 %
	Cooking/Lighting fuel	100 %	100 %	100 %
	Soap/washing products	100 %	100 %	100 %
Contributions	Remittances to relatives	0 %	0 %	0 %
	Mosques	100 %	100 %	100 %
	Credit repayments	89 %	91 %	83 %
	Mutual support groups (funeral)	81 %	83 %	75 %
	Mutual support groups (non-funeral)	22 %	22 %	25 %
	Other local organizations	6 %	9 %	0 %

As for estimated use of income by kind, the average of all answerers was that they would spend the income to staples about 33 % (unmarried 32 %, married 35 %), to non-staple fresh food about 22 % (unmarried 20 %, married 19 %), to non-fresh food items about 20 % (unmarried 20 %, married 19 %), to non-food items about 17 % (unmarried 18 %, married 16 %), and to contributions about 6 % (unmarried 6 %, married 6 %).

About 30 % of income would be spent on staples, and about 20 % would be spent on non-staple fresh food (meat, for example), thus about 50 % of income would be spent on those items. Moreover, about 20 % would be spent on non-fresh food items, which are favorite food; therefore, almost 70 % of income generated would go on food related expenditure.

Table 7.37 Usage of the Income by Kinds

	Staples	Non-Staple Fresh Food	Non-Fresh Food Items	Non-Food Items	Contributions
Total	33.33 %	22.36 %	20.00 %	17.78 %	6.53 %
Unmarried	32.29 %	21.88 %	20.21 %	18.54 %	6.46 %
Married	35.42 %	23.33 %	19.58 %	16.25 %	6.67 %

Although the estimated expenditure on school fee, and textbooks, etc. was relatively low (58 %) in general, almost all answerers have finished their study, they might have intension to bear the scholar fee for family members.

In conclusion, 1) increase in economic power, 2) large impact on food related expenditure, and 3) impact on scholar fee can be observed by establishment of rural women's fund, which has an intention to promoting women's economic activities. Accordingly, livelihood improvement effects in the village may be seen as a result of promotion of women's economic activities through management of rural women's fund.

(6) The Result of Self-evaluation for Women's Group

1) Evaluation of Women's Group Activities

The Study team asked participants to evaluate themselves about women's group activities by selection type questionnaire. By this evaluation, any changes occurred in women and issues for future would be extracted. Evaluation items are as below;

a) Frequency of meetings and situation of attendance

b) Individual growth

c) Growth of the group

d) Planning and its contents

e) Management and board members

There are 4 grades of questions in each evaluation item, and the answerers check the question which is a close answer to their situation. The result of check is gathered by each grade, and the highest percentage of them is seen as the point of evaluation item.

Answerers were 28 from Felarg, 10 from Borgeziad, and 34 from Bozghong. Question items were derived from "Community development by livelihood improvement approach" (Japan International Cooperation Agency (2006)).

In summary, while women well attend to the meeting, and members realize individual growth, their realization about group's growth is relatively poor. In addition, they are passive to some extent about planning and group management. After establishment of the group, the group activities supported the individual growth in one year; supports for the growth of group, autonomous planning, and group management should particularly be emphasized in future.

Table 7.38 Evaluation Result of the Women's Group Activities

Items	Points
Frequency of meetings and situation of attendance	4.0
Individual growth	3.5
Growth of the group	2.0
Planning and its contents	2.5
Management and board members	3.0

*: As there is the same average score in "individual growth," and "planning and its contents," '3.5' and '2.5' were given as a point.

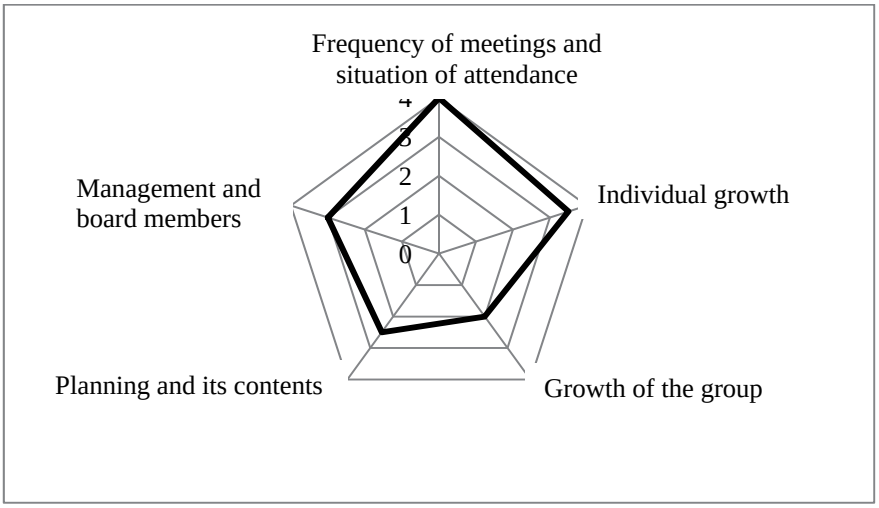


Fig. 7.5 Evaluation Result of the Women's Group Activities

2) Reasons not to Participate in the Group and Leave the Group

Enrollment of members and continuation of activities are important things for group activities; however, there are women who do not participate and left the group. In general, 1) technical, 2) age, 3) business, 4) marriage, and 5) lack of information are the major reasons.

In addition to above, there are some villagers who could not participate in the appropriate time due to insufficient distribution of information, although they wanted to participate. Below are some counter measures.

Table 7.39 Countermeasures to the Reasons not to Participate and Leave the Group

Reasons	Counter measures
Technical	It seems that women have anxiety about starting a new inexperienced activity. This anxiety can be lessened by introducing some success cases. In addition, a particular attention should be paid to the first steps. As women start a trial with anxiety, they can easily be disappointed and quite the trial if they fail the first trial. As for beekeeping, an image of fear of bees can be prevailed, but it is clear from the result of PP that they can be familiar with bees.
Age	If a woman is old enough, she cannot participate to the activity in the first place. A form of participation can be proposed; for example saving money in the fund.
Business	Women in the Study area have a period when they are quite busy in the year (from September to October). The planning should consider this period.
Marriage	Women may leave the village after marriage, but some of them will live in the village as well. Particularly, those women who would remain in the village can be increased if they can gain income from economic activities there.
Lack of information	At the beginning of a project, necessary information should be firmly delivered to the target people; therefore, a particular attention should be paid when a kick-off meeting is organized.

(7) Reactions in the Village

1) Reaction of Leaders of the village

The Study team exchanged points of view about PP for women with leaders of 3 villages. First of all, they appreciated the implementation of PP for women, in general. They found no problem that the outsiders support women. Moreover, there was no problem on cultural and religious aspects during the implementation of PP.

They recognized some changes of women after the implementation of PP such as; 1) expansion of economic activities, 2) economic independence to some extent, and 3) increase in choices. They also understood that women themselves are satisfied and they have a will to continue.

There is also no problem if women become economically independent, and the men in the village consent to this, according to the leaders.

If women go out of the village in future, the leaders said that father and/or husband must allow it, and a firm organization such as JAO should supervise their activates.

In brief, particular negative impacts have not been seen, and very positive reactions were observed to the promotion of women's activities

2) Resumption of Cloth Weaving by Elder Women

In the Study area, the cloth weaving has been disappeared for long time, and it was completely died out before the PP. According to villagers, they burned wooden weaving machines.

However, some skilled elder women resumed the cloth weaving after installation of weaving machines for the PP. At least, one such woman has been found in each 3 village and the skill of a woman at age of 70 in Felarg is still good. She deftly weaved a bath towel.

In this way, it is important to realize any utilizable techniques in the village, and the village head of Bozghong appreciate this. Although the above mentioned woman said that the weaving method taught in the PP was different from hers, her weaving technique can make difference from others. In addition, women's skill would rapidly improve if they weave cloth with well-known technique for them.

Above all, as elder women, who rarely were out in public during the implementation of PP, happily

weave, the revitalization of self-esteem of them may be happened. Besides, it is important to think of rediscovery of the local resources such as the use of past techniques in this case.

7.3 Feedback to the Master Plan

(1) Trial of Water Saving Irrigation

In the Study area, cash crops such as barberries and jujube are grown in small fields on the mountain slopes. Basin irrigation with a 12 days interval is applied to almost all of these fields. Considering the ongoing decrease in discharge of qanat water, this PP examined methods for effective water-saving irrigation.

The results of the irrigation trial indicate, among others, that: (1) several models of water-saving irrigation system can be applied in the Study area, according to the location of the water source and the field; (2) among such models, low-cost drip irrigation system, using only gravity pressure, is in the highest priority; and (3) with introduction of drip irrigation, water-saving irrigation with an interval of four to seven days can be applied to barberry. These results contributed to the formulation of plan for introducing water-saving irrigation, in Program for irrigation system improvement in the Master Plan.

(2) Pilot Project for Improvement of Agriculture and Livestock Techniques

In the Study area, while barberries and jujube are the major agricultural products, growing vegetables or raising livestock is stagnating, and residents are buying these agricultural products to consume. Therefore, the ratio of food expenses in the household budgets is high. Under such a situation, this PP examined if income can be increased and food expenses can be reduced, by improving cultivation techniques, including introduction of simple facilities, and promoting raising small livestock animals.

The results of the PP indicate, among others, that: (1) net-house cultivation and small-scale chicken raising do not require complicated techniques, and therefore can be practiced by elders and women. These activities can contribute to create jobs in the rural area, increase income, and secure a source of good quality protein; (2) vegetable cultivation in net-house is highly effective for saving water, with an expected high yield; (3) it is needed to continuously enlighten farmers on the importance of saving water; (4) in winter, when the climate is unfriendly for vegetables to grow, it is recommendable to use a simple small-scale non-heating vinyl house, which has a high heat-retaining property; (5) it is necessary to select agricultural techniques that can easily be practiced by small-scale farmers, including women and elders; and (6) women are highly interested in growing fresh vegetables, including herbs, inside the house during winter. These results contributed to determine the details of activities and inputs for each project, in Program for crop and livestock productivity improvement.

(3) Pilot Project for Distribution and Marketing

In the Study area, specialty products such as barberries and jujube are almost exclusively sold to brokers. They are mostly price-makers, while farmers are price-takers. Under such a situation, it was considered to be desirable to diversify the sales channel. This PP examined its potential, by trying packaging, processing, and selling agricultural products to retailers in and outside the Province as well as in the Wednesday market.

Trying to sell products by themselves for the first time, participating farmers understood the importance of capturing customers' needs for a successful sales activities and also importance of creating trust with retailers, if they want to sell products to them. They also understood that it is critical to improve sales techniques, including how to make their products look more attractive, and that selling to brokers is one of the good marketing channels, which is low-cost and labor-saving.

The results of the PP indicate, among others, that: (1) in the Wednesday market, farmers can sell their products by themselves at higher prices than prices at which they sell to brokers; (2) value-added of agricultural products can be increased, by processing low quality or unused materials in a workshop that meets hygiene standards; and (3) in case of selling to the retail shops, selling in bulk has more demand than that of simply packaged products. These results contributed to determine the details of activities and target sales volumes in each marketing channel, in Program for distribution and marketing improvement.

(4) Pilot Project for Income Source Diversification and Livelihood Improvement

In the Study area, agriculture is mainly a part-time economic activity, where men are involved in other paid works. Women who stay in the villages mostly do not have opportunities for economic activities, other than supporting men in agriculture. Also, women's groups for economic activities do not exist. Under such a situation, this PP examined the potential for diversification of income source in the Study area, through women's economic activities, with rural women's fund as its introductory activity.

The results of the PP indicate, among others, that: (1) the rural women's fund is highly effective as an entry activity in villages not having experience of economic activities in group; (2) cloth weaving and beekeeping are priority activities; (3) sewing contributes to livelihood improvement at the household level; (4) women can be disappointed and lose their interests, if they fail at the beginning of activities. Therefore, a particular support at this stage should be considered; (5) women realized their individual growth through the group activities. In the Master Plan, group's growth should also be stimulated at the same time; and (6) women are very busy from September to October for barberry and jujube harvest. Therefore, activities should not be planned for this period. These results contributed to determine the details of activities, timing of implementation, and priority sub-projects, in Program for income source diversification.

Chapter 8 Conclusions and Recommendations

8.1 Conclusions

(a) This Master Plan was formulated based on the basic concepts of "increasing the income by improving the productivity in regional specialty products and diversifying income sources" and "improving the living environment for residents so that more people can live with peace of mind." When this Master Plan is implemented, it is expected that, depending on the combination of the projects, the income of small-scale farmers in the Study area increases up to the level of income of urban residents in South Khorassan Province. Moreover, it is expected that the Master Plan generates more than three times higher economic benefits to participating farmers than the government expenditure for its implementation. Currently, the governmental direct cash transfer through the ongoing subsidy policy reform is an important source of income for the agricultural households in the Study area, accounting for as much as 41% of their annual income. Under such a situation, it is expected that improvement of human, physical, and social capitals in the Study area through implementation of the Master Plan will lead, in the medium- to long-term, that participating farmers no longer need any assistance, thus contributing to reduction in the government expenditures. Therefore, the Master Plan is highly effective as a rural support measure.

(b) Outflow of population from rural to urban areas, caused by the economic gap between these two areas, and resulting high-aging and depopulation of rural areas that are currently ongoing, are urgent challenges to tackle, not only in South Khorassan Province but across the country. Moreover, the situations that the Study area is facing are likely to have many similarities to the general situations of arid rural areas in Iran. Therefore, although the Master Plan was formulated setting the limited area in Birjand Township of South Khorassan Province as a model, it can be widely applied in other areas of the Province and even in other provinces, and contribute to a long-term development of the target areas and alleviation of the burden on the government for taking a variety of measures to reducing poverty.

(c) However, it should be noted that the above-described effects of the Master Plan can be expected under conditions that there is no major change in external factors and the Master Plan is implemented as it was planned. There are various risks that could cause troubles in its implementation and thus prevent the full achievement of its positive effects, such as climate and natural disaster risks, biological and environmental risks, and market risks. For some of the proposed projects, their effects may be negatively impacted to a large extent, if the costs go up or the benefits go down, from their pre-estimated values in the plan. Therefore, it would be needed to closely monitor the possibilities for the above-mentioned risks to become real, as well as their significance if they are to become real.

(d) The Study area has barberry, jujube, honey and other items as specialty products. Looking more widely at South Khorassan Province, the list extends to saffron, pomegranate, apricot, pistachio, dates, sugar beet, cotton and a diverse range of other specialty products. In the Study area, in particular, although there are constraints on irrigation, fruits grown in the area are evaluated having high sugar contents. South Khorassan Province has the potential to enhance the added value of these types of agricultural products and fruits by processing, packaging and selling them.

(e) Farmers in the Study area and in South Khorassan Province have more non-agricultural income than agricultural income, most of them being involved in both farming and other jobs. The population is aging and young people are moving away from farming. Considering the labor constraints, to increase the farmers' incomes based on farming-related activities, it is important to promote fruit trees suitable for labor-saving management, such as barberries and jujube, and small-scale intensive horticulture (with introduction of simple skills) that can be performed by rural women, retired people, and elders. In particular, promoting small-scale economic activities

by rural women, who have previously had little involvement in economic activities, is essential for future stability of the operation of small-scale farms.

(f) As water volumes in qanats tend to decline, it is necessary at the field level to raise the efficiency of water usage and practice water-saving irrigation as much as possible. To that end, JAO would need to continuously conduct extension activities so that farmers have incentives to introduce water-saving irrigation. As examined in the Study, where there is enough slope, drip irrigation using natural pressure is appropriate to be introduced to save water, with a priority in orchard cultivation.

(g) The small-scale net house cultivation of vegetables implemented in the PP was observed to save approximately 50% of water volume, compared to the current system of 12 to 14 days of irrigation rotation. It was also demonstrated that a much increase in yield can be anticipated. The scale and nature of the facilities for net house cultivation can be varied, depending on whether the farmers intend to use them to boost their incomes or to cultivate for their own consumption. Moreover, it can be used in both mountainous and flat areas, as well as both in rural and urban areas.

(h) In the PP, sales by farmers at Wednesday markets, trial production of processed goods, marketing, and a market survey of potential for selling to retailers were conducted. The results clearly indicated the potential for enhancing the added value of agricultural products and diversifying sales channels. Therefore, the distribution and marketing program of the Master Plan aims to enhance the farming income "by extending the current specialty products into a sixth industrialization (combining through production - processing - distribution - sales) on the basis of customer needs."

(i) In areas that have no or little experience on group activities or economic activities by women, "rural women's fund" is extremely effective as an entry-level activity.

(j) The PP confirmed that the Study area has a high potential for small-scale household-level industries, such as weaving, small-scale poultry farming, and beekeeping by women. It also confirmed that such activities create jobs at the village level.

8.2 Recommendations

(a) This Master Plan shows measures to reduce the gap between urban and rural areas, through increasing farm household income and employment opportunities in the villages and regions, taking the Study area as a model. Reducing the gap between urban and rural areas is an issue which the Iranian Government considers as the most important. The several villages in the Study area have been already faced with a crisis of extinction. If the villages are left as they are with no actions taken, their extinctions will proceed, and national valuable social capitals, such as farm lands and qanats, will be abandoned. It would be a national loss. Therefore, it would be appropriate for MOJA to allocate budgets, reserved for reducing the gap between urban and rural areas, to the implementation of projects targeting rural areas, such as the Study area. As a part of such measures, MOJA is invited to implement the Master Plan without delay and establish a successful model for reducing the gap between urban and rural areas.

(b) As of October 2012, preparations were under way in the Study area for the "formation of a new women's cooperative" to continue and extend the PP activities implemented during the Study period, and the "construction of a direct sales shop or farmers' market," using the Japanese government's grassroots grant aid system. Such movements and continued PP activities could be advanced, together with the implementation of the Master Plan, so that the Master Plan achieves its expected outcomes and impacts. It is valid to promptly establish the JAO project office that the Master Plan proposes as its implementation organization, and at the same time to further strengthen the personnel. To put the Master Plan into effect on time, MOJA and JAO are invited

to take budgetary and other necessary measures.

(c) In the rural area of South Khorassan Province, including the Study area, qanats are the most important infrastructure that forms the social and economic basis of the residents. While rehabilitation of qanats was out of scope of the Study, for the Master Plan to achieve its planned goals, qanats need to be appropriately maintained. Therefore, MOJA and JAO are invited to make an effort to strengthen the administrative structure for qanat maintenance, based on the suggestions made in Project for qanat conservation, and take necessary budgetary measures for a series of activities from capacity development of concerned personnel to implementation of projects.

(d) The Master Plan aims to stabilize and improve incomes of small-scale farmers, who are the great majority of farmers in Iran, by employing little capital and using their limited land, water resources, and workforce. Although the Study selected the small study area as a model, the Master Plan presents measures for addressing issues existing throughout the country. Also, the Master Plan can be tailored in each program or as combinations of projects. Therefore, the same methods can be applied to the governmental support for rural areas in the whole country. Thus, it is recommended that the Master Plan be applied not only to the arid regions, such as the Study area, but also throughout the rural areas of Iran. In application of the Master Plan, both general and region-specific risks that may cause to decrease its effects need to be taken into careful consideration.

(e) Iran produces a wide range of agricultural products in its diverse regions, having four seasons and ranging from arid to rainy zones, and from flat to mountainous areas. The Study has indicated that increasing the added value of specialty products and extending farming to a "sixth industrialization" can be extremely effective measures for improving the livelihoods of small-scale farmers. It is recommended that MOJA develop, in the whole country or in specific provinces, a "One Village, One Product Movement," focusing on local agricultural or specialty products. The "One Village, One Product Movement" contributes to developing agriculture-related industries, and not just production.

(f) It is recommended that MOJA and JAO obtain and implement technical cooperation from overseas for the following activities, which are related to the contents of the MP.

1) Jujube, which is one of the specialty product items of South Khorassan Province, is difficult for farmers to propagate, and hence MOJA and JAO are recommended to implement a project to raise production of jujube seedlings.

2) Barberry and jujube are precious specialty products, which are strongly resistant to aridity. They both have medicinal effects and are expected to have diverse applications. Therefore, MOJA is recommended to use scientific analysis to advertise the medicinal effects in the country and overseas.

3) There are 17 women's cooperatives and cooperative federations in South Khorassan Province. With involvement of these existing organizations, it is recommended to develop projects for strengthening women's cooperatives, aiming to support economic activities by women in the province.

4) In South Khorassan province, there are abundant fruit trees and specialty products, and there is a potential for enhancing the added value, through processing and packaging. It is recommended that MOJA and JAO implement projects for processing agricultural products, aimed at creating new products, in collaboration with overseas small and medium enterprises.

5) Farming is widespread even in mountainous areas of Iran. With the aging of farmers, securing agricultural workforce is a challenge. MOJA and JAO are recommended to address this

challenge with projects for developing small-scale agricultural machinery that can be used by elderly people.

6) In the PPs, there was no opportunity to conduct a demonstration of medium-sized non-heated greenhouses to grow products for sale. MOJA and JAO are recommended to implement a project for extension of such greenhouses, which are highly practical.

7) Through implementation of the PPs and surveys conducted during the Study, it was found out that South Khorassan Province, including the Study area, has a high potential for promoting "Exchange with city-dwellers: Rural green tourism." This will be done through reviewing advantages of living in rural areas and re-evaluating existing local resources. MOJA and JAO are recommended to implement "Rural green tourism" as a method to revitalize the rural area, towards building prosperous rural areas.