ICARE
INTERNATIONAL CENTER FOR AGRIBUSINESS RESEARCH AND EDUCATION

TUFENKIAN FOUNDATION

"DEVELOPMENT OF A COMPREHENSIVE INFRASTRUCTURE AND COMMUNITY DEVELOPMENTPLAN"

AGRIBUSINESS FOR ARTSAKH (A4A) PROJECT

ICARE FOUNDATION May, 2019

Contents

1. Introduction 0
2. Methodology 1
3. Socio-Economic Analysis of Kashatagh region 2
   3.1 General information 2
   3.2 Social conditions 2
   3.3 Economic conditions 3
4. Current Situation in Observed Cluster Areas 7
   4.1 Kovsakan community 7
   4.2 Mijnavan Community 9
   4.3 Ishkhanadzor community 10
5. Analysis of 3 cluster areas 12
6. Selection of the Cluster Area for Community Development Analysis 15
7. Assessment of Mijnavan Community 15
   7.1 Target group 16
   7.2 Locational factors 17
   7.3 Sustainable development 20
   7.4 Governance 20
   7.5 Process management 21
8. Value chain analysis in Mijnavan community 22
   8.1 Fruit production value chain 23
      8.1.1 Challenges and Recommendations along the Fruit Value Chain 23
   8.2 Crop Production Value Chain 25
      8.2.1 Open-field farming 25
      8.2.2 Greenhouse cultivation 26
      8.2.3 Challenges and Recommendations along the Crop Production Value Chain 26
   8.3 Animal Production Value Chain 28
   8.4 Other value chains 29
9. Community development plan 29

9.1 Fruit Production 29
9.2 Vegetable and melon crop production 30
9.3 Dried fruit production 31
9.4 Production of wood briquette 32
9.5 Establishment of a processing company 33
10. Social Projects 34
10.1 Current state of social infrastructure 36
10.2 Recommended social infrastructure projects 36
11. Implementation schedule 37
Appendices 40
1. Appendix A: Biological-economic characteristics of trees grafted on Apricot Yerevan variety cloning rootstock and seed rootstock 40
2. Appendix B: Biological-economic characteristics of suggested peach varieties 41
3. Appendix C: Biological-economic characteristics of cherry varieties 42
4. Appendix D: Biological characteristics of recommended vegetables 43
5. Appendix E: Biological characteristics of legumes 44
6. Appendix F: Biological characteristics of strawberry 45
7. Appendix G: Biological characteristics of tomato 45
8. Appendix H: Fruit orchard establishment costs 46
9. Appendix I: Vegetable production establishment costs 47
10. Appendix J: Dried fruit production 48
11. Appendix K: Wood briquette production costs 50
12. Appendix L: Processing company establishment costs 52

1. Introduction

Kashatagh region is the largest of 8 regions in Artsakh Republic, with total area of 3,376.60 km^2, located in the south-eastern part. It approximately equals the size of Syunik marz in Southern Armenia, with which it has a border from the west, from north to east it borders Shahumyan, Martakert, Askeran, Shushi and Hadrut provinces respectively, and Islamic Republic of Iran in the south. Historically, Kashatagh was a part of Kingdom of Syuink. Kashatagh has 54 communities, out of which 3 are urban: Berdzor (formerly Lachin), Kovsakan (formerly Zangilan) and Mijnavan.

Kashatagh, in particular, is the strategic bolt that ties Artsakh and Armenia together, making them effectively one. In recent years, focus of Tuffenkian Foundation (TF) has begun to shift towards the economic and infrastructure development of Kashatagh. The purpose of TF is to make Kashatagh region an attractive place for new inhabitants through creating successful business models and engaging non-local entrepreneurs, not only to attract investments, but to transfer knowledge and skills to locals as well.

The liberated territory of Kashatagh has an extensive potential to become one of the most important pillars of Artsakh's economic development, as it has vast agricultural lands and a lengthy history of animal husbandry (especially during Soviet times).

Over the 6 months (October 2018 – March 2019) research team of International Center for Agribusiness Research and Eduction (ICARE) has implemented "Agribusiness for Artsakh" (A4A) project. The main objective of the project was to provide participatory assessment of Kashatagh region and development of a cluster-based, 3-5-year rural economic and community development plan for Mijnavan community (selection was done in the scope of the project). The work included identification of various investment opportunities in different value chains in the community.

1st phase of the project addressed fundamental questions in local economic development, that is assessment of existing capacities in 3 communities. Strengths and weaknesses of each cluster area including available labor resources, existing infrastructure and agricultural potential have been investigated for further analysis of agribusiness development in one of selected cluster areas. After thorough analysis of 3 cluster areas agreed with Tunfenkian Foundation, Mijnavan community has been selected for further value chain analysis and development of economic opportunity report which were carried out during the second and third phases of the project. This report is rather comprehensive and includes results of all phases of the project.

2. Methodology

Two complementary approaches Hexagon and GENESIS have been applied for identification of economic opportunities in Mijnavan community. GENESIS and Participatory Appraisal of Competitive Advantage (PACA) approaches were used for detailed value chain analysis, which helped to gain better understanding of the sectors in local community that are crucial for economic development and identify strategic interventions that are needed to enhance competitiveness and growth of local community. Porter's Diamond model was used for revealing competitive advantages of the sectors in Mijnavan[1].

In the early stage of the project, ICARE experts visited Kashatagh region, namely Mijnavan, Kovsakan and Ishkhanadzor communities and observed the area, land and weather peculiarities in mentioned communities for further development. On site consultantion for TF's beneficiary farmers was provided.

In the framework of "A4A" project in-depth interviews were conducted with the following stakeholders:

-Chief of staff of the minister of agriculture of Artsakh,

-Head of Kashatagh region,

-Head of Agriculture department of Kashatagh self-government body,

-Head of Kovsakan community

-Head of Ishkhanadzor community,

-Head of municipality of Mijnavan community,

-Employees/experts from Tuffenkian foundation.

3 focus group discussions were conducted with community residence for identification of regional advantages, potential value chains for development, prospects and obstacles hindering local economic development.

Total 13 semi-structured interviews were conducted with farmers in Mijnavan community.

[1] Hexagon, Genesis and PACA are tools/metohd used in local economic development (LED), Porter's Diamond Model is used to identify competitive advantages in selected cluster area.

3. Socio-Economic Analysis of Kashatagh region

3.1 General information

Kashatagh province is the biggest province of the de facto Republic of Artsakh. It covers area of 3,376.57 km^2 (29.5% of the total area of Artsakh Republic). Kashatagh has 54 communities[2] from which 4 are urban and the remaining 50 are rural. Kashatagh borders Shahumyan region in the north, Martakert Region in the north-east, Askeran Region, Shushi Region and Hadrut Region in the east. Iran in the south and Armenia are in the west of the Kashatagh province.

The relief of the Kashatagh region is rocky. The area is sharply steep. The climate is dry subtropical. Most part of the territory is mountainous and steep and many places are covered with bushes. Hagaru river flows through Kashatagh with its stream "Aghavnoget". Only narrow river valleys are favourable for agriculture in this province. The remaining northern area of the province is favourable for the development of animal farming. Unofficially the region is divided into two parts: northern mountainous part and southern part, where comparably favourable conditions for cultivation exist.

3.2 Social conditions

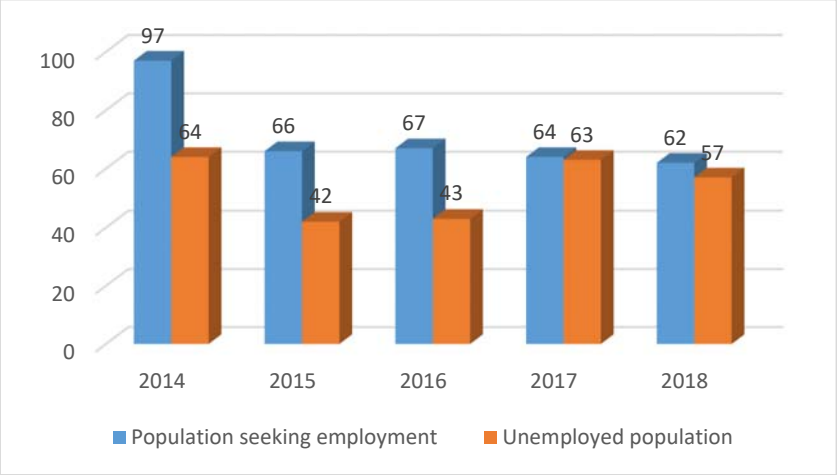
Population: As of January 2018, Kashatagh has a population of 11,568 people (out of which 31.3% urban, 68.7% rural) forming around 7.9% of the entire population of Artsakh Republic[3].

According to the National Statistical service of Artsakh Republic, total number of economically active population is relatively stable over the last 3 years after decline in 2015. In 2016, the share of unemployed population in total labor force (unemployment rate) was significant (see Figure 1 for details).

[2] Government of NKR, Kashatagh region
Link: http://gov.nkr.am/en/regions/details/52/

[3] National Statistical Service of Artsakh Republic, Statistical yearbook of artsakh republic, 2018
Link: http://stat-nkr.am/en/component/content/article/896------2018

Figure 1: Breakdown of employed and unemployed population in total labor force in Kashatagh region, people



Source: National Statistical Service of Artsakh Republic

Average monthly gross salary increased from 112,808 AMD to 117,306 AMD in 2016-2017 time period, which are 26% and 24.5% less than average gross salaries in Artsakh for 2015-2016 years correspondingly.

Poverty: Poverty level in Kashatagh province is showing increasing trend for 2015-2016. The level of poverty increased from 28.4% (out of which 7.3% is extremely poor) in 2015 to 35.5% (out of which 21.2% is extremely poor) in 2016. Average poverty level in Artsakh increased from 22.8% in 2015 to 23.3% in 2016. The level of extremely poor in Artsakh decreased from 6.5% to 6.2% for the same period. Data on poverty level was not updated for 2017 and 2018.

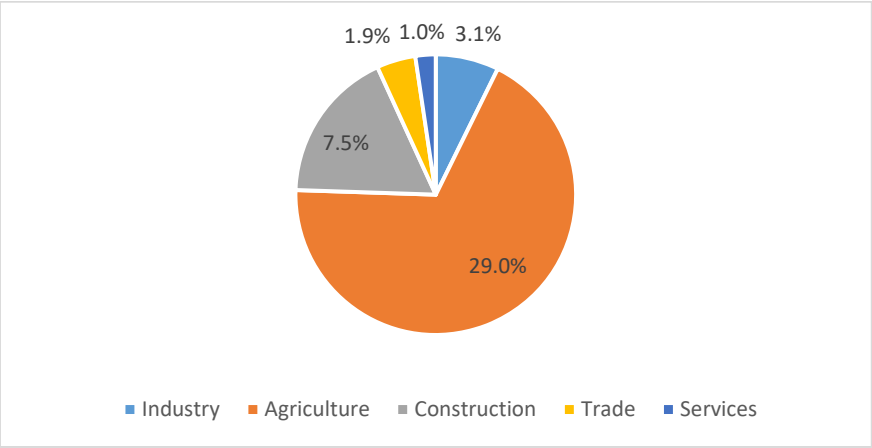
Migration: According to the National Statistical Service of Artsakh Republic 6.3% of Artsakh household members of the age of 15 and over who were involved in migration processes in 2014-2016 and have not returned are from Kashatagh. 0.6% of migrants who left Artsakh and returned in 2014-2016 time period were from Kashatagh. 4.6% of all Artsakh Rpublic migrants in 2014-2016 were from Kashatagh.

In this context, it is important to mention about the resettlement program implemented by the Government of Artsakh. In 2017 45 families (186 people from which 96 children) were resettled in Kashatagh.

3.3 Economic conditions

In 2017, in Kashatagh the value added by main sectors of the economy within total volume of corresponding sectors in Artsakh is presented below (Figure 2): Not surprisingly, agriculture has the largest share in the economy, considering favorable conditions for cultivation of crops and growing fruits in the region. Plus, resettlement program offers number of privileges to families and individuals who are eager to get involved in agricultural activities.

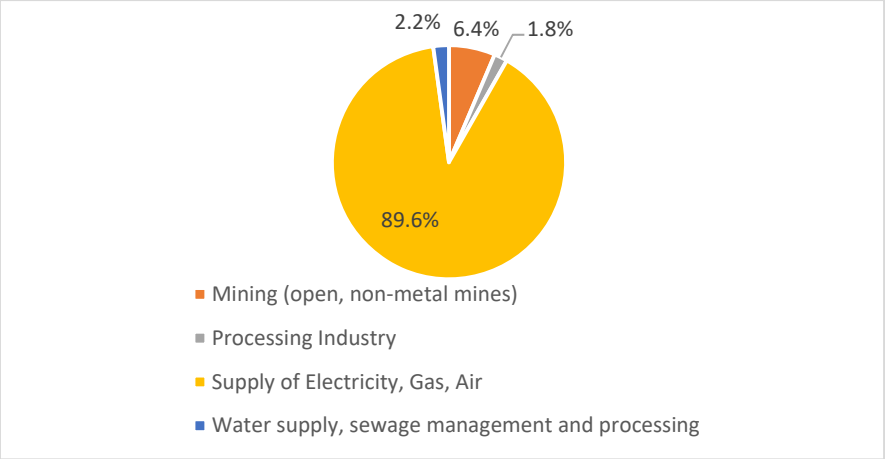
Figure 2: Value added by main sectors of the economy as a percent in total value of corresponding sectors in Artsakh, 2017



Source: National Statistical Service of Artsakh Republic

As described in Figure 3, supply of electricity, gas, air contributes 89.6% of total industrial output in Kashatagh. Minor contribution in total industrial output have processing industry, mining and water supply.

Figure 3: The structure of industrial output, 2017



Source: National Statistical Service of Artsakh Republic

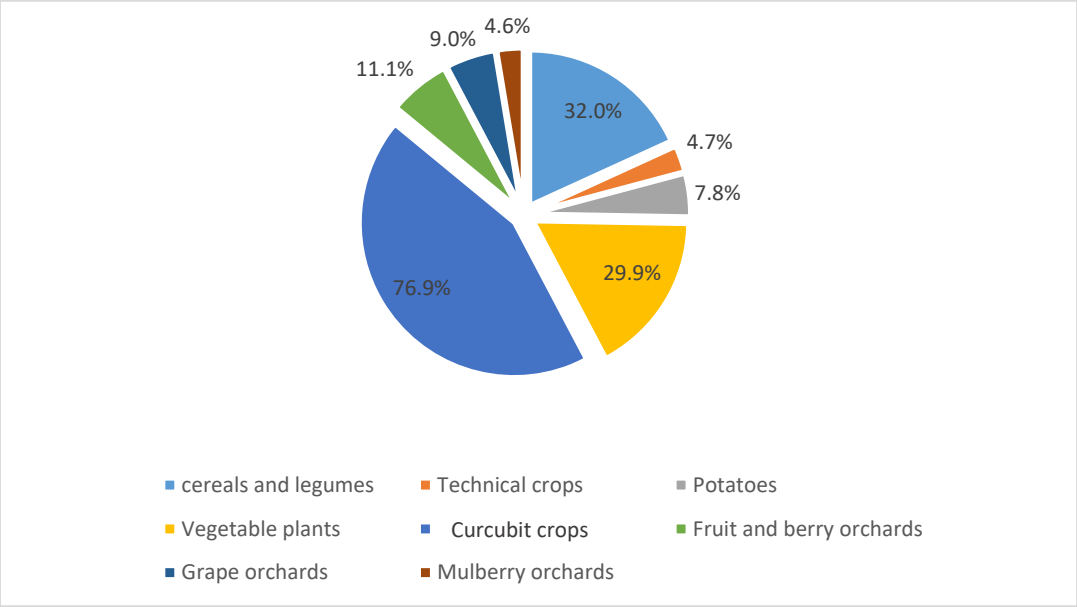
It is worth mentioning that significant portion in processing industry have Food Processing (65.2% of total Processing output) and wood processing excluding furniture production (33.5% of total output). Currently, agriculture and mining are the main branches of Kashatagh economy. Mining areas are located generally in Northern parts of the region, while southern parts of the region generate most part of agricultural produce.

Agriculture: Kashatagh has significant strategic role in Artsakh agriculture. 31.2% of all agricultural land and 31.6% of all yielding land-lots are located in this province.

The province is the leading one with the number of cattle as well. Kashatagh can roughly be divided into 2 parts: South and North Kashatagh. Favorable conditions for animal breeding and animal farming in Northern mountainous parts of Kashatagh exist, where there is enough pasture land, while in the Southern parts, near the river banks there are lands that are comparably favorable for cultivation.

As illustrated in Figure 4, cucubit crops (includes watermelon, pumpkin, cucumber), cereals and legumes and vegetable plants have the largest share in total agricultural production in Artsakh.

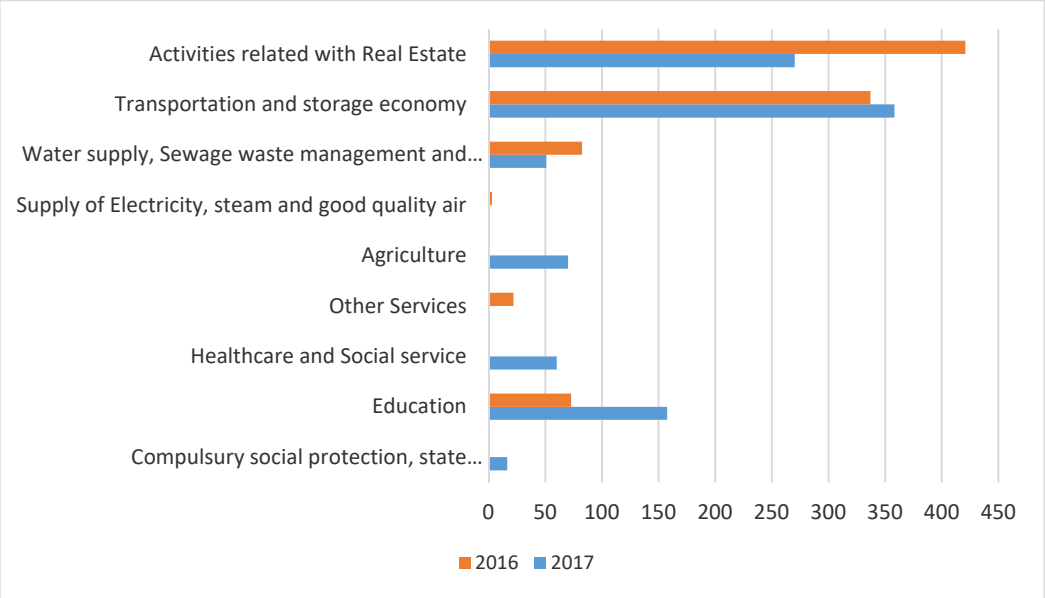
Figure 4: Contribution of Kashatagh Province to the agriculture of Artsakh Republic in percentage, 2017



Source: National Statistical Service of Artsakh Republic

Construction: Government of Artsakh allocated 6.8% and 6% of their annual construction budget in Kashatagh in 2016 and 2017 respectively. The structure of the State construction projects is shown in Figure 5.

Figure 5: The Structure of the state construction projects in million AMD, 2017.



Source: National Statistical Service of Artsakh Republic

4. Current Situation in Observed Cluster Areas

Kovsakan, Mijnavan and Ishkhanadzor communities of Kashatagh region were included in this study. The current situation of communities are presented in next sub-sections.

4.1 Kovsakan community

Kovsakan community is situated in Qashatagh region in Artsakh Republic on the bank of Voghj river. The community is in south-western part of Artsakh Republic. It is 100 km from Berdzor regional center and 147 km from the capital Stepanakert. Kapan-Mijnavan railway which is now in poor condition used to go through Kovsakan community. Community is located on plains. Total area is 21,273.3 ha of which 5889.7 ha is agricultural lands and 10,124 ha is forest area. Total population in community is 680 people of which 205 are over 18 and 23 are retired. As discussed with the head of Kashatagh agricultural department, animal husbandry, cultivation of grains, grapes, pomegranate and persimon are the primary agricultural activities that people undertake in Kovsakan community of Artsakh.

Kovsakan community has:

- 2 schools
- 1 hospital
- 1 police
- 1 kindergarten
- 1 fire service

Agriculture sector: Economy of Kovsakan community is heavily dependent on agriculture. Primary income source for smallholder farmers is agriculture as well. As presented in Table 1, main area of agricultural land is used for cultivation of barley (800 ha), wheat (550 ha), melon crops (50 ha), vegetable crops (43 ha) and orchards, which comprise only 31.5 ha of total agricultural land. Orchards of pomaceous fruits (6.5 ha), stone fruits (10 ha), walnuts (10 ha) and pomegranates (5 ha) are established in the community. Forest area is the largest in Kovsakan community and people in the community are involved in the harvest of wild herbs and berries. Since the harvest is not done for the commercial purposes, harvested amounts are not being controlled and recorded. Despite the favourable weather conditions in the community, farmers do not grow fruits, because of the perishability issue and the lack of processing company in the community or nearby regions. That is the reason that farmers grow crops that have longer shelf life and can be distributed to regions in Armenia.

Table 1: Crop land area, 2017

Crop/Plant	Area, ha
Barley	800
Wheat	550
Melon crops	50
Vegetable crops	43
Orchards	31.5
Corn	22
Corn for silo	10
Potatoes	3.5
Vineyards	2
Mullberies	2
Onion	1
Garlic	1
Beans	0.3

Source: Local self-government bodies of Kashatagh Province

Animal Husbandry: Animal husbandry practices are well introduced in Kovsakan community. Number of livestock, poultry and beehives is presented in Table 2. The community is a leader compared to 2 other communities observed with the number of livestock and poultry which can be explained with the availability of pasture areas (4036 ha) in the community and short distance from Syunik region. As discussed with the representative of agriculture department in Kashatagh province, there is no dairy production or milk collection points in Kovsakan, which leaves farmers with no other option, than to cut the number of cows kept. And with the number of beehives as well Kovsakan community is leading. Although there is a decreasing trend in this category, the number of beehives are 3 times more than those in Ishkhanadzor. Mijnavan community does not have beekeeping practices at all.

Table 2: Number of livestock and poultry in Kovsakan community

	2016	2017	2018/12
Cattle	550	300	335
of which: cows	275	115	125
Pigs	250	355	400
sheep and goats	1200	758	830
Poultry	3200	4910	6750
Beehives, unit	100	66	70
Horses and donkeys	3		2

Source: Local self-government bodies of Kashatagh Province

4.2 Mijnavan Community

Mijnavan community is located in southern part of Kashatagh region. It is situated 105 km from Berdzor regional center and 152 km from the capital Stepanakert. Community has 5,634 ha total area of which 4186.3 ha is agricultural land, 938.7 ha is forests. Araks river is flowing across the border of Mijnavan community. Jugha-Horadiz and Mijnavan-Kapan railway used to pass through Mijnavan. Mijnavan has the lowest altitude compared to Kovsakan and Ishkhanadzor communities. Its elevation is about 500 meters above sea level. Total population in the community is 841 people, 216 households. It is worth mentioning that the Government of Artsakh plans to build water supply system and external water supply line for Mijnavan town[4] as stated in midterm state expenditure plan. Orchards and vegetable plant cultivation are the main economic activities in the community, according to the head of Kashatagh agricultural department.

Agriculture sector: Agriculture comprises the lion share of the economy of Mijnavan community. As presented in Table 3, main area of agricultural land is used for cultivation of barley (500 ha), wheat (250 ha), melon crops (30 ha) and vegetable crops (16 ha). The largest cultivated orchard area among the three communities has Mijnavan. 39 ha of orchards was established in Mijnavan community. Pomegranate orchards (30 ha) are the most preferred ones in this community. Orchards of pomaceous fruits comprise 6 ha. 3 ha of orchards are stone fruits and walnuts.

Table 3: Crop land area

Crop/Plant	Area, ha
Barley	500
Wheat	250
Orchards	39
Melon crops	30
Vegetable crops	16
Potatoes	3
Beans	1

Source: Local self-government bodies of Kashatagh Province

Mijnavan has the largest pasture area (6,781) among the observed communities. Forests occupy 938 ha.

[4] Midterm State Expenditure Plan of Artsakh Republic, 2019-2021 (p 115)

Animal Husbandry: Mijnavan community is more comparable with Ishkhanadzor community in animal husbandry practices. Number of livestock, poultry and beehives is presented in Table 4. The community has relatively higher number of pigs and sheep than Ishkhanadzor community. The community does not have beekeeping practices at all. The animal husbandry practices have not changed significantly in recent 3 years.

Table 4: Number of livestock and poultry in Mijnavan community

	2016	2017	2018/12
Cattle	51	45	56
of which: cows	18	19	21
Pigs	186	269	192
sheep and goats	475	404	446
Poultry	782	1430	739
Horses and donkeys		2	2

Source: Local self-government bodies of Kashatagh Province,

4.3 Ishkhanadzor community

Ishkhanadzor used to be a village in Kashatagh region in Artsakh. Currently, Artsakh Government is considering making Ishkhanadzor provincal center for Southern Kashatagh province. It is situated 62km south-east from Hakar river on the crossroad of Goris-Hadrut and Berdzor-Kovsakan. Population of Ishkhanadzor is mainly involved in farming and horticulture. Total area is 1700 ha of which 120 ha is forest area. Community is in central position and has been heavily inhabited in the last 3 years with the support from Government of Artsakh and Kashatagh Charity Foundation. 10 houses were constructed in Ishkhanadzor in 2017. In 2015, 35 individuals (11 families) have been resettled in Ishkhanadzor, 55 individuals (12 families) in 2016, 93 individuals (19 families) in 2017 and 220 individuals (45 families) in 2018. Total population in Ishkhanadzor is 570 people. 339 people are over 18 and 69 people are retired. [5] Most resettled families come from Gyumri, Vanadzor, Hrazdan, Charencavan, Artashat and Yerevan. As most of the population in Kashatagh, people in Ishkhanadzor are involved in agriculture.

The community has:

- 1 medical station
- 1 police inspector
- 1 school
- 1 fire service

[5] Data received from Ishkhanadzor community local self-government bodies

Agriculture sector: As depicted in table 5 below, main agricultural areas in Ishkhanadzor are used for production of barley (700 ha) and wheat (450 ha). The area under orchards is only 19.5 ha and the largest share of the area is used to grow pomegranate (10 ha). Eastern dates with with 5 ha area, pomaceous fruits with 4 ha area and walnuts with 3 ha area follow pomegranate orchards with the share in total area of agricultural lands in the community. Crop and fruit production is not well diversified in Ishkhanadzor community. Farmers are mainly involved in growing barley and wheat. Barley production was 1981 tons and wheat production was 1,476 tons in 2017. It should be noted, Ishkhanadzor community has larger area under grain cultivation compared to Mijnavan community, and the yield is respectively higher compared to Mijnavan also explained by proper cultivation techniques. Ishkhanadzor has the smallest forest area compared to other communities and wild collection practices are not properly explored yet. As discussed with the community self-government bodies, retailers from Goris and Kapan are the main buyers of agricultural produce produced in Ishkhanadzor and they buy the produce just from the farmer's fields.

Table 5: Crop land area 2017, ha

Crop/plant	Area (ha)
Barley	700
Wheat	450
Total Orchards	19.5
Corn	8
Melon crops	2
Mullberies	2
Vegetable crops	1.6
Potatoes	1
Vineyards	1
Garlic	0.5
Onion	0.3
Beans	0.2

Source: Local self-government bodies of Kashatagh Province

Animal husbandry: As depicted in table 6, animal production is collapsing in Ishkhanadzor community. The number of livestock except for pigs has been decreasing in the last 3 years. One of the factors is the small pasture area in the community and the lack of sheds. Although area under pastures in Mijnavan is 7 times larger than in Ishkhanadzor, number of cows in the community exceeded the same category in Mijnavan 4 times in 2017 and 2 times in 2018. Again, as in other 2 communities observed, Ishkhanadzor is also facing lack of milk collection points and processing companies, which can stimulate the production of milk and other dairy produce.

Table 6: Number of livestock and poultry in Ishkhanadzor community

	2016	2017	2018/12
Cattle	219	105	100
of which: cows	115	90	50
pigs	45	65	126
sheep and goats	396	448	350
poultry	1100	2315	1000
beehives, unit	21	22	21
horses and donkeys	6	4	1

Source: Local self-government bodies of Kashatagh Province

5. Analysis of 3 cluster areas

The observed 3 communities in Kashatagh region have comparably same structure of economy, climate and infrastructure. Residents of the communities are mainly resettling families, which receive state financial support and usually get involved in agriculture. Ishkhanadzor has state supported residential housing project and the largest population among 3 other communities observed.

Telecommunication services, water and electricity supply are available in all communities. Electricity supply is being suspended from time to time conditioned with network extension works. Overall quality of services is satisfactory in all 3 communities observed.

The communities have approximately same elevation above the sea level, which offers favorable climate conditions for high value agricultural plant cultivation. In this context, Mijnavan has a little advantage over other communities observed, as it has the lowest elevation and river Araks crosses its border providing additional opportunities for fish growing. The economy of the communities heavily depends on primary agriculture. There are no food processing or milk collection companies in the communities. Production is sold in Artsakh and in Syunik regions. The absence of asphalt covered roads makes transportation of agricultural goods and equipment quite difficult. Kovsakan and Mijnavan communities are situated closer to Kapan city and it is comparably easy to attract equipment from Syunik region.

Figure 6: Community strengths and weaknesses

Strengths	**Weaknesses**
Kovsakan community	
➢ Favorable natural conditions ➢ Well established animal husbandry practices ➢ Location near Syunik region ➢ Available labor force (205 people are over 18 y.o. and 23 are retired)	➢ Insufficient number of agricultural machinery ➢ Lack of milk collection points ➢ Lack of processing companies ➢ Poor condition of roads
Mijnavan community	
➢ Favorable weather conditions for orchard establishment ➢ Largest available pasture area ➢ Location near the river ➢ New and efficient water supply system to be constructed in Mijnavan	➢ Insufficient number of agricultural machinery and labor ➢ Lack of processing companies ➢ Poor transportation infrastructure
Ishkhanadzor community	

➢ Favorable location (on the crossroad of Goris-Hadrut and Berdzor-Kovsakan) ➢ Available labor force ➢ Large area of available arable land	➢ Not well diversified agriculture ➢ Insufficient number of agricultural machinery ➢ Lack of processing companies ➢ Poor transportation infrastructure

Kovsakan community has the largest cultivated area and the highest potential in animal husbandry. Mijnavan has larger orchard area and better climate conditions for cultivation of fruits. It also has the largest pasture area. Ishkhanadzor community is specialized in production of barley and wheat. The other crop/plant cultivation area is smaller and therefore the yields are low.

Taking into consideration current projects in Ishkhanadzor and Kovsakan communities, particularly state initiative of making Ishkhanadzor provincial center for Southern Kashatagh, state supported residential construction in Ishkhanadzor community, public-private investments in Kovsakan community, Mijnavan community was selected for cluster analysis to ensure balanced and dynamic development of Southern part of Kashatagh province. Distance from Mijnavan community to Kapan is approximately 43 km, and its distance from Ishkhanadzor community that is going to be a regional center is approximately 40 km. That makes available active cooperation with the communities and offers potential economic benefits. Mijnavan has favorable climate and soil characteritics for high value crop/plant production. The resettlement program privileges cover Mijnavan community resettlers as well, which is a big plus in attracting labor force to Mijnavan community.

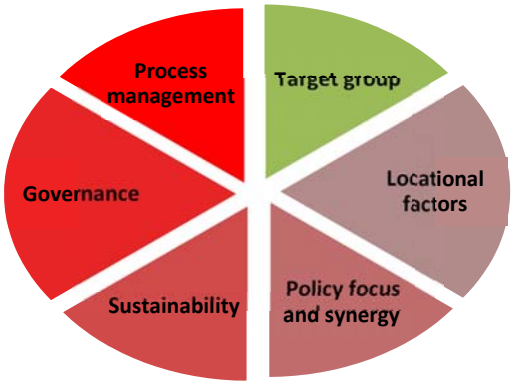
6. Selection of the Cluster Area for Community Development Analysis

Thorough analysis of 3 communities in Kashatagh region through interviews conducted and the secondary data analysis revealed strengths, weaknesses and current state of socio-economic conditions in each of the regions. All three communities have identical infrastructure, social problems and opportunities. Investing in Mijnavan community development would contribute to having 3 communities develop with almost the same pace, and the cumulative economic and social impact of their cooperation would be higher as compared with the case of having only 2 communities with all public-private investment flows. The decision to select Mijnavan community for further economic development analysis have been discussed and agreed with Tufenkian foundation.

7. Assessment of Mijnavan Community

Situational analysis of Mijnavan community with the aim of revealing economic potential and identifying the promising sectors in the community have been implemented through application of "Participatory Appraisal of Competitive Advantage" (PACA), where stakeholders played an active role in identifying factors hindering economic development and opportunities that can be utilized. Furthermore, some relevant features of Porter's Diamond Model have been applied to highlight competitive advantages existing in the community. Hexagon approach of a community development conceptualized key issues in local economic development. The 6 factors of Hexagon approach helped to identify complexity of Mijnavan community development. The six triangles of Hexagon approach are displayed in the **Figure 7** below:

Figure 7: The hexagon of key issues on local community development:



The business concepts were proposed and designed following the applicable principles of this approach.

7.1 Target group

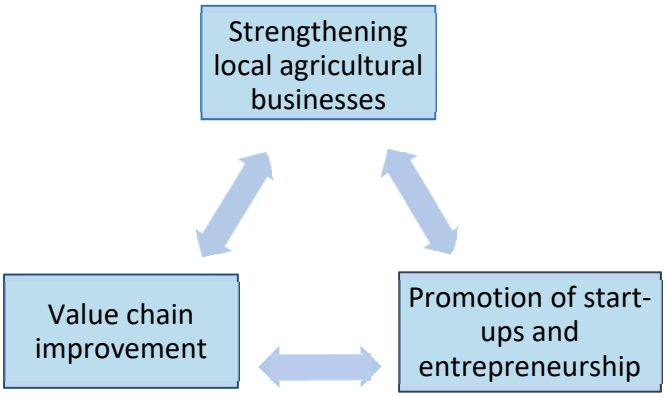
Economic development is achievement of hard work and dedicated members of community and supporting organizations. Mijnavan community households engaged in agriculture activities were the main target group in the framework of this strategy. Prioritization of agriculture sector was done considering its major role in economic activeness of the community. All Mijnavan community members are considered to be beneficiaries of current development strategy.

The target group is engaged in production of fruits (persimmon, pomegranate, fig), vegetables (tomatoes, eggplant, cucumber), cereals (wheat, barley, lucerne, corn), melon crops (watermelon) and animal farming. Most part of the target group has secondary education. Individual surveys with Mijnavan residents engaged in agricultural activities revealed that few people have university education, however they do not work with their profession.

It is important to mention that the target group does not have strong trust towards their local self-government bodies. Thus, this relationship should be improved in order to secure tangible results from the development strategy implementation. Transparency, equal access to state programs and awareness raising about existing and upcoming government programs should be properly coordinated with local authorities.

Hexagon methodology suggests different approaches for strengthening local household and promotion of start-up initiatives varying from targeted skills development, business networking to entrepreneurship training, launch of business incubators and subcontracting and spin-off promotion. The concept of economic development is shown in Figure 8.

Figure 8: The target group of local economic development



7.2 Locational factors

The quality of life and business environment in the community were assessed with the "Locational factors" triangle of Hexagon approach.

Location of the community: Mijnavan community is 42.3 km away from Kapan-the largest city in Syunik province and is 185 km away from Stepanakert. Being situated close to Kapan and Meghri cities, Mijnavan community residents have been benefitting from trade opportunities with Armenian cities. Collection points were established in Meghri in the scope of ‘’Markets for Meghri’’ project implemented by CARD foundation. Furthermore, farmers in Meghri received consultancy and trainings in wide number of agricultural topics in the scope of the project, which means experience sharing with this farmers will be an asset for Mijnavan community members. Another advantage of community location is Araks river bank. Focus group participants highlighted the functional importance of river adjacent location. Araks river evokes certain national sentiments as well. It inspires the residents and suggests that the community could be a tourist destination.

Climate: Mijnavan has mild and humid climate. Winters are short and there are no severe winds in this community. Conditions are friendly for the foundation of orchards.

Soil: All surveyed residents and focus group participants confirmed that the soil in Mijnavan is very fruitful. For certain period of time they were not cultivated and could accumulate significant useful microelements and regenerate. Both focus group participants and agronomy experts mentioned about the need of doing soil analysis for proper determination of soil properties.

Infrastructure: Mijnavan community has poor transportation and communication infrastructure. Most parts of the roads connecting the community to its strategic partner cities Stepanakert and Kapan do not have asphalt coverage. It is difficult to transport goods, agricultural equipment, aid

and other necessary supplies through these roads. The residents have access to the internet services. However, the average internet speed and price are higher as compared with the Armenian average. As the interviews revealed poor infrastructure particularly hinders trade opportunities with producers/processors and middlemen from Armenia and Stepanakert. There were cases when the prices of vegetables and fruits dropped because of bad transportability of the crops. In addition to poor roads and communication, there is no hospital/medical point, kindergarten, cultural centre in community. If the road connecting Ghapan to Mijnavan/Kovsakan, onward to Arajamugh and on to Hadrut is constructed as planned by the Government of Artsakh, this may open up possibilities for collaboration with processing companies, retailers in Armenia, expand trade opportunities and attract new resettlers to stay and work in the community.

Workforce*:* There are about 841 residents, that is 216 households living in Mijnavan community (in Mijnavan and three adjacent villages together). As discussed with the community members there is a problem with the involvement of local workforce during the harvest season. Everyone is working in their own farms, and it is difficult to hire additional labor force. Average daily rate for agricultural works is 5000 AMD. There are no highly qualified agronomists and veterinary specialists in Mijnavan community for consulting local residents engaged in agriculture.

Energy resources: Mijnavan community does not have natural gas supply. The electricity supply infrastructure is in development stage, because of which electricity supply quality is low and there are certain areas and residential houses that do not have access to electricity supply network. The community has abundant firewood resources that are vastly used by the residents for heating purposes.

State Support programs: The Artsakh Republic tax service exempt land, profit and income taxes of citizens who are engaged in agriculture. The water fee is the only state payment that should be done by the residents who want to start agricultural businesses. The government offers several support programs: subsidizing fertilizer prices, granting zero percent borrowings for drip irrigation system, granting lump-sum payments for vegetable producers, price subsidy is applied for tobacco cultivation. However, the surveyed community residents unilaterally agreed that the government support programs do not contribute to the development of their community as a whole and are not efficient.

Housing conditions: In their interviews and focus group discussions the residents of Mijnavan community complained about housing conditions. They explained they have got damaged houses and often they need to repair them without any support from the state or local self-government bodies. Absence of drinking water supply was among major issues emphasized during focus group discussions.

Social infrastructure and services: Mijnavan has a school though it does not have highly qualified teachers. The community does not have a kindergarten, which affects socialization of children and agricultural works of the community residents. The closest hospital to Mijnavan is situated in Kovsakan town (approximately 11 km). The community has only 1 medical treatment point and 1

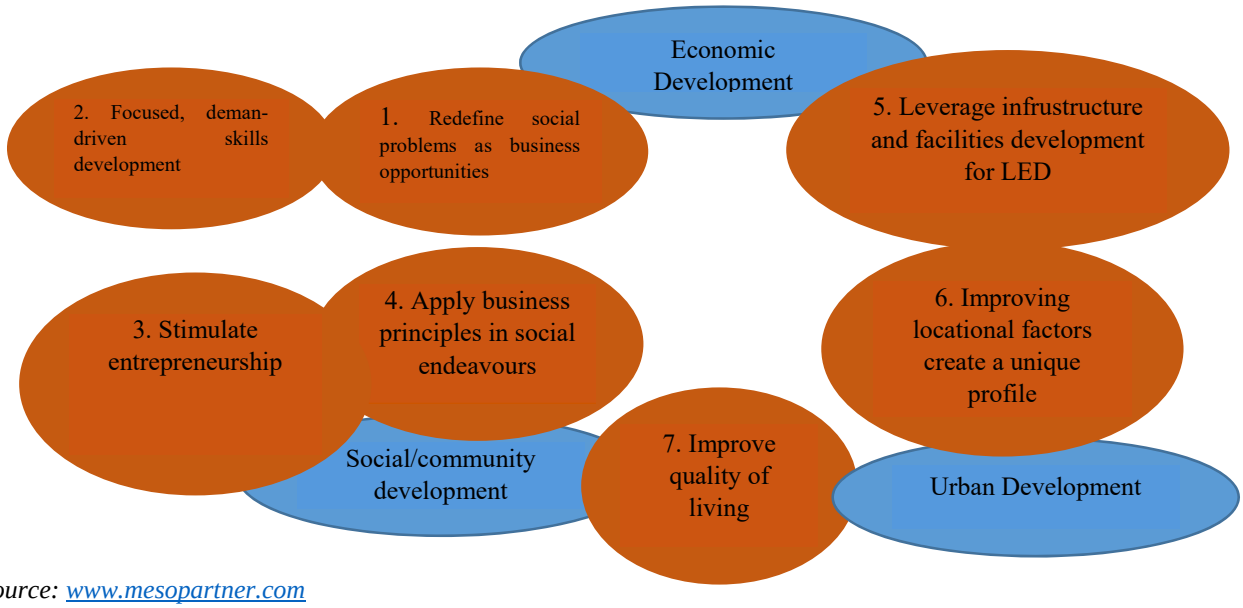
first aid car both poorly equipped. Van community has school with 36 pupils and needs some renovation. No health point and mayor's office are available. No kindergarten is available; there are 6 pre-school age children who may attend kindergarten in nearby settlements. Mush community has newly and fully renovated school where children from neighboring Alashkert community attend. Container serves as health point and mayor office, as well as for youth to gather and spend time there. Alashkert has no school / kindergarten/ health point and mayor office. Mayor and nurse provide service in their own houses.

Cultural life: Another issue the residents were concerned with was the absence of cultural extension classes available in Mijnavan community. Local municipality has facilities that can be used for organizing cultural classes in Community.

Support from local self-government bodies: The residents consider the local self-government bodies do not provide equal opportunities for everyone. The residents believe they cannot trust and rely on the local self-government bodies. The mayor of Mijnavan explained that the budget is very small and the local self-government bodies can do very little for the community.

Synergies: The community itself should be engaged in its regional development plan. The development strategy should focus on the current needs, capacities and moods of the community. **Figure 9** helps to highlight the difference between community development and community involvement and the importance of creating synergies between local economic development, local social development and urban development.

Figure 9: Synergy scheme



Source: www.mesopartner.com

Through **addressing social problems** in the community, such as housing, cultural life, upgrading the schools and training the teachers will open up possibilities for economic development of the community. Community resettlers and newcomers once seeing social problems solved will be eager to come and start businesses in Mijnavan. **Urban development** through improvement of the infrastructure and existing facilities will enhance economic development of Mijnavan, thus expanding trade opportunities and attracting investors to the community. **Promoting entrepreneurship** through organizing training for farmers and providing small grants for leader-farmers will in return contribute to social development and economic development of the community.

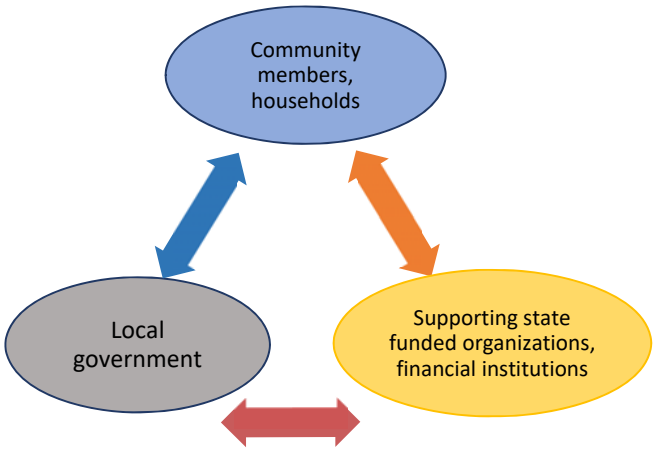
7.3 Sustainable development

For sustainable development of Mijnavan community, both social change and sustainable economic development should be enhanced. Capacity building should be based on the three pillars: economic development, ecological development and social development with the ultimate goal being improvement of the quality of life of the residents and protecting the environment. Substituting externally produced goods and services with the locally produced ones and reducing cash outflow from the community will greatly contribute to improved economic performance of the community. Mijnavan has only two shops and few agricultural equipment service providers. There are no processing companies, recreation services or cultural centers where the residents can spend their money. It is important to note that the community members themselves see this as a big problem, and some of them have already developed business concepts for establishment of a grocery shop, café and a processing company and are willing to contribute to money circulation inside the community.

7.4 Governance

The 5th triangle of hexogen emphasizes the role of the efficient governance framework and the importance of public private partnership. As it was mentioned above, surveys with Mijnavan community members revealed significant mistrust of the community members towards local self-government bodies, conditioned by their subjective assessment of efficiency of the government support programs and the quality of public services provided. To maximize the implementation effect of the community development plan, increased transparency and gradual growth of public trust towards the local self-government bodies should be ensured.

Figure 10: The triangle of governance for Mijnavan community



7.5 Process management

Specific monitoring methodology and tools for community development plan and permanent growth cycle provision should be adopted. It is important to keep track on the strategy implementation activities constantly. It would be advised to allocate a special oversight team to Mijnavan for coordination, communication and monitoring purposes. The three monitoring cornerstones Hexagon methodology suggests are:

- Participatory diagnostics, which is effectively done by employing PACA approach
- Participatory planning, designed to enable vast majority of the community to benefit from the proposed strategy
- Participatory monitoring, evaluation and bench-marking, which done by the oversight team would increase the efficiency of the strategy and provide its sustainable effect on the community

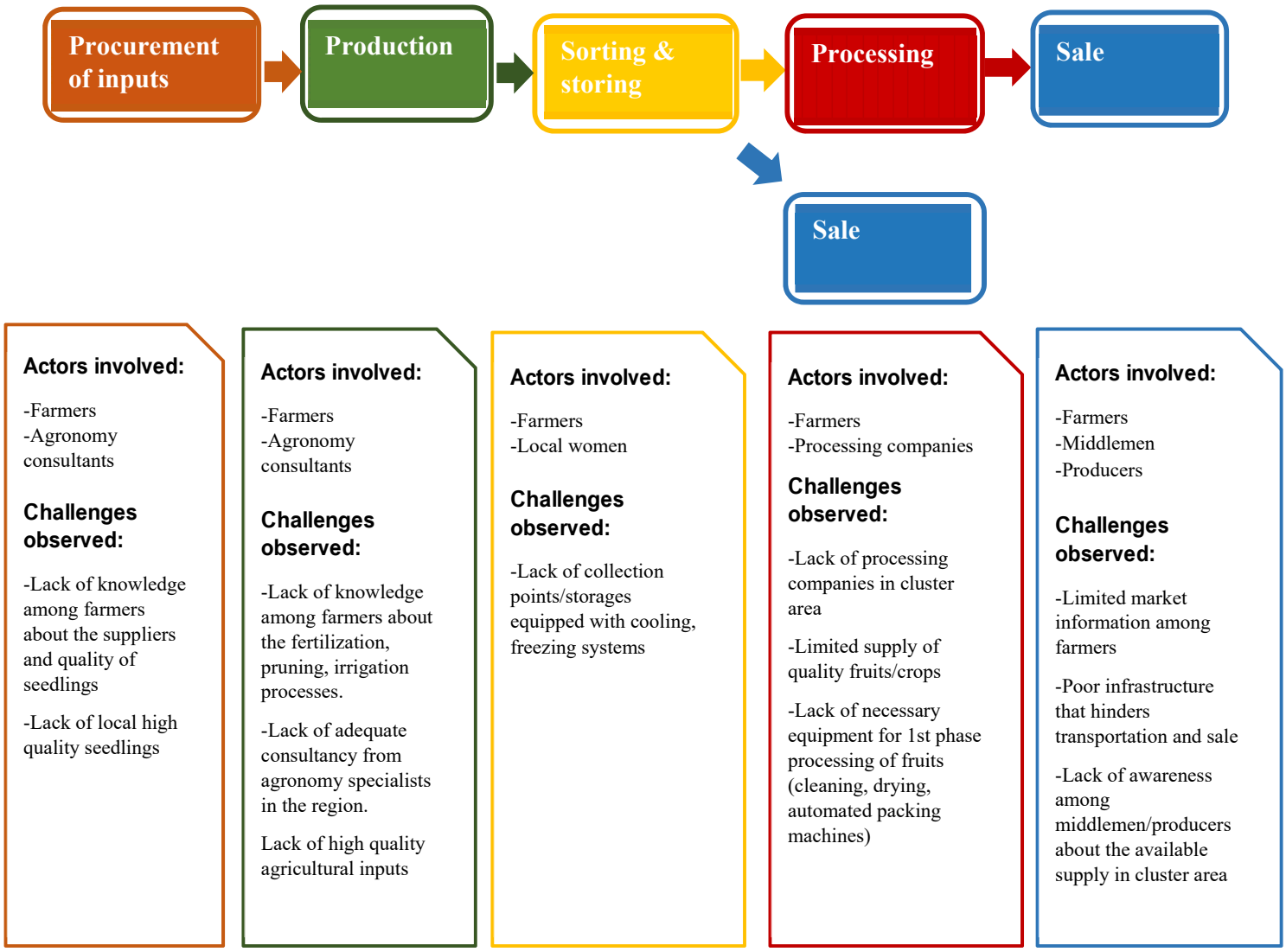
The mentioned monitoring activities should be accompanied by three more practical activities such are:

- Identification and mobilization of Mijnavan community leaders and interested stakeholders (Government representatives, local authorities, NGO reps, etc).
- Implementation of local economic development plan in close collaboration with the community leaders and stakeholders.
- Reflection and adjustment: monitoring the implementation activities in the community, introducing new instruments and activities, adjusting existing activities where necessary.

8. Value chain analysis in Mijnavan community

Value chains of different agricultural products in Mijnavan community were analysed. During the visits the landscape, some of the local orchards were observed and interviews with farmers were conducted. Biological and economic efficiency of the observed crops were assessed. The assessment revealed possible value chains to be further developed in the community, challenges observed along the value chains and the recommendation for future improvement. Following sections of the report describe the observed value chains.

Figure 11: Typical value chain scheme in Mijnavan community



8.1 Fruit production value chain

Climate conditions in Mijnavan community compared to 3 regions in Armenia (Tavush marz, Ararat valley and Meghri) are more favourable and mild. The absolute minimum in winter is -9°C -(-10°C). Rainfalls are mostly concentrated in April-May, after flowering, and this does not damage the pollination process. The location of land, the slope and orientation are sufficient for growing high value fruits and for the establishment of orchards. Considering the favourable climate conditions, expert evaluation conducted in 2017 in Mijnavan and the factors that affect biological and economic efficiency of cultivation of fruits, the following fruits and their varieties are recommended for cultivation.

- Apricots-early varieties
- Peaches-early varieties, mid growing varieties, late growing varieties
- Cherries-early varieties
- Persimmon
- Pomegranate
- Mulberry
- Fig

Recommended varieties for the trial:

- Olive
- Pistachio

It should be noted that when recommending varieties for cultivation first and foremost a priority was given to biological effectiveness of the plant. The key condition for ensuring the efficient growth of trees is the right selection of appropriate varieties considering soil and climate conditions in the region thus minimizing risks of losses.

Fresh fruit production can be further expanded to **processed fruits (production of jams, juices) and dried fruit production.** Key features of suggested fruit varieties is presented in Appendix A.

8.1.1 Challenges and Recommendations along the Fruit Value Chain

- **Procurement of seedlings**

Challenges observed: As the initial meeting with farmers in Mijnavan revealed, lack of information about the potential suppliers of quality seedlings and the lack of local/regional suppliers was one of the causes for low level of yield and widely spread diseases and pests. Farmers are not aware of quality requirements set for seedlings and usually procure what is available.

Recommendation: Seedlings from the Krymsk scientific-research institute in Krasnodar territory and Nikitinsk botanical garden are advised to be imported as they have been tested and have a certificate. Additionally, these 2 places mentioned are the closest to Armenia, the prices for seedlings are affordable and have similarities to Armenian soil-climate situation. Plus, it is strongly advised to give basic information to farmers about planting, care and growing of seedlings, since this is the crucial point in ensuring high quality yield.

- **Cultivation**

Challenges observed: Fungal diseases (moniliasis and clasterosporium carpophilum) are widely spread in Mijnavan. Clasterosporium and curliness of leaves in case of peaches have also been observed in cluster area and had a major impact on quantity, quality and on growth of trees in general. Failure to implement correct chemical protection in the field has led to low quality yield in 2018. The irrigation methods, frequency of irrigation and norms were broken. The actions undertaken to fight against weeds were incomplete. Fertilization was not implemented properly, pruning was done incorrectly not considering biological characteristics of the plant. Plus, incorrect pruning is one of major obstacles hindering high yield from orchards.

Recommendation: In spring of 2019 it is advised to implement pruning and chemical control with the assistance of agronomy experts, also to showcase the irrigation and fertilization methods. These short trainings will help farmers to ensure high yield for the fruits grown. During the training suppliers of high quality chemicals and fertilizers can also be introduced to farmers. Farm service center in Meghri is one of the suppliers in the Syuniq region.

- **Sorting and storing**

Challenges observed: Lack of collection points/storages is a major problem observed in cluster area. Currently sorting of fruits/crops is done in small garages or a small part of a house is allocated to sorting and storing. When the production scale is small, then the area in houses can be enough for doing basic sorting and storing, but of course when we speak about industrial production collection points/storages are needed.

Recommendation: The recommendation is to construct a collection point/storage in a cluster area. Collection points should be equipped with freezing, drying and automated packing machines. Collection points should also serve as a contact point for farmers, retailers and producers.

- **Processing**

Challenges observed: As described earlier, major agronomy issues such as diseases, incorrect pruning, grafting, etc cause decrease in yield and reduce the quality of produced fruits/crops. And usually the processing companies look for large scale farmers that will supply homogeneous products which at this point most of the farmers in Mijnavan are not able to do. Plus, there are no processing companies in the region, even the basic equipment for processing is missing.

Recommendation: The first and most important point would be capacity building of local farmers in establishment and management of orchards. Large processing companies in Kapan, Meghri and Stepanavan should be contacted for the sale of products. Dried fruits, preserved food are demanded in Armenia and Artsakh and it is advised to construct a processing company that will supply high quality products to Armenian market.

- **Sale**

Challenges observed: Farmers in the region are not aware of basic marketing and logistics techniques. They don't possess information about large retailers, processing companies and also some basic skills as negotiation, online marketing are also missing. And also there is a lack of information about available fruit/crop supply in a cluster area among retailers, processing companies.

Recommendation: Awareness raising on potential online platforms that will help with the marketing and sale of fruits/crops should be introduced to farmers. "Berqarat Hayastan" on Facebook, website of SPYUR and ARBUZ on instagram are few examples of these platforms that will help the farmers to meet processors/retailers without involving middlemen in the process.

8.2 Crop Production Value Chain

8.2.1 Open-field farming

Mild climate in Mijnavan satisfies the basic conditions for successful growth, development and high yield of almost all types of vegetables. It enables to get yield 15-20 days earlier than in Ararat valley in Armenia. The opportunity of early yield ensures higher economic benefits.

Considering the limited labour force in Mijnavan, for cultivation and harvesting of crop varieties partial or full automation is advised. **Tomatoes, green onion (leaf parsley), radish, early cabbage and potatoes** are recommended vegetables to be cultivated in the community. Fresh vegetables can be delivered to markets in Meghri, Kapan and Stepanakert (in case of vegetables, perishability issues are not that severe). Processing companies in Artsakh and Armenia can be contacted for the collaboration.

- **Production of cereals**

The dry sub-tropical climate allows cultivating almost all cereal crops. Corn, barley, wheat used to be cultivated in this area before. It is important to pay attention to crop rotation to maintain and increase quality of the land. The following crops are suggested for cultivation based on their economic efficiency and positive impact on soil quality: **peas, lentil, soybeans, shambala and buckwheat.**

- **Production of berries**

Taking into consideration mild climate of Mijnavan and high value of berries it is also suggested to cultivate strawberries on the sunny slopes (or intercropping in orchards), using open-air or hydroponic cultivation technology. Due to the long vegetation period, it will be possible to get high yield. In mild climate conditions open air bushes will survive during the winter and yield for additional 1-2 years. Particularly berries have high demand in the market, both fresh and processed. Restaurants, processing companies are recommended to be contacted for the sale of the berries.

8.2.2 Greenhouse cultivation

The development of greenhouses has huge potential in the cluster area with mild climate like Mijnavan. Due to lower heating costs in autumn, winter and spring, it is possible to produce vegetables with lower cost and offer more competitive products in the market. It is suggested to construct hydroponic greenhouses on non-agricultural land-lots (land-lots polluted with sandstones, gravel, rocks, etc.).

The climate of Mijnavan is perfect for growing vegetables in off-season period. It is possible to produce frost hardy vegetables in autumn-winter-spring period without additional heating costs using basic single arch greenhouses. In case of good cultivation plan, it is possible to get more than one yield per one off-season period.

One important advantage of these type of greenhouses is the timing of labor requirement. There is a lack of labor force in Mijnavan, which becomes severe especially in agricultural season. As these greenhouses require cultivation and harvesting labor in off-season period it would be easier to attract labor. These type of greenhouses, also require significantly less capital investment. Suggested varieties of tomatoes to be cultivated with hydroponic technology are presented in Appendix G.

8.2.3 Challenges and Recommendations along the Crop Production Value Chain

- **Open Field Farming**

Challenges observed: To achieve higher economic benefit the agricultural works should be automated as much as possible. The main risk for open-air farming is unfavourable climate conditions (hail, droughts, sukhoveies, etc.). In Kashatagh region there are no anti-hail stations and government support for anti-hail nets is still in discussion stage. Open-air farming also requires serious attention towards selection of crop, its seedling, inter-crop distance, crop circulation cycle, concerning which local farmers need significant consulting of agronomists. Each type of crop or

hybrid is being developed for certain soil and climate conditions, in case the conditions are not kept the yield will suffer. Challenges for this cultivation method in Mijnavan are the lack of labor force, especially during agricultural high season and lack of agricultural equipment. Kashatagh region mainly rents or hires equipment from neighboring Syunik region and local farmers are in short hand in negotiations with the agricultural equipment owners.

Recommendations: It is recommended to organize training for local farmers and increase their knowledge about crop selection, planting, pruning, irrigation and harvesting. Seeds for the suggested crops can be purchased from the Scientific Center of Vegetable and Technical Crops, Agrico LLC, Scientific Center of Agriculture, Shirak Agricultural Scientific Center, Ejmiatsin Agriculture and Plant Protection Scientific Center. Foundation of an experimental area for vegetable, berry and cereal varieties will benefit local farmers. Different types of crops would be tested and the strongest, the most resistant and high yielding varieties would be offered to farmers next season. Open-field farming would require creation of agricultural equipment park. The farmer would need tractors, saddlery machine, equipment for installing drip irrigation system and drainage pipes, area for growing seedlings, sprinkler, harvester combine, and transportation trailers. To achieve higher efficiency of agricultural machinery usage, the land-lots should be as large and as flat as possible.

- **Greenhouse Cultivation**

Challenges observed: Three main challenges were observed for the development of advanced hydroponic greenhouses in Mijnavan community.

First of all these type of greenhouses require significant capital investment in equipment and construction materials and Mijnavan farmers and businesses have limited access to affordable financing. Also, there is a lack of suppliers of the required technologies and equipment in Artsakh and in Armenia. Hydroponic greenhouses require significant energy resources for heating, cooling systems. Mijnavan community and Kashatagh region as a whole have poor energy infrastructure and energy resources are limited to electricity and firewood. Artsakh farmers have lack of knowledge concerning seed procurement and greenhouse operation in general.

Recommendations: The seeds of the advised varieties can be purchased in Armenia from official distributers of Enza Zaden, Rayk Tsvani and other companies. Import of the equipment from foreign suppliers directly will decrease the expenses and ensure that the equipment will meet the required standards. Few companies operating in Armenia such as Landshaft LLC, CARD CJSC can supply the required equipment for the construction of small and medium size winter green houses. Installation of solar panels can mitigate the dependence on poor energy infrastructure. However, heating and cooling system operating on electricity and solar power requires significant investment. In small and medium sized greenhouses (with production area of 500-3000 m2) a heating system based on firewood, manure, bran can be installed. During spring season,

greenhouses can operate without additional heating system depending on crop variety and its vegetation requirements.

Single arch freestanding greenhouses have very simple construction and they can be built and on stand-alone land-lots or in orchards using inter-plant area. These orchards require less investment and they can provide early, good quality yield provided mild climate of Mijnavan. It is advised to organize special training for local farmers to enhance their skills in green house operation and management.

8.3 Animal Production Value Chain

As the discussions with the community members and local authorities revealed, there is a big potential of animal husbandry in Mijnavan community. Although the community is rich with pastures and the climate is favourable, local population have not fully investigated this field and didn't take practical steps for its development. Animal husbandry practices are limited to only production of pigs and goats, poultry and cows. According to official statistics the community does not have beekeeping practices at all and animal husbandry practices have not changed significantly in recent 3 years. The sector has big potential for development and the community can greatly benefit from export of animal products to Iran. The regulations and the accepted standards of the export to Iran should be investigated further, as the country has several requirements of import of animal products. Caucasus Brown, buffalo, sheep and poultry production have a potential of the development in the community.

Challenges observed: Lack of knowledge and experience in animal production is a major factor hindering the development of this value chain in the community. Few community members have adequate experience in animal husbandry and work hard to expand animal production in the community. Additionally, lack of veterinarian in the community or professional veterinary services is another obstacle for low interest in the field. As some of the community members explained there is a lack of knowledge about animal diseases, its prevention and control and this makes it difficult for them to think of expanding the production.

Recommendations: First and foremost, activities need to be undertaken to increase the awareness of local population of benefits of involvement in animal husbandry, exchange of experience should be organized with experienced farmers in Artsakh and Armenia who can share their cases with fellow farmers and provide consultancy. Professional veterinary services should be available in the community to improve animal health care and prevent possible animal-borne diseases.

8.4 Other value chains

In consultation with the industry experts and the community members we suggest the development of 2 other value chains, including wood briquette production and grape production in Mijnavan community.

- **Grape production**

With wine making becoming more and more popular in the country, wine producers face serious issue in the lack of high quality Armenian grapes for the production. Therefore, it is advised to consult with experienced winemakers and assess the potential of grape production in the community. The first step should be soil and water analysis. Furthermore, it is worth to assess the case of ''Wine Cubes'' in Vayots Dzor region, where selected local farmers are being supported to grow quality grapes, produce quality wines and sell it in the local market. Along the supply chain farmers benefit from the support of consulting company.

- **Wood briquette production**

The community members had previous experience in wood briquette production and used to produce up to 6 tons daily. The production is not labor intensive and the people involved in the production do not need to possess special skills. The army used to be the main consumer of the production, but there is definitely a big possibility to diversify the market and to target wider number of consumers (processing companies, HoReCa, NGOs, final consumers).

9. Community development plan

During the study, different value chains were identified for further development. However, with the collaboration of Tuffenkian Foundation, the concepts of investment plans were prepared for those sectors which have been priority for Tuffenkian foundation. The economic calculations for establishment/enhancement of different sectors are presented in the next subsections.

9.1 Fruit Production

Project description: As of 2017, Mijnavan had 39 ha of orchards. Pomegranate orchards comprise 30 ha of total orchard area. The second most cultivated fruit is persimmon. Mijnavan community has significant area of pomegranate and persimmon orchards. Fig, plum, apple and cherry trees are being grown in smaller orchards having the area of less than 1 ha. The suggested crops for establishment of orchards coincide with the opinion of local community members. The consultants

working in the scope of the project had different recommendations, which are presented in value chain analysis section. It is strongly advised to do soil analysis prior to deciding upon fruit and crop varieties to grow in the community.

ICARE team did the calculation of fruit orchard establishment and profitability assessment in consultation with agronomy experts. Availability of local resources with their prices were considered.

According to our analysis pomegranate and persimmon offer higher profitability compared to fig. All three fruits can be further processed into value added products such as dried fruits, jam and wine. The initial establishment investment would be paid back after the first year of yielding age.

Mijnavan community members mainly sell their products through few retailers and wholesalers with relatively low prices. Cultivation with improved methods will increase the quality of products and average yield from 1 ha. This will enable farmers to network with new clients and get higher profits from their orchards. Detailed information about cost calculation is presented in Appendix F.

Cost category (AMD)	Fig	Persimmon	Pomegranate
Orchard establishment costs	5 749 600	5 052 600	6 880 800
Total operating costs	1 086 500	1 466 500	1 306 500,00
Revenue	3 960 000	5 244 000	6 000 000
Net profit	2 873 500	3 777 500	4 693 500,00
Payback period	4.62	3.88	5.17

9.2 Vegetable and melon crop production

In 2017 Mijnavan community households produced 554.7 tons of vegetables and 600 tons of melon crops cultivating 16ha and 30ha respectively. The most common crops to be cultivated were tomato, eggplant, pepper and watermelon. Based on the discussion with Mijnavan community members and consultations with field experts, it is suggested to increase growing area of tomatoes and watermelon. Information about tomato species most suitable for the area, also other recommendations, which were introduced to the community members during the focus group discussions are presented in appendix.

The calculation of tomato and watermelon production and profitability was discussed with agronomy experts and availability of local resources with their prices were taken into account.

Cost category (AMD)	Watermelon	Tomato
Total farm establishment costs	696,750	4,260,000
Total operating costs	2,029,050	6,428,417
Revenue	4,050,000	12,870,000
Net profit	2,020,950	6,441,583

Marketing and sale of fruits, vegetables and crops: Considering perishability issues of fresh fruits and vegetables, it is strongly advised to assist the farmers in Mijnavan to work on contractual basis with retailers-processors both in Artsakh and Armenia. Usually retailers and/or producers who work on contractual basis require fresh fruits and vegetables of homogenous quality in preagreed quantity. This means that the agronomy training provided to farmers should also be aimed at providing in-depth knowledge in production of high quality fruits and vegetables common to Mijnavan community. The role of internet marketing should not be underestimated either. Farmers should be active on pages like ''Berqarat Armenia'', Gazar.am, Agroshuka.am, etc.

9.3 Dried fruit production

Project description: Both the city mayor and focus group participants stated that the sale of fresh fruits grown in Mijnavan is quite problematic because of poor infrastructure. One solution suggested for incurred seasonal losses is the establishment of dried fruit production in the community. Main fruits and vegetables suggested for dried fruit production are **plum, persimmon, fig, tomato and watermelon.** Suggested dried fruit production entails construction of 70m^2 production plant in Mijnavan where electric dryer with **1000kg production capacity** will be installed. For the production of dried fruits high quality, healthy and clean fruits will be used.

The community has a potential to supply 5 tons of fresh persimmon, 1 ton of fresh fig, 4 tons of fresh watermelon, another 4 tons of fresh tomatoes and 1 ton of plum. Detailed cost calculation of the proposed project is presented in Appendix J.

Cost category	**AMD**
Investment costs	11,414,000
Total operating costs	3,615,801
Revenue	9,157,500
Net profit	4,433,359

Payback period	2.57 years

Marketing and Sale: Market for dried fruits in Armenia is well occupied by local and imported products. This means that huge efforts should be invested in keeping the quality of production high and working towards exploring market opportunities for the producers in Mijnavan. Packaging of the products should be appealing and in eco-friendly packaging material considering recent trends of promoting green lifestyle and zero plastic waste. 4 main channels of sale should be well investigated for dried fruit products:

- Products are sold to big exporters or to their agents
- Products are sold to middlemen
- Products are sold at supermarkets, restaurants, Duty frees
- Products are sold directly to consumers

Promoting dried fruits produced in Mijnvanan during annual harvest festivals organized in Yerevan and Stepanakert will be a big step to bringing awareness to local production. Additionally, running a facebook page for this product category with the videos of fruit harvesting season, dried fruit production process, the people who are working in the production and the need to support small businesses in Artsakh will all serve the purpose of making Mijnavan brand known in Artsakh and beyond its borders.

9.4 Production of wood briquette

Project description: Discussion with Mijnavan community members helped to identify key areas where the community has competitive advantage and the briquette production appeared to be one of the areas that can be enhanced with the support from foundation. As it was introduced at the municipality there used to be a briquette production in Mijnavan 3-4 years ago. The community members used to produce 6 tons of briquette daily. Briquettes were produced from reed and the main consumer of the products was the army. It was later decided to transfer the equipment of briquette production to Araqsavan and the production stopped in Mijnavan.

Production of biofuel from briquettes will provide an opportunity to locals to efficiently utilize biological resources available in the region and reduce negative impact on the environment. It should be noted that CO_2 emissions from biological waste are equal to 0 as the amount of CO_2 emitted is equal to CO_2 previously emitted in the plant growth process. Annual production capacity of the proposed plant is 1000-2000 tons. Detailed cost calculation is presented in Appendix I.

Cost category	AMD
Investment costs	92,716,240
Total operating costs	40,200,000
Revenue	60,000,000
Net profit	15,840,000
Payback period	5.13 years

Marketing and sale: Promoting wood briquettes via Facebook, list.am and through contacting greenhouse owners that don't use gas for heating purposes. Special attention should be put on bringing awareness to environmental benefits of consuming wood briquettes among consumers, plus stating region of origin as ''Mijnavan community in Artsakh'' on product labels.

9.5 Establishment of a processing company

Mijnavan community faces big issues with the realization of fresh fruits and vegetables produced locally. Losses incurred during the harvest season may vary from 40%-60% as the local farmers described. Therefore, a processing company is advised to establish in the community to support local farmers to find alternative ways for the sale of fresh fruits. The processing company will release persimmon jam, pomegranate juice, preserves from fig, plum and berries (this category is not yet fully explored in the community, but has a potential for development). To understand the establishment costs of fruit and vegetables processing company, consultant from "Food Industry Consulting" has been contacted. Annual 350 tons of fresh fruits and vegetables can be processed in the company. Detailed cost-benefit analysis of processing company will require additional architectural planning and precise estimation of production capacities for each crop type. Total investment for processing company is **AMD 30,360,500.**

10. Social Projects

Focus group discussions conducted on February 20th in Mijnavan community aside from revealing the needs existing in the community, also prevailed the potential of local producers for implementing projects, small businesses in Agriculture. Invited participants were the ones who had experience in running small businesses, farms in Mijnavan and were well aware of the regional specifics, possible selling options of their products and had clear vision of their community development options. In many cases the ideas that the participants raised were related to encouraging the establishment of small businesses in community. Ideas include **agricultural consulting and service center** that would sell agricultural inputs and consult on agronomy and animal breeding to increase the efficiency of production and decrease production costs, **establishment of milk collection point** to promote animal farming, **establishment of a guesthouse** and café in Mijnavan to improve its hosting infrastructure, cultivation of *salvia officinal* for sugar production. Recommendations on social projects that also include ideas of Mijnavan residents are described below:

Small Grants for local businesses

Photo credit: OneArmenia

As agriculture is the main source of income for smallholder farmers and many farmers see the community development through different agribusiness projects implemented, it is recommended to announce a call of small grant projects that will be aimed at supporting residents to establish farms, small processing companies, greenhouses, etc. Meetings with Mijnavan farmers revealed that some of them have already planned establishment of greenhouses, dairy processing factory, dried fruit production and have an idea of costs associated with production, sales of products, equipment, materials needed and experience in the field. It is recommended to have technical assistance grants to have grant schemes more targeted. Technical assistance grants may include:

- Purchase/upgrade of technology
- Purchase of construction materials
- Purchase of agricultural inputs

To ensure the transparency of the process, the announcement of the call should be open to everyone in the community and the information about it is advised to be disseminated with fliers, local radio, TV, etc. The application procedure should be clear enough and in Armenian, so that the language and complexity of the process won't discourage potential qualified applicants from applying to the grant.

Supporting youth education

Photo credit: ICARE Foundation

Local economic development highly depends on involvement of educated youth in the process. Some young residents in Mijnavan community have been working in agricultural field over years and aside from running the farms and generating income from the sale, some of them continue to incur losses, which can definitely be skipped as a result of education in agronomy and related subjects. Main areas where the farmers need education is chemical and biological control, sustainable use of natural resources, agri-technical works, non-traditional crops and their cultivation methods. Foundation can provide scholarships to youth to take courses at related faculties at ANAU, attend "Greenhouse Crop Production and Management (GCPM)" course at ICARE. It is highly recommended to provide training to young teachers working in community school. Thus, cooperation with ''Teach for Armenia'' program, Universities in Armenia should enhanced.

Agronomy training for farmers

Photo credit: ICARE Foundation

Focus group discussions with Mijnavan community members and individual consultancy provided by ICARE experts helped to identify the fields where the participants need a training. As community members are heavily involved in everyday agricultural activities recommended training should be short-term (up to 7 days) and include both theoretical and practical part.

Topics for training may include:

- Production technology of main vegetables
- Production technology of fruits
- Cost-benefit analysis
- Internet literacy

Aside from the trainings provided, it is advised to prepare training materials/handbooks that will help farmers to increase efficiency of their work, decrease the losses incurred during the production process and improve productivity.

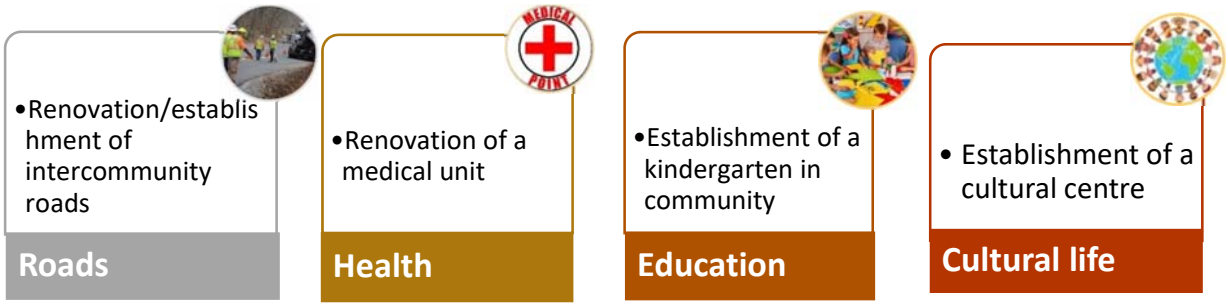
10.1 Current state of social infrastructure

Mijnavan has a school though it does not have highly qualified teachers. The community does not have a kindergarten, which affects socialization of children and agricultural works of the community residents. The closest hospital to Mijnavan is situated in Kovsakan town (approximately 11 km). The community has only 1 medical treatment point and 1 first aid car both poorly equipped. Van community has a school with 36 pupils and needs some renovation. No health point and mayors office are available. No kindergarten is available; there are 6 pre-school age children who may attend kindergarten in nearby settlements.

Mush community has newly and fully renovated school where children from neighboring Alashkert community attend. Container serves as health point and mayor office, as well as for youth to gather and spend time there.

In Alashkert community no school / kindergarten/ health point and mayor office operate. Mayor and nurse provide services in their own houses.

10.2 Recommended social infrastructure projects



The development and provision of social infrastructure would accelerate the socio-economic development of Mijnavan community. The above recommended social infrastructure projects are very basic essential services that if in place would attract workforce, enhance trade with other

regions in Armenia and Artsakh and contribute to sustainable development of the community. All that resettling families receive when they come to Mijnavan are houses in poor conditions. And by being away from developed cities/communities, many families either do not take the opportunity to resettle in Mijnavan or they come and do not create any economic value, thus having no impact on socio-economic development of the community. Implementation of above mentioned projects would attract farmer-entrepreneurs, quality labor force to the community. In particular renovation of the roads will open up major trade possibilities with giant producers from Armenia (processing companies, dried fruit producers, wholesale sector, etc) and Artsakh.

11. Implementation schedule

The community development activities should be implemented parallel within 3 years. It is assumed that Tuffenkian foundation will start Mijnavan community development in 2020. The possible implementation duration is presented in below table:

Activities	Implementation time period	Description of the activity
Phase 1: Implementation of social infrastructure projects	2020 – 2023	
1.1 Renovation/development of intercommunity roads	2020 – 2023	
1.2. Renovation of a medical point	2020	
1.3. Establishment of a kindergarten in the community	2020	
1.4. Establishment of a cultural centre	2020	
Phase 2: Implementation of social projects	2020 – 2023	Ongoing process, should be implemented periodically, twice or 3 times a year.
2.1 Conducting agronomy trainings for farmers	2020 – 2023	
2.2 Provision of small grants to local businesses	2020 – 2023	
2.3. Supporting youth education	2020 – 2023	
Phase 3: Community economic development	2020-2023	
3.1 Production of wood briquette	2020-2021	
3.2Enhancing dried fruit production in the community	2020-2021	
3.3 Enhancing fruit production (establishment of fruit orchard) sector	2020-2021	
3.4 Enhancing vegetable and melon production	2020-2021	
3.5 Establishment of processing company	2022-2023	

Conclusions and Recommendations

In the scope of the "Agribusiness for Artsakh (A4A)" project Mijnavan community economic, infrastructure and social development plan has been prepared with a participatory approach, that is, with the involvement of local community members in drawing common development plan for Mijnavan. Prior to drawing conclusions and making recommendations for economic and social development plan, a situational analysis has been implemented with **Hexagon methodology**. Key issues on local and regional economic development has been conceptualized by analysing 6 main triangles: **Process management, Target group, Locational factors, Policy focus and synergy, Sustainability and Governance.** The analysis revealed general economic situation in the community, factors hindering the development, and scenarios for social and economic development of the community. Common issues observed include mistrust of community members towards local self-government bodies which is explained by transparency problems and inefficient cooperation between residents and local governing bodies. Common infrastructure issues observed in the community include roads in poor condition, problems with electricity supply, internet availability, the absence of kindergarten, medical point and fire service. It is suggested to invite at least one healthcare specialist to increase awareness among community members about healthy lifestyle. Proposed Local Economic Development plan highly emphasizes the need of educated youth in the community and stresses on **capacity building** of local youth in agronomy and related fields. This can be done through **social projects:** supporting youth to receive **higher education in agronomy,** participating in training programs and through provision of **short-term trainings** and agro-technical learning materials to local farmers. The economy in Mijnavan is not diversified, most part of the population is engaged in agricultural activities, so promoting awareness raising activities in community will play crucial role for **local economic development.** With the precision agriculture gaining worldwide popularity, educating rural youth on key agriculture concepts, internet literacy and agricultural development patterns in developed countries is seen as an essential component for sustainable development of the community.

To reduce the outflow of money from Mijnavan and contribute to stimulation of money circulation inside the community it is recommended to announce a **call for small grant projects** to support the residents to establish farms, small processing companies, greenhouses, etc. Willingness of locals to improve quality of life in community and contribute to economic development is worth mentioning. Some of the community members already designed business concepts for dairy production, establishment of a greenhouse, fish production, etc. The support to community members to implement their ideas will create an environment that enables local economic development through consolidation of community resources and improvement of quality of life. Establishment of agro-service center with a concept of "CARD" foundation will significantly contribute to the development of the community. The service center will have its agronomy and veterinary specialists who would provide professional consulting to the local community members and offer all the required high-quality inputs. Through active networking with local community members and precise logistics it will be possible to offer inputs with affordable prices.

Suggested business ideas for economic development of the community considered availability and sustainable use of natural resources, availability of labor force in Mijnavan, profitability of the

business and access to markets. Proposed business ideas for economic development of Mijnavan include production of wood briquettes, dried fruit production, production of vegetables, establishment of fruit orchards and processing company. Community had previous experience in the production of wood briquettes and successful collaboration precedents. The business is both environment friendly and profitable, as CO_2 emissions are insignificant and the demand for products is ensured; main consumer of the product is the army. As the discussions in the community revealed, the sale of fresh fruits is quite problematic in Mijnavan (in some cases up to 60% of harvest was lost) considering poor condition of roads and weak business networking skills of local farmers. Therefore, it is suggested to invest in dried fruit production and processing company, as it will ensure employment in the community and serve as a permanent solution for incurred losses. The investments in the community would require reliable and highly skilled staff for solid coordination of small grant program and successful implementation of business ideas discussed in the report.

Appendices

1. Appendix A: Biological-economic characteristics of trees grafted on Apricot Yerevan variety cloning rootstock and seed rootstock

Seed rootstock

- **# of trees on ha**: 125-156
- **tree planting formula**: 10x8
- **the height of the trees**: 5-8 meters
- **year of harvest**: 5th
- **year of commercial harvest**: 8th-10th
- **harvest from 1 ha**: 20-25 tons
- **complexity of work**: high

Evrika 99

- **# of trees on ha**: 416
- **tree planting formula**: 6x4
- **the height of the trees**: 4-5 meters
- **year of harvest**: 3rd
- **year of commercial harvest**: 5th-6th
- **harvest from 1 ha**: 30-35 tons
- **complexity of work**: high

Pumiselect

- **# of trees on ha**: 500
- **tree planting formula**: 5x4
- **the height of the trees**: 3.5-5
- **year of harvest**: 3rd
- **year of commercial harvest**: 5th-6th
- **harvest from 1 ha**: 30-35 tons
- **complexity of work**: medium

BB-1

- **# of trees on ha**: 800
- **tree planting formula**: 5x2.5
- **the height of the trees**: 3-3.5
- **year of harvest**: 3rd
- **year of commercial harvest**: 4th-5th
- **harvest from 1 ha**: more than 35 tons
- **complexity of work**: medium

Kuban-86

- **# of trees on ha**: 208
- **tree planting formula**: 8x6
- **the height of the trees**: 4-6 meters
- **year of harvest**: 4th
- **year of commercial harvest**: 7th-8th
- **harvest from 1 ha**: 25-30 tons
- **complexity of work**: medium

2. Appendix B: Biological-economic characteristics of suggested peach varieties

"Orange" early growing

- **fruit weight:** 150-300
- **transportability:** low
- **year of harvest:** 3rd
- **year of commercial harvest**: 4th-5th
- **harvest from 1 ha**: 30-40 tons
- **crop maturity period:** Aug.-Sept.

"Uspekh" early growing

- **fruit weight:** 150-200
- **transportability:** high
- **year of harvest:** 3rd
- **year of commercial harvest**: 4th-5th
- **harvest from 1 ha**: 30-40 tons
- **crop maturity period:** Aug.

"Uspekh" mid growing

- **fruit weight:** 200-350
- **transportability:** high
- **year of harvest:** 3rd
- **year of commercial harvest**: 4th-5th
- **harvest from 1 ha**: 30-40 tons
- **crop maturity period:** Aug

"Mashtots"

- **fruit weight:** 250-450
- **transportability:** high
- **year of harvest:** 3rd
- **year of commercial harvest**: 4th-5th
- **harvest from 1 ha**: 30-40 tons
- **crop maturity period:** Aug.-Sept.

Orange clone

- **fruit weight:** 200-450
- **transportability:** high
- **year of harvest:** 3rd
- **year of commercial harvest**: 4th-5th
- **harvest from 1 ha**: 30-40 tons
- **crop maturity period:** Aug.-Sept.

3. Appendix C: Biological-economic characteristics of cherry varieties

Kneni

- **# of trees on ha**: 333
- **tree planting formula**: 6x5
- **the height of the trees**: 5-8 meters
- **year of harvest**: 5th
- **year of commercial harvest**: 8th-10th
- **harvest from 1 ha**: 15-20 tons
- **complexity of work**: high
- **price for early variety:** 1500 AMD

VCL-2 (clone)*

- **# of trees on ha**: 666
- **tree planting formula**: 5x3
- **the height of the trees**: 3-4.5 meters
- **year of harvest**: 3rd
- **year of commercial harvest**: 5th-6th
- **harvest from 1 ha**: 20-25 tons
- **complexity of work**: low
- **price for early variety:** 1500

LZ-52 (clone)*

- **# of trees on ha**: 800
- **tree planting formula**: 5x2.5
- **the height of the trees**: 2.5-3.5
- **year of harvest**: 3rd
- **year of commercial harvest**: 5th-6th
- **harvest from 1 ha**: 20-25 tons
- **complexity of work**: low
- **price for early variety:** 1500

Gizelia 6**

- **# of trees on ha**: 800
- **tree planting formula**: 5x2.5
- **the height of the trees**: 2.5-3.5
- **year of harvest**: 3rd
- **year of commercial harvest**: 5th-6th
- **harvest from 1 ha**: 20-25 tons
- **complexity of work**: low
- **price for early variety:** 1500

4. Appendix D: Biological characteristics of recommended vegetables

Tomatoes

Suggested varieties: "Elite Pakmor", "Jina", "Soni", "Sunrise", "Gyumri", "Lusine" and "Eraz"
Transportable
Good for processing
Resistant to diseases and pests
Yield: 80,000 – 100,000 kg/ha

Green onion, leaf parsley

Frost hardy plants,
- Can resist up to -7 -10^{0}C frost
- Can hibernate under snow
- Off-season production, makes it easier finding the required labor
- Yield: 8-10 conventional bouquets per 1 m^2

Radish

- Frost hardy plant,
- Off-season production, makes it easier finding the required labor
- Seed requires +2 - +3^{0}C for germination
- Plant required +10 - +12^{0}C for high yield
- Yield: 2-3 kg/m^2

Early cabbage

Frost hardy plant,
- Off-season production, makes it easier finding the required labor
- Provides yield 1-1.5 months earlier than in Ararat valley
- Vegetation period: 90-120 days depending on the variet
- Yield: 50,000-60,000 kg/m^2

Potatoes

Varieties: "Liza", "Impala" and "Cosmos"
15-20 day earlier yield than in Ararat valley,
Opportunity to get a yield twice annualy
Resistant to diseases and pests
Yield: 40,000 kg/ha

5. Appendix E: Biological characteristics of legumes

Peas

- Can be cultivated in non-irrigated land-lots.
- It requires 250-300 mm annual rainfall
- Can resist to -40C frosts and droughts
- Vegetation period is 80-90 days
- Yield: 1,500-3,000 kg/ha

Soybeans

- Varieties: "Amfor", "Gamma", "Menua", "Milena", "Vaghahas 1", "Vagharshapat 1", "Vagharshapat 2"
- Requires irrigated land
- Wide usage in food, food processing, industrial production
- Vegetation period is 75-160 days depending on the variety
- Yield: 1,500-2,000-2,500 kg/ha

Lentil

- Can be cultivated in non-irrigated land-lots
- Mixed cropping with barley or oat
- Can resist to -8-12^{0}C frosts and droughts
- Vegetation period is 70-90 days
- Yield: 1,500-2,000 kg/ha

Shambala

- Requires irrigated soil
- Used as animal feed
- Seeds can be used in food
- Vegetation period is 60-65 days
- Yield: 1,000-1,500 kg/ha

Buckwheat

- Can be cultivated in non-irrigated land-lots
- The cultivation and harvesting of buckwheat can be fully automated.
- Vegetation period is 75-85 days
- Low yield: 1,000-2,500 kh/ha

6. Appendix F: Biological characteristics of strawberry

Strawberry variety: "Harmony"

- Resistant to diseases and pests
- Easily transportable
- Starts yielding in 6-7 weeks and can be harvested till the first autumn frost
- Yield: 500-600 g/bush

Strawberry variety: "San Andreas"

- Higher resistance towards diseases and pests
- Good taste characterisics
- Attractive berry appearance
- Provides less average yield than "Harmonia"
- Starts yielding in 6-7 weeks and can be harvested till the first autumn frost
- Yield: 500-600 g/bush

7. Appendix G: Biological characteristics of tomato

Atia, Zulfia

- Yield is high: 30-40 kg per 1 m^2
- Good taste
- Larger size of crops compared to other varieties

Comet, Maxenza

- Yield is high: 30-40 kg per 1 m^2
- Taste is comparably low
- Better transportability
- Comet has longer shelf life (10-15 days)
- Maxenza is very resistant to mildew

Annaluka, Annalisa, Annatefka

- Higher price
- Lower yield compared to large size varieties: 20-25 kg per 1 m^2
- Good taste

8. Appendix H: Fruit orchard establishment costs

AMD	Fig	Persimmon	Pomegranate
Revenue	3 960 000,00	5 244 000,00	6 000 000,00
Operating costs			
Pruning	100 000,00	100 000,00	75 000,00
Care for tree trunks	82 500,00	82 500,00	137 500,00
Fertilizer (nitrogen)	144 000,00	144 000,00	144 000,00
Fertilizer (potassium)	56 000,00	56 000,00	56 000,00
Fertilizer (phosphor)	160 000,00	160 000,00	160 000,00
Treatment against pesticides	80 000,00	180 000,00	250 000,00
Tillage	20 000,00	20 000,00	20 000,00
Rubbing	38 000,00	38 000,00	38 000,00
Digging	19 000,00	19 000,00	19 000,00
Grass mowing	75 000,00	75 000,00	75 000,00
Irrigation	12 000,00	12 000,00	12 000,00
Harvesting	200 000,00	450 000,00	200 000,00
Other costs	100 000,00	130 000,00	120 000,00
Total operating costs	(1 086 500,00)	(1 466 500,00)	(1 306 500,00)
Gross profit	2 873 500,00	3 777 500,00	4 693 500,00
Net profit	2 873 500,00	3 777 500,00	4 693 500,00
Total establishment costs	5 749 600	5 052 600	6 880 800
Payback period	4,62	3,88	5,17

Number of trees per ha	400	330	500
Average yield	12 000	23 000	15 000
Years before harvest	3 years	3 years	4 years
Selling price of high quality fruit (20% of total harvest)	400	280	450
Selling price of average quality fruit (60% of total harvest)	350	220	400
Selling price of low quality fruit (20% of total harvest)	200	200	350

Pomegranate and persimmon offer higher profitability as compared with fig. All three fruits can be further processed into value added products such are dried fruits, jam and wine.

Mijnavan community members mainly sell their products through few retailers and wholesalers with relatively low prices. Cultivation with improved methods will increase the quality of products and average yield from 1 ha. This will enable farmers to network with new clients and get higher profits from their orchards.

9. Appendix I: Vegetable production establishment costs

Establishment costs		
Crop	**Watermelon**	**Tomato**
Land cleaning and preparation	210,000	210,000
Seeds/Seedlings	18,000	4,050,000
Seedling placement cost	468,750	468,750
Fertilizer (nitrogen)	118,800	104,000
Fertilizer (kalium)	80,000	54,000
Fertilizer (phosphor)	296,000	160,000
Treatment against pesticides	97,500	94,000
Tillage	19,000	19,000
Rubbing	19,000	76,000
Digging	70,000	70,000
Care for plants	120,000	94,000
Irrigation	12,000	12,000
Harvesting	450,000	916,667
Other costs	50,000	100,000
Total costs	2,029,050	6,428,417
Revenues		
Average yield	45,000	110,000
Sales with high price	1,350,000	9,900,000
Sales with average price	2,160,000	2,310,000
Sales with low price	540,000	660,000
Total revenues	**4,050,000**	**12,870,000**
Net Profit	**2,020,950**	**6,441,583**

Crops	Low price	Average price	High price
Tomato	80	100	150
Watermelon	70	100	150

10. Appendix J: Dried fruit production

Table below summarizes information about fresh fruits required in production and the time required for drying fruits and vegetables.

Type of fruit	Amount of fresh fruit required for 1 kg of dried fruit	Average time required for drying (hours)	Annual dried production (kg)
Plum	5.5	23-36	200
Persimmon	5.5	30	1000
Fig	5.2	27	200
Tomato	13-18	26	350
Watermelon	4	24	500
Total production of dried fruits			**2,250**

Capital investment costs

Cost category	Measurement	Quantity	Price (AMD)	Total
Construction of production plant	Unit	1	4,500,000	4,500,000
Electric dryer (1000 kg)	Unit	1	3,850,000	3,850,000
Packaging machine	Unit	1	625,000	625,000
Thermoregulator	Unit	1	450,000	450,000
Transportation costs	Km	330	500	165,000
Stainless table	Unit	2	185,000	370,000
Sink	Unit	2	236,000	472,000
Barrow	Unit	2	168,000	336,000
Humidity meter	Unit	1	190,000	190,000
Sieve	Unit	152	3,000	456,000
Total capital investment costs				11,414,000

For the first year of operation, the community will be able to produce **2,250 tons of dried fruits**; 200 kg of plum, 1000 kg of persimmon, 200 kg of fig, 350 kg of tomato and 500 kg of watermelon. Production capacity can be expanded over the years with the establishment of new orchards and vegetable farms. 2 permanent staff (an accountant and a manager) and 6 seasonal workers will be employed in the production. It is advised to invite experienced dried fruit producers from Armenia to share their experience with the producers in Mijnavan. Market for dried fruits is highly competitive and only high quality producers survive. The number of dried fruit producers in Armenia is 5,000-5,500 and the annual production of dried fruits is estimated to be 1650 tons. High quality dried fruits produced in Mijnavan will have better taste and better product appearance, as persimmon, fig, tomato and watermelon have higher quality compared to the ones available in Armenia. Establishment of dried fruit production will allow to generate **AMD 4,433,359 profit** per 2.2 tons produced.

11. Appendix K: Wood briquette production costs

With the suggested equipment listed below annual production capacity of the plant is **1000-1200 tons.** Average selling **price for briquettes is 60-90 AMD** for 1 kg. One ton of briquetted straw is equal to 2.5m^3-3m^3 of wood. The market price for 1m^3 of wood varies from 22,000 AMD to 25,000 AMD. The revenie for 1 ton of briquette varies from 60,000AMD to 90,000AMD and the work is less labor intensive and more convenient to do. For the analysis, the price used for 1 ton of wood briquette was 60 AMD.

Costs[6]	Measurement	Units	Unit costs (AMD)	Total costs (AMD)
Capital investment				
Briquette making equipment RUF-400	Unit	1	48,941,520	48,941,520
BELARUS MTZ 1523.3	Unit	1	29,743,600	29,743,600
Plow (ПлугПЈІН-5-35П)	Unit	1	666,120	666,120
Conventional baler (Gallignani 3690 S)	Unit	1	8,800,000	8,800,000
Mower BCS Duplex Gold	Unit	1	2,000,000	2,000,000
Hydraulic forklift Rinieri base 0820		1	2,400,000	2,400,000
Transportation costs		1	165,000	165,000
Total capital investment costs				92,716,240

Production costs calculated for 1 ton				
Input costs	tons	1	25,000	25,000
Labor	Person	3	1,700	5,100

[6] Aside from RUF-400 and Belarus MTZ 1523.3 all other equipment are available in Armenia at ''Hrashq Aygi'' LLC.

Electricity	Kw/h	150	49	7,350
Fuel, other fluids	-	1	250	250
Depreciation costs	AMD/tons	1	6,650	6,650
Packaging and labeling costs	tons	1	1,300	1,300
Local transportation costs	AMD/tons	1	700	700
Total costs				**46,350**

Total capital investment costs excluding construction costs of production plant are **AMD 92,716,240**. Total operational costs for 1-ton briquette production are estimated AMD 19,450 including transportation costs from the field to production plant. The net **profit generated** for the first year of operations will be **AMD 15,840,000**. For Mijnavan community the establishment of production plant will ensure employment for community members, serve as a model business for other communities in Artsakh to follow and will be a perfect example for a profit-making business that causes minimum damage to environment**. Payback period** is estimated to be 5.13 years.

12. Appendix L: Processing company establishment costs

N	Equipment	Purpose	Quantity	Price, AMD
1	Boiler house	Designed to provide dry stream	2	5,820,000
2	Vertical autoclave	Designed to ensure microbiological security of canned products	2	2,910,000
3	Boilers	Designed for thermal processing of fruits and vegetables.	6	4,365,000
4	Reactor	Intended for the preparation of the substance	1	1,212,500
5	Stainless steel tables	Used for preliminary processing (cleaning, cutting and etc.)	6	873,000
6	Baths	Used for cleaning fresh fruits	6	1,843,000
7	Fruit mill	Intended for grinding raw materials, used in the production of jams, honey, caviar	1	970,000
8	Lidding machine	Designed for lidding with Twist-off lids	1	5,820,000
9	Labelling machine	Used to label ready products	1	3,395,000
10	Packaging machine	Used to package ready products	1	1,697,500
11	Lab equipment	Used for quality control in processing company	-	1,455,000
Total				**30,360,500**