IMPROVING LIVELIHOOD OF RURAL COMMUNITY
THROUGH GREENHOUSE FARMING
A CASE STUDY OF INJIL DISTRICT HERAT
AFGHANISTAN

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SEPTEMBER 2016

Thesis Presented to the Higher Degree Committee
Of Ritsumeikan Asia Pacific University
In Partial Fulfillment of the Requirements for the Degree of
Master of Science in International Cooperation Policy
ACKNOWLEDGMENTS

I would like to thank the most merciful and the most compassionate, Almighty Allah, for his unbounded blessings and favors on me that I could be able to accomplish this study. I would like to express my sincere gratitude to my supervisor prof. MIYOSHI Koichi for his unsparing and great efforts, support, patient, advice and encouragement throughout this study.

In addition I am honored to extend my gratitude to whole APU, professors, graduate school and entire staff for their management, hard work, and support.

I would like to extend my gratitude to the Japan International Cooperation Agency (JICA) and all their affiliate sections and staffs including PEACE project for their financial and technical supports and as well as the government and people of Japan for all their support and kindness.

I want to express my deepest gratitude to my Mom, whole family and friends for their unlimited and all time prayers, supports, encouragement and caring during my studies and to the accomplishment of thesis and I would like to thank my friend Farid Ahmad FARZAM RAHIMI for his always encouraging and advices during writing this thesis.
DECLARATION

I, SADEQ Mir Aref, declare that this thesis, titled as “Improving Livelihood of Rural Community Through Greenhouse Farming, Case study of Injil district of Herat province Afghanistan” is my own original work apart from authors cited under supervisions of prof MIYOSHI Koichi. It is submitted to Ritsumeikan Asia Pacific University (APU) in partial fulfillment of the requirement for the degree of Master of Science in International Cooperation policy. Furthermore, I hereby declare that the information for this study was taken from published and unpublished of others’ work was acknowledged and referenced properly.
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<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
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<tr>
<td>ANDS</td>
<td>Afghanistan National Development Strategy</td>
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<tr>
<td>ANSF</td>
<td>Afghanistan National Security Forces</td>
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<tr>
<td>ARDS</td>
<td>Agriculture and Rural Development Strategy</td>
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<tr>
<td>AREU</td>
<td>Afghanistan Research and Evaluation Unit</td>
</tr>
<tr>
<td>CRS</td>
<td>Catholic Relief Service</td>
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<tr>
<td>CSO</td>
<td>Central Statistic Organization</td>
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<tr>
<td>DACAAR</td>
<td>Danish Committee for Aid to Afghan Refugees</td>
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<tr>
<td>DAIL</td>
<td>Directorate of Agriculture, Irrigation and livestock</td>
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<tr>
<td>DDA</td>
<td>District Development Assembly</td>
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<tr>
<td>EGTOP</td>
<td>Expert Group for Technical Advice on Organic Farming</td>
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<td>FAO</td>
<td>Food and Agriculture Organization</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GI</td>
<td>Galvanized Iron</td>
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<tr>
<td>GNI</td>
<td>Gross National Income</td>
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<tr>
<td>GNP</td>
<td>Gross National Product</td>
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<tr>
<td>MAIL</td>
<td>Ministry of Agriculture, Irrigation and livestock</td>
</tr>
<tr>
<td>MRRD</td>
<td>Ministry of Rural Rehabilitation and Development</td>
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<tr>
<td>NDF</td>
<td>National Development Framework</td>
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<tr>
<td>NGOs</td>
<td>Non-Governmental Organizations</td>
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<td>Acronym</td>
<td>Full Form</td>
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<tr>
<td>NRVA</td>
<td>National Risk and Vulnerability Assessment</td>
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<tr>
<td>OECD</td>
<td>Organization for Economic Cooperation Development</td>
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<tr>
<td>SIGAR</td>
<td>Special Inspector General for Afghanistan Reconstruction</td>
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<tr>
<td>TNAU</td>
<td>Tamil Nadu Agricultural University</td>
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<tr>
<td>TSG</td>
<td>The Soufan Group</td>
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<tr>
<td>UNHCR</td>
<td>United Nation High Commissioner for Refugees</td>
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<tr>
<td>USA</td>
<td>United State of America</td>
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<td>USAID</td>
<td>United State Agency for International Development</td>
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<td>USDA</td>
<td>United State Department of Agriculture</td>
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<td>UV</td>
<td>Ultra Violet</td>
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<td>WB</td>
<td>World Bank</td>
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ABSTRACT

This study investigates the role of greenhouse farming on improving rural livelihood and agriculture growth in the case of Injil district of Heart Province, Afghanistan. The study examines the impacts of greenhouse farming on farmers’ incomes, positive changes in betterment of rural community livelihood, its high potential contribution for the rural development, and shows that this technique of farming has the potential to provide fresh agricultural products to the markets especially in the off-seasons, which could not be grown without greenhouses.

In order to do this study, field research was conducted in Injil district of Herat Province and three successful cases have been selected from varieties of farmers in three different villages that narrated their success stories on establishing greenhouse structures, greenhouse farming is identified as a means of agricultural development in order to strengthen livelihood of households and improve community development in rural areas of the country.

Both primary and secondary data were used to achieve the objectives of this research; for obtaining primary data interviews were conducted with government officials, stakeholders and farmers as well as focus group discussions in the villages of Injil district; secondary data were acquired from Afghan government’s documents and reports.

The result from the study shows that greenhouses as new technology of farming increase the products of high value crops dramatically, and generate more income to the greenhouse growers. Additionally, greenhouse farming plays an important
role for the betterment of rural livelihoods due to high-income generation for farmers.

The result based on farmers’ perceptions shows that greenhouse farming as new agricultural technology transfer has the potential to be spread in all over Afghanistan. In addition, unemployment is a major problem in the rural areas in Afghanistan; greenhouse farming can contribute in increasing employment opportunities to the rural communities especially in the off-seasons and cause to hinder the young rural people from migrating to the neighboring countries.
CHAPTER ONE: INTRODUCTION

1.1. Background of the Study

Afghanistan is located between 29° 35’ – 38° 40’ latitude and 60° 31’ – 74° 55’ of longitude. It is surrounded by Uzbekistan, Tajikistan and Turkmenistan in the North, China is located to the Northeast part of the country with a small border, Pakistan has the biggest border with Afghanistan, it is located to the east and south and also Iran is located to the West. Afghanistan is a mountainous country and these mountains are covered by snow, which generate large sources of water in summer season. Afghanistan’s altitude is up to 7500 meters above sea level and contains fertile valleys and desert plain. (Qureshi, 2002)

Afghanistan is a landlocked country with 652,230 square kilometers. The arid to semi-arid climate leaves the Afghans with hot summers and cold winters. Since most parts of the country consist of mountainous terrains, the population, which can only be estimated due to the ongoing years of conflicts, is roughly 28,395,716 (The World Fact Book, 2010). Of the estimated 15 million people in the labor force, eighty percent of the populations are engaged in agriculture practices, which include farming, herding or both (USDA, 2010).

The economy of Afghanistan was based on agriculture and livestock prior the war that took place in the country. The majority of Afghanistan’s populations are living in the rural areas and agriculture was absorbing the huge part of labor source; majority of the people were engaged in different segments of this sector; Afghanistan’s agricultural products were sufficient enough in food production for
own consumption and even varieties of agricultural products particularly horticultural products were exported in international markets. But, the recent devastating wars have destroyed all infrastructure of the country including agriculture system, irrigation, food production factories and agricultural research centers.

Since Afghanistan is an agricultural based country and daily food consumption is significantly dependent on this sector, these mass destructions in most parts of the country has resulted in loss of large number of people’s livelihood and caused to the existence of lack of employment opportunities. Afghanistan needs to achieve an overall recovery, especially reconstruction of agriculture productivity system, which is highly significant to the both agriculture growth and to the development of economy.

Afghanistan has diverse agro-ecological zones that varieties of crops and vegetables can be grown and these zones allow cultivating year-round if protected agriculture or the crops in the greenhouse are used, which are highly profitable for the farmers and suitable for marginal lands. This technology is affordable and profitable for the poorer farmers by using simple structures from the available primary materials. Moreover, greenhouse farming is highly suitable and recommended in some parts of Afghanistan where farming communities are facing water deficiency problems.

Greenhouse farming, or protected agriculture under the plastic or glass tunnels, protects plants from the harsh environment, over coldness and from the different types of diseases; it signifies an exhaustive form of crop production in which both
the timing of production and growth environment can be well-ordered and water-use efficiency can be considerably enhanced (Moustafa, A. T… 2006).

Greenhouse farming offers good opportunity to the areas where less water is present, where people suffer from these water shortages, and where arable lands for cultivation are limited; in this regard greenhouse-farming technology accommodates within these areas. As far as Afghan farmers in the rural areas produce crops to only meet their own requirements for food consumption, they have no way to accept the subsistence agriculture system due to unavailability of technology and are still using the traditional methods of farming that causes lower productivity rather than market oriented agriculture production, the constraints such as lack of technical knowledge of new agricultural technologies has addressed the farming communities to the subsistence agriculture system in Afghanistan.

The recent developments in the agriculture sector in Afghanistan by implementing policies programs and projects through agriculture extension services to the farmers have positively impacted on farmers and rural community; greenhouse farming as new technology has been transferred to help farmers to accelerate crop productions in order to shift from subsistence method to market oriented step. Therefore, greenhouse farming has been expanding dramatically throughout the country in recent years through implementation of projects and distribution of greenhouse structures to the farmers to produce high value crops and to promote this technique of farming in all over Afghanistan for the great results that have been recognized from this type of farming.
1.2. Research Objectives

This research aims to assess farmers’ views and perceptions, to ascertain potential constrains to a wider adoption of Greenhouse farming technology in Afghanistan and to evaluate the impacts of the greenhouse farming technology on greenhouse growers’ incomes to the improvement of their livelihoods. The outcomes from a socio-economic evaluation provide satisfactory evidence that Greenhouse farming in Afghanistan has the potential to contribute considerably to both the improvement of rural communities in the dry water-scarce zones in Afghanistan and to the Afghan economy. It is found that greenhouse farming can play a vital role in providing local and national markets with fresh agricultural products that could not be grown otherwise, especially in off-season, this new technology of farming can contribute to the development of rural communities through providing job opportunities and bulk high value cash crop production opportunities for farmers within those areas, on the other side it helps the private sectors by establishing factories to produce greenhouse structures, materials and other needed equipment, which will be profitable for both farmers and private sectors. Furthermore, greenhouse farming could be expanded to a wider adoption in order to serve local, national and even international markets to generate higher incomes to the farmers and good revenues for the government, which will also help in using natural resources of land and water in an appropriate way especially in the dry scarce areas of Afghanistan where there is less water and limited land.
1.3. Research Questions

How are the livelihoods of the rural communities being changed through greenhouse farming in Afghanistan?
How greenhouse technology impacted on growers’ incomes in Injil District of Herat province, Afghanistan?
Why are greenhouse growers successful in Injild district of Herat, Afghanistan?

1.4. Research Problem

Decades of war have contributed to the collapse of productive agricultural infrastructure in Afghanistan, which also resulted in lack of employment opportunities in the rural areas, and a large number of people have lost their livelihoods. Afghanistan is a third world country with a rich agricultural tradition dating back thousands of years. It is also a country in danger, having decades of destruction due to ongoing wars and conflicts, a country that relies heavily on agriculture, foreign aid and trade that is currently making progress toward success and rebuilding the agriculture that it once had.

The economy of the country is based on agricultural products, and Afghan farmer communities have been producing with the traditional and old techniques of farming for many centuries; a major farming part of agriculture labor force of Afghanistan is formed from women in the community; they are involved in different activities of agricultural segments that needed to be supported by the government. Afghanistan as an agricultural country is highly dependent on this sector; improvement of agriculture is directly related to the livelihood of people to shift from the traditional method to advanced agricultural system. Greenhouse
farming has been recognized as a positive force for economic development of the country as well as livelihood improvement of rural communities. But, there are a number of challenges and problems such as lack of financial institutions and markets are the main obstacles on farmers’ directions to more widening of greenhouse farming in Afghanistan.

1.5. Significance of the Study

The main significance of this study is to help farmers to increase production and generate more incomes, and accelerate rural development in Afghanistan through greenhouse farming technique, and the restoration of Afghanistan’s agricultural productive capability is essential to the regaining food safety of rural communities and to the improvement of their livelihood situations. The green house farming technology has been accepted as a proper way of farming under protected agriculture and is known to the farmers, which is suitable and profitable in the areas where there is less water and land. Using simple structures of greenhouse is both affordable and profitable for the poor and marginalized farmers, and they can use from the primary available materials. Adoption of greenhouse farming is helping to improve of rural livelihood and provide employment opportunities within those areas.

1.6. Summary

Afghanistan has experienced decades of war and conflict that completely destroyed all infrastructure of the country including agriculture and irrigation system, which also destroyed the country’s food production capacity and many people, have lost their livelihoods and rehabilitation of agriculture system has
been contributing to the improvement rural community and agriculture sector. Greenhouse farming offers a good opportunity to increase high value crops and to the improvement of farmers’ incomes.
CHAPTER TWO: LITERATURE REVIEW

The Literature review chapter describes theories, concepts, and importance of agriculture, the latest improvements in this sector and greenhouse farming as new technology of farming to the development of rural communities and their livelihoods; it also describes the impacts and importance of greenhouse farming on farmers and other rural communities. Furthermore, this chapter portrays the significance of new agricultural technologies and transfer to the development of rural communities.

2.1. Agricultural growth As Key Source for Development

Economic growth generally relies on new technological changes by creating new process and products (Hoekman et al., 2005). Agriculture can be the means of growth in all countries, especially for the agriculture-based countries and has the vital power of reducing poverty; the estimates in agriculture based countries show that GDP growth has direct relation with agriculture growth, the GDP growth comes out of agriculture is much higher rather than being originated outside agriculture in reducing poverty. It is estimated that agriculture's effectiveness in poverty reduction in China has been 3.5 times more than the growth comes outside agriculture, and for Latin America 2.7 times and these estimates coincides with India as well. On the other hand, the growth in agriculture sector is counted as the means of industrializing a country; agriculture growth has brought industrial revolution that spread in that era across the world starting in England in the 19th century and in 18th century in Japan and even more lately China, Indian,
and Vietnam have been the witnesses of emerging industry due to the rapid agricultural growth (Burch et al., 2008).

Furthermore, economists in the beginning of 20th century found out that agriculture plays an important role in development. Lewis (1945) notes that agriculture development theory was based on the idea that “there are large sectors of the economy where the marginal productivity of labor is negligible, zero or even negative.” Later on Johnston and Mellor (1961) demonstrated that agriculture performance has an active role in development path of countries; this large sector in developing countries is an important sector capable of generating capital to the further improvement of non-agriculture sectors (Anríquez, &Stamoulis, 2007).

Agriculture is the important key issue of most rural economies, which mostly consist of developing countries, whereas agriculture development aims at providing proper facilities to the welfare of rural communities through the availability of sustained improvement of agriculture outputs and rural economic development depends on improved agriculture sector with high productivity. Therefore, one of the successes of rural development is from the positive impacts of agriculture development that aims at creating welfare facilities to the people of rural communities and causes to livelihood improvement (Thirtle et al 2003).

The real value of agriculture to the both economic and rural development of a country is identified from the figures, which are given by the regional authorities added to real GDP of a country. Thus, agriculture is highly important within the national economic development of agriculture-based countries. As far as less
agriculture-based developed countries having high rural population, lower per capita income and facing higher poverty problems. Therefore, improvement and advances in agriculture is more needed for their own development. (Anriquez, & Stamoulis, 2007)

Agriculture as one of the sources of growth in the development path is a major determinant to the betterment of rural livelihoods. Higher productivity is the path to agriculture improvement, and in order to increase the yield, and it is needed to accelerate the growth in agriculture. China’s rapid growth in agriculture is due to rapid changes in agricultural technologies, which caused rural development and poverty reduction from 53 percent in 1981 to 8 percent in 2001 (Burch et al., 2008). New agricultural technologies have been one of the primary factors in contribution to maximize the agricultural productivities in developing countries in the last five decades. Using the new technologies of farming not only leads to increase in productivity, but has also become a factor in creating job and employment opportunities in rural communities and improvement of rural livelihood as well. (Carlisle & Wadsworth 2007)

2.2. New Agricultural Technologies and Influences on Rural People

Agricultural technology has the potential to contribute to the increase of agriculture productivity, the key concept to economic growth, and to help smallholder farmers to increase incomes and create labor opportunities; it also has positive impacts on their livelihood in the rural areas. Agricultural technology identifies the procedure planning of reducing poverty in the rural areas and provides opportunities of identifying this sector in national development
strategies, which decides that investment in agriculture sector is appropriate for the development of agriculture-based countries and the farmers involved. (DFID 2004)

The extensive adoption of new technologies have led to a rapid increase in agricultural productivity in most of part of the world particularly in developing countries such as South and East Asia. As a result, adoption of new technologies in agriculture sector have impacted partially on reducing poverty, increasing in incomes and wages of agricultural producers, providing better livelihood opportunities, impacting on lowering food prices. Thus, Timmer notices in his book that industrialization in Asia was in essence agricultural improvement (Timmer 1988).

Increasing agricultural productivity has been one of the main determinants of economic growth, rural development and poverty reduction; hence new agricultural technologies have improved these determinants and shared the positive impacts on poor rural livelihoods and it is the key factor to achieve the Millennium Development Goals. Rapid agricultural technology changes in most developing countries have led to increase in productivity, throughout these countries the percentages of yield averages drastically have changed during the last few years, due to spread of new agricultural technologies (Maxwell 2001).

Improvement in agriculture sector and productivity has strong impact on other economic sectors, such as creating job opportunities in the relevant sectors, high input supply, increasing food security and inducing and supporting economic growth. Therefore, using from the new technologies in agriculture
increases productivity, which impressively impacts on livelihoods and poverty reduction. Thirtle et al (2003) examined the increase in agricultural productivity due to improvement in agriculture sector by using new technologies among 48 developing countries in 1985-1993 and found out that with 1% increase in total yield in agricultural production reduced between 0.6 to 1.2% of the people who were living in the rural areas less than US$1 per day. So, he demonstrates that no other sector can have such high impacts on people’s livelihoods and as well as poverty reduction and in fact adoption of new agricultural technologies and improvement in agricultural productivity have proved remarkable changes on both people’s livelihoods and poverty reduction in recent years.

Agricultural technological changes have been evolving since growers experienced variety methods of cultivation under different environment conditions, using from new machinery and sources of power have led to the rapid increases in agriculture’s productivities in many parts of the world. Influences such as secure output market and increase in subsistence production are great opportunity for farmers to enhance investment in this sector. Effective input supply systems in order to increase efficiency in yield productivity, supporting infrastructure of agriculture system particularly irrigation, risk and vulnerability where new agricultural technologies have the potential to reduce vulnerability and increase in incomes of the poor people in the rural areas, hence these determinants have persuaded farmers to adopt new technologies of farming for the purpose of betterment of livelihood (DFID 2004).
2.3. Concept of Greenhouse Farming

Cultivating plants in open field is the natural way of farming that has been taught to human to cultivate both cash crops and food crops. However, the world has improved and people found out that growing plants in some temperate climatic conditions are highly adverse and cannot resist against cold weather. Therefore, humans have been compelled to find out methods to protect high value cash crops from the excessive cold, wind, or excessive temperature environment. For this reason, plastic and glass tunnels have been developed, which is called greenhouse technology (Hunter 2010).

“Greenhouses are inflamed frame structures that are covered with a transparent material in which crops are grown under protected environment conditions” (Douglas et al., 2010). Greenhouse farming and other types of controlled environment cultivation have been developed to control the temperature and design desired climatic conditions that permit the crop production to be extended through the round-year farming. Protected agriculture under greenhouses is associated to accommodate at off-season production when the weather is cold and the prices of agricultural products increases and for this reason greenhouse environmentally can be controlled through providing heat to overcome extreme cold conditions and establish crops favorable temperatures (Douglas et al., 2010).

The idea of environmentally controlling plants has existed since Roman times; they were cultivating cucumber in wheeled carts to keep it under the sun during the day and were carrying inside during the night to avoid cold weather. Later in the 13th century, greenhouses were improved in Italy and Korea. The concept of
greenhouses was known in England and Netherland in the late 17th century, for the first time medicinal crops were grown in Holland in 18th century and in Japan this technique of farming developed in the late 18th century. The main structures of greenhouses were accepted when wider sheets of plastics and polyethylene became available in the world. Currently greenhouse farming is improving all over the world; 89600 hectares of greenhouses plots are in Netherlands, 25000 hectares of Spain are under greenhouse, in USA, 4000 hectares and in Italy, 18500 ha are covered by greenhouses that mostly cultivate different types of vegetables (Dutta&Sen, 2013).

Greenhouse farming has proved that Increasing high value crops productivity and extending the season for longer period of time of the product outputs by protecting plants in greenhouses has shown that cultivation of plants in greenhouses increase productivities efficiently and extends productivity season with higher profit. (Wells & Loy, 1993) Cultivating crops in the off-season leads to increased profits for growers and it showed that off-season crop yielding generates more incomes due to high prices of products in markets (Ford, 2004).

2.4. *The types and Advantages of Greenhouses*

Classifications of greenhouses are based on compatibility and cost, which are divided in to three types, low cost or low-tech greenhouses, medium-tech greenhouses and high-tech greenhouses (TNAU 2013). The low cost greenhouses are the simple structures and designs, which are easy to build with simple locally available materials such as woods, bamboos and timbers with transparent Ultra Violet (UV) plastics that use fewer high tech materials. These types of greenhouse
structures don't own specific environmental control parameters. Therefore, only simple techniques of environmental control such as side wall opening is used to set the inside temperature to increase or decrease, mostly these types of greenhouse are used in very intense cold weather with low ceilings that keep the heat inside for longer time (TNAU 2013).

A Medium-tech greenhouse is erected with medium investment and manual environmental control. As the structure and base is made of galvanized iron and pipe, this type of greenhouses are more powerful and resist against winds, rain and harsh environment. The air, heat and humidity can be controlled manually in order to maintain favorable air inside, hence this type of greenhouse should be cared for and maintained properly and they are favorable to be in those areas where the climate is arid and dry. High-tech greenhouses are suitable in most types of environments. The system is fully automatically controllable, and comparing to low and medium-tech increases in productivities and requires more investments (TNAU 2013).

The main reason to cultivate and grow plants in greenhouses is when the plants can’t be grown in outdoor environment due to intensively cold weather, the high value crops and variety of vegetables that have high demand market for out seasons has valuable advantages and high return of investment for the farmers, the yield can be increased 10-12 times comparing to the open field cultivation and it is round year plant cultivation. Furthermore, cultivation in greenhouses decreases diseases and plagues from other pesticides, as well as needs less water especially in dry areas where there is not sufficient water. Therefore, all these advantageous
aspects persuade farmers to look forward to try greenhouse farming (Johnny 2012).

2.5. *Greenhouse Farming as New Technology for Agriculture Growth*

Protected agricultural products under the greenhouses are to enhance the off-season productivity and to increase the quality as a new modern technology of farming for the greenhouse growers. Greenhouse structures are designed from covered plastic, metal or wooden bases and pillars being used to keep the plants according to the tendency of crops in an attempt to increase the productivity and generate more benefits to the growers; the primary greenhouse structures include simple primary materials included simple plastics and available woods and timber with low cost. Moreover, more advanced greenhouses are very improved in structures that higher technologies are applied and this type of greenhouse is more improved and durable against harsh outdoor environment which included metal structures, high quality polyethylene, high techniques of irrigation technologies and they are designed in advanced types of greenhouses, but bearing with higher cost comparing to simple greenhouses (Jensen, 2004).

Greenhouse technology has been promoted and used among the people for decades. This technique of farming significantly provides higher yield compared to open field cultivation. Cultivation in the plastic tunnels has the ability to protect the crops inside the greenhouses from a variety of diseases, pests and other harmful elements. Furthermore, greenhouses that use less water by developing high drip irrigation technology have encouraged the people who are living in the
dried scarce areas to promote this technique of farming. The technology requires less use of land area, with higher productivity (Blake et al., 2008)

Environmentally, greenhouse farming is more controllable compared to open field cultivation in terms of water supply, air humidity, light and temperature that can be regulated by the growers. Meanwhile, pests and other disease can be prevented to the maximum extent in order not to have access to the plants in greenhouses. Therefore, greenhouse farming has the potential to overcome some challenges, such as water deficiency, rising agricultural product costs, low in productivities, slow agricultural growth and changing in climates that currently facing in agriculture sector in most countries. Furthermore, for the increase of productivity greenhouse farming has the potential to extend the growing season in round-year cultivation to deliver more products, whereas cultivating in the open field doesn't have this potential (EGTOP 2013).

Greenhouse farming for producing varieties of vegetables has been accepted as part of organic crop farming. Its existence in all and early season availability with good quality products has shown socio- economic importance for both growers and consumers for its reasonable income to the growers and fulfilling consumer’s requirements through round-year availability of the products, despite the fact that technique of farming has an early higher structuring costs and intensive labor than outdoor cultivation. But, it provides a vital source of income for the farmers and helps in the betterment of livelihoods of rural communities (EGTOP 2013).

The rapid promotion of protected agriculture under greenhouses has contributed to water efficiency improvement. The cultivation of protected agriculture has
reported the yield increase and in reducing water consumption (AbouHadid et al.1992). The shortage of water resources, increasing in population, low agriculture products and high demand for agricultural products, particularly vegetables, have encouraged the growers to take the first step in starting up good agricultural practices to build greenhouses for vegetable crops, and due to the current high demands of consumers for year round vegetables production, greenhouse farming for producing fresh vegetables avoids being dependent on outdoor productions (Baudoin et al. 2013).

2.6. Socio Economic importance of Greenhouse Farming

The greenhouse technology farming has been marked as a method of producing agricultural products especially with the high value demanded vegetables throughout the world. The high vegetables quality production of greenhouses by using less land area, water efficiency and less labor forces and increase in yields are noticed for sustainable agriculture rather than traditional. Moreover, the ten times increase in yields comparing to open field farming and extending the period of growing not only minimizes diseases and pesticides but also generates more income for the greenhouse growers (Dutta & Sen, 2013).

Farmers in the rural areas who own greenhouses are the main beneficiaries of greenhouse farming due to high yield productivities; the socio-economic dimension of greenhouse farming focuses more on generating higher income for the growers and to ensuring to be a permanent food security reference for them. Furthermore, greenhouse farming contributes to a better quality of life for the
growers and other local community that are involved in greenhouse farming business (Dutta & Sen, 2013). Protected agriculture under greenhouses for the off-season vegetables enhances the percentages intensity by 200-300% and the demand for the vegetables increases every year; the off-season vegetables crops have high value for the farmers due to its high demands by consumers. Increase in yield and rural employment generates more income from the greenhouse farming. Thus, protected agriculture under greenhouse farming for high value crops especially in the off-season is the best alternative for vegetable productions. It is estimated that the cost incurred and revenue obtained from off-season greenhouse farming, by calculating the benefit cost ratio is profitable to the betterment of growers and other rural communities (Tahir & Altaf, 2013).

To increase farming productivity, it is needed to adopt improved technologies of farming for sustainable agriculture production. Adoption of new technologies leads to maximizing productivity and increases in returning level to higher profit. Cultivation of vegetables in greenhouses as commercial cash crop have shown that is highly important with the potential of increasing incomes in the rural areas, improving the living standards and as well as creating employment opportunities for the people in the rural communities.

Growing out-of-season vegetables by using greenhouses for cold temperatures protection has the opportunity to earn high prices of crops in the cold seasons; this premium value has encouraged farmers to pursue this technique of farming due to high profitability, which economically has impacted positively on farmers’
incomes and on the other hand this will fulfill the demands of market out season vegetables requirements, while the main incomes of rural communities are dependent on agriculture and this sector provides food security for their livelihoods. Therefore, recently the social impact of greenhouse farming has shown a great improvement in the livelihood of the rural communities (Hunter 2010).

Greenhouse technology offers great flexibility in Production timing for varieties of vegetables to generate substantial improvement in farm incomes and high yields, and it provides an opportunity for the farmers to adopt the technology for its great incomes from the high quality productions by selling and supplying to market. Furthermore, increase in yields and improvement in quality, especially in off-season where the prices of vegetables are premium can pave the way to the greenhouse growers to earn more profits significantly without turning into an oversized operation, which does not only fulfill the requirements of the people to fresh products, but also positively impacts on betterment of farmers’ livelihoods in the rural areas (Hunter 2010).

2.7. Greenhouse Farming and Technology Transfer

2.7.1. Concept of Technology

Technology can be defined as achieving specific production outcomes from particular processing chosen outputs. A technology may be used to generate multiple outputs from the combined structures to generate high-end outputs from the single input. On the other hand, technology can be described as device,
process or organizations to achieve specific proposes thorough using scientific knowledge (Maskus 2004).

Sohal (1981) Defines Technology as configuration and knowledge determining set of specific processes and products that are connected to get certain results through finalizing difficult problems. Pavitt (1985) proposes that technology is varieties of knowledge regarding a certain application in an area of development. Thus, Roath and Tihanyi (2002) suggest that technology includes information, which cannot be reducible easily. So, technology is secret knowledge of an organization (Wahab.et al. 2012)

Solmon (2000) notes that the way of organizing people and tools to achieve certain ends to their requirements through application of all organized sources of knowledge is called technology. Hence, the social science scholars define technology as interrelated with social values, which is featured as organized activities of an area to assist human to adopt new initiative to a utilized environment. McGinn defines technology as a high value of human activities that are connected to environmental, socio-economic and cultural influences in its conceptualization to the achievement of high valued results (Luppicini 2005).

2.7.2. Agriculture and Technology Transfer

Technology transfer is the transition of knowledge and new discoveries to the development of an area to the public that occurs through different paths for the purpose of bringing about new technologies and guides to third party under supervision of professionals (Penn- 2013). Technology transfer is the process of
transferring innovations from an academic area to the commercial sectors (Bastani et al., 2015).

Meanwhile, technology transfer is known as a mechanism of information shifting across borders to an effective way of processing technologies and marketing to its absorption and imitation. Thus, the importers of technology are interested in getting new knowledge at low cost to develop the people for the purpose of increasing profit in the area. In general, the technologies that are transferred are newer comparing to the local practices and techniques. Therefore, the transfer of technology can occur through the temporary migration of people from a developed area to the developing economies to generate high quality of performances (Maskus, 2004).

According to the reviews of some authors, technology transfer is a difficult and complex process that occurs within different functions on a single product and commonly acknowledged as complex process, which needs time to evolve. Furthermore, it refers as transmission of new experiments with effective absorption to provide certain services within and across the countries. Technology transfer is the process of moving the concepts and ideas from the experiment places such as laboratory to the market places or transfer of ideas, knowledge and concepts from developed to the developing or less developed countries. Autio and Laamanen (1995), insinuate, “technology transfer involves an intentional goal-oriented interaction between two or more social entities, during which the pool of technological knowledge remains stable or increases through the transfer of one or more components of technology” (Wahab et al., 2012 p 63).
Adoption of new technologies for sustainable agriculture and farming system is a big challenge and issue for the growers; it is needed to bring new changes in agriculture sector in order that farmers can fulfill consumers’ demands. This makes farmers to look always for new technologies as one of the directions of reducing costs for them. Furthermore, high quality products, increasing in productivity, year-round products availability and higher incomes with having great knowledge of the area are led to fulfill the requirements of consumers; all these can be done through adopting new technologies of farming in agriculture (OECD 2001).

Adopting the transferred technologies for sustainable farming and agriculture system is to contribute efficiently to the farming sector and financially helping farmers to generate more incomes from the changes. Therefore, several factors cause to adopt new technologies for sustainable farming such as research and development, learning new methods of farming, availability of proper financial sources and cooperation of government and non-government organizations (NGOs) to adopt transferred technologies (OECD 2001).

Oyekale and Idjesa (2009) argue that farming experiences of farmers, education, accessing to farm inputs and to financial sources are highly influenced in adoption of new technologies and they noticed that one of the main priorities of new technologies adoption is access to credit that farmers can invest in new technologies. Moreover, they argue that active extension services significantly influence the adoption of new technologies and its maintenance (MWANI 2012).
In the same study according to Ziberman new technology requires some costs, new equipment, working knowledge, marketing promotion and as well as learning and training time to get greater utility (OECD, 2001). A workshop report of European countries argues that adopting new technology can provide assistance to reconcile the needs for sustainable and profitable food production. Appropriate adoption in new technologies can sometimes fulfill the environmental goals and food production. Stakeholders such as farmers, consumer groups, agro-food industries and non-government organizations have a great impact on promoted participatory approaches of new technology adoption.

2.8. Livelihood and Household

2.8.1. Household

Household is said to be the basic unit of society, which usually comes from a group of people sharing the same hearth for cooking. (Chambers & Conway, 1992) Household is defined as group of people of both genders co-residing in a house sharing all their financial resources for the expenses of their living (Statistics Canada, 2012). A household consists of either one person or a group of people living under a roof that may or may not have relations with each other and sharing meals among the members. It is distinct from a family; a household comprising a single family or a group of people living together and it is the basic unit of analysis in many social economic models. (Jenkinson, 1998)

2.8.2. Livelihood

The basic needs and requirements of human to food and cash are called as livelihood. Humans need to do some activities to improve the living conditions in
a protective way of management opportunities. So, these activities are referred to as livelihood. (Lont& Hopes, 2004) Livelihood is the method of managing life in a better manner, which provides the main requirements of human being such as shelter, food, cash income, material and consumable. Therefore it is a self-motivated assortment that physically structured and constantly updated (Winser, 2004)

The word livelihood has been defined by many authors based on their studies (Chambers and Conway 1992, p. 7) is defining “A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living; a livelihood is sustainable when it can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long-term”. The livelihood can be sustainable when it can deal with and retrieves from burdens and stresses in order to conserve and increase its competencies and resources now and in the future.

Assets is one of the main component of livelihood among other components, which constructs the living standard of people, it includes both tangible assets and available sources. Kantz, 2001 expresses that livelihood is the shared path of individuals that corporate the living standards and interactions within the families. Each community, people and individuals have different level of livelihood patterns and strategies. Hence, the aims to the improvement of livelihood to the target communities is emphasized on better management of life quality in order to
bring positive changes in their lives. DFID, (2003) identifies six aspects of a sustainable livelihood, 1-Improved access to high-quality education, information, technologies and training and better nutrition and health 2- A more supportive and cohesive social environment 3- More secure access to, and better management of, natural resources 4- Better access to, and better management of basic and facilitating infrastructure 5- More secure access to financial resources 6- A policy and institutional environment that supports multiple livelihood strategies and promotes equitable access to competitive markets for all.

2.8.3. Improving Rural Livelihoods

Improving livelihood shows the improvement of the people, families and members. The positive changes in the livelihoods indicate the engagement of members' high productivities and development in a household livelihood is based on the fulfillment of physical, economic, social requirements and empowerments. The important categories of capital assets build the livelihoods are natural, social, physical, human and financial, these vital components capital assets cause to positive changes in livelihood. In addition the physical and financial resources can contribute to the improvement of people’s livelihoods (DFID, 1999).

Three quarters of world’s population (1.2 billion) are living in the rural areas and live on less than one US$ dollar per day. Their main perspective of living is agriculture, and poor people in rural areas have less access to human, social, physical, financial and natural capital assets. The transformation in agriculture has always played a vital role in enhancing wide spread of poverty reduction and
contributed to the improvement of rural livelihoods. Agriculture ensured the food security of the people as the population is growing (SHORT, 2002).

SHORT (2002) in DFID report expresses that, to provide better livelihood directions through agriculture for the poor rural in a developing country level, it is highly recommended to establish a policy and institutional environment that can contribute to the provision of agriculture growth opportunities for the rural community to have access to services, land and market. This includes persuasion of private sectors in order to invest in agriculture growth, knowledge, skills and development. Moreover, the recent studies have shown that agriculture has the dynamic potential in promoting rural development, economic growth of the poor people, poverty reduction and its significant role to the improvement of rural livelihoods in many developing countries especially Africa and South Asia.

Development in agriculture sector indicates fundamental improvement to the pro-poor people in the rural; it is the key factor to the improvement of livelihood strategies of millions of people that are living in non-proper conditions. However, it contributes to economic growth and is the provider of staple foods to the poor rural people. Agriculture is identified as a major part of natural resources based-activity forming significant part of livelihood strategies of rural communities due to involvement of small families in all process of its productivities. Furthermore, it is one the major contributors of employment perspective for most developing countries, DFID (2002) finds that despite rapid growths in urbanization sector in South Asian, but agriculture still provides jobs for 60 percent of the population and contributes 27 percent of GNP of these countries.
2.9. Community and Community Development

Social relationship among the people in an area refers as community, aiming to achieve social well-being and real relations in a society. Community is said as primary social experiment of realm in a family, it is the main pillars to human association, which is aiming at collaboration collective responsibility. (Wilkinson, 1979) Community is defined as group of people having the same interests, objectives and shared goals; it signifies living a group or collection of people in the same shared well-specified space. (Craig, 2007) However, to find out more on community and community development, Miyoshi (2012) defines community as “a relative aggregation constructed by individuals, groups and organizations acknowledged by a specific area, generally defined by administrative boundaries, and within this boundary, these individuals, groups and organizations recognize themselves as being a member of the community”. Moreover, community is defined as a gathering of people living together on the same geography with having combined commonalities. (Chaskin et al., 2001)

To achieve the goals in a community, there should be a development in the community toward achieving these goals; community development is the process of collective activities of people in order to solve problems in the society for the community to achieve the goals (Leaders, 1981). Community development has been defined as a way of reinforcing the society through prioritizing the collective actions of the people. A community aiming at obtaining social, economic and environmental policy goals, it creates the opportunities to empower the local communities and seeks to bring positive changes (Craig, 2007).
Wilkinson (1979) Points out that community development is the channel to organize, gather and communicate people through their activities and establish humanity cooperation within areas, community development prospect is simply to help people to the betterment of life style. Meanwhile, community members are the main fundamentals of the society to the development of communities and rural. Hence, community development is a process, which is conducted by community members.

2.10. Summary

Greenhouse farming for cash crop production has been recognized as an appropriate technique of protected agriculture to be used by farmers in adverse intense cold environment especially in off-seasons, when the weather is too cold for open field cultivation. Greenhouse farming has the capability to extend the growing season, increase the products, generates more incomes and improves the livelihoods of farmers and other communities in the rural areas. The literature review chapter mainly described the importance of agriculture growth, new technologies of farming and transfer of these agricultural technologies to the development of rural communities and as well as the importance and impacts of greenhouse farming on farmers‘ livelihood and rural development from the reviewed literatures written by authors.
CHAPTER THREE: METHODOLOGY

To study and find out the role of agricultural new technology of greenhouse farming on rural livelihoods through recent promotion of this new technique of farming in Afghanistan, this chapter delineates and examines the research methods of this study, which describes and illustrates the data collection methods and its analysis in this research study, the methodology chapter consists of the following parts.

3.1. Description of Research

To conduct this study, the author decided to choose qualitative method of research by using triangle methodology technique that includes multiple methods of conducting research. Triangle methodological study has been described by many authors, Hussein (2009) illustrates methodological triangulation technique as applying two or more techniques in conducting research studying, Berg (2004) describes triangle methodology technique as agglutinating different and several techniques to assist the researcher to grab “a better, more substantive picture of reality; a richer, more complete array of symbols and theoretical concepts; and a means of verifying many of these elements”.

Therefore, qualitative case study research aiming to explore, describe and understand well suited this study, multi-techniques such as focus group discussions, conducting personal interviews and as well as personal observations were used in this research study. Qualitative technique of methodology is aiming to describe the study from different perspectives in a research case; it consists of
multi approach techniques, which describes the subject matter in an interpretative and naturalistic way. Therefore, qualitative research studies things in natural ways trying to identify its phenomena in its meaning for the people (Denizin and Lincoln, 2005).

Qualitative methods particularly study the actual occurrences in an area in order to describe, identify and show the real phenomena in details to find out specific subjects or topics that show difficulties in terms of other studies (Kalof, Dan & Dietz, 2008). In other word, Mcqueen&Knussen (2002) says; use of qualitative research method is not needed to calculate or put numbers; it neither gives importance to insertion of statistical data nor using from the measurements devices in qualitative research. Moreover, case study is a tactic or strategy of a method of research that was used in this study, Hartly (2004) states case study is only a research strategy that obtains experimental data thorough broad investigations of phenomena, in this research the real success stories of greenhouse growers show the empirical concepts in real life.

In this qualitative study the researcher conducted interviews in semi structures model of interviews with government officials of related sectors by providing open-ended questions for the purpose of collecting primary data. Open-ended is described as sort of questionnaires in an interview where there is no boundaries to respond the questions for the respondents of an interview (Macqueen &Knussen 2002).

Furthermore, to understand the importance, impacts and influences of greenhouse farming as new technology of farming in Afghanistan and its role on people's
livelihoods and incomes in the rural areas, a case study of greenhouse farming were carried out in Injil district of Herat province Afghanistan. The interviews in research field were conducted with twenty greenhouse growers in different villages of this district, the selected greenhouse growers were chosen randomly due to lack of previous recognitions or relations with them. But, the earliest interviews with both agriculture promotion office of Herat provincial agriculture department and Injil agricultural department paved the way to the researcher for general information on official number of greenhouses registered in all villages of this district. Among the chosen greenhouse growers, three different cases of them were chosen to narrate their full success stories and thanks to the greenhouse growers that eagerly responded to researcher’s questions and narrated their different success stories with no fear of taking pictures, voice and video recording.

Personal observation was one of the important techniques used in this study; researcher visited greenhouses of the farmers in their villages and saw the real changes in their livelihoods that have occurred after building greenhouses with small portions of land and changed their incomes. Comparing to their previous methods of farming, researcher personally observed different types of greenhouses that farmers have erected on their farmlands. Meanwhile, researcher also observed marketing processes of their products such as collecting, bundling, and packaging and various methods of shipping of the products to the market. Focus group discussion technique of data collection was also used in this research to obtain deep understanding of the subject. Kitzenger, (1995) argues, “Focus
group discussions are a form of group interview that capitalizes on communication between research participants in order to generate data. Although, group interviews are often used simply as a quick and convenient way to collect data from several people simultaneously, focus groups explicitly use group interaction as part of the method” (p. 299). Researcher conducted focus group discussions with both government officials of the related sectors and farmers, the first group discussion with government officials was conducted in agricultural promotion of Herat provincial agricultural department regarding the current situation of greenhouse farming and discussed more on finding ways to look for a wider adoption of greenhouse farming in all districts of this city. The second focus group discussion was done in Jaghara village of this district with a number of greenhouse growers and including non-greenhouse growers. Hence, both focus group discussions helped researcher to get the real picture of current improvement in greenhouse farming and as well as obtaining the information on challenges in which greenhouse growers currently are facing.

In general this study is mainly focusing on improving greenhouse farming, the impacts in the livelihoods of farmers and rural communities in Injil district of Herat city Afghanistan. This study describes the findings of the collected data to the lately improvement of greenhouse farming in Injil district. Injil district was selected as the case study due to its better development, better security, proximity to the main city of Herat and having short distance to Herat industrial town; greenhouse farming in this district has been developing by cooperation of international organizations, Afghan government and efforts of farmers that are
encouraged to extend and build many more greenhouses to spread in all villages of this district and as well as in all districts of Herat province. This technique of farming is highly profitable and sustainable especially in the winter season due to the cold weather and off–season cultivation that many of the farmers are idle and do nothing on their farmlands during cold seasons.

The collected data from Injil district shows that how the farmers have been encouraged to start and build greenhouses for their own income growth, increase of production and the facts behind this improvement to the recent greenhouse farming promotion in all over of this district. The conducted interviews with the government officials of the agriculture and greenhouse related department of both agriculture department of Herat city and agriculture department of Injil district, project developers of greenhouses and the farmers in Injil district shows that improvement of greenhouses for cultivation of high value crops and vegetables have been expanded and sped up in most villages of this district from different initiatives methods that made the farmers to focus and improve greenhouses farming and cultivate in the plastic tunnels.

3.2. Research Site

This research study was conducted in Injil district of Herat province where greenhouse growers of this district are the starters and promoters of this technique of farming in all over of this province. Herat is located in west part of Afghanistan and has borders with two countries of Iran and Turkmenistan and with three provinces and this city covers 55,869 km2 that represent 8.56% of Afghanistan total land area, Herat is the second most populated city after Kabul, estimated
above two million (CSO 2003). Injil District was picked as the forefront among other districts of Herat province; this district is a great producer of wheat, maize, vegetables (cauliflower and spinach) and fruit (melons, grapes, pomegranates and mulberry). Injil district is one of the major producers of commercial crops such as cotton, sugar, sesame, tobacco and some other commercial crops grown across including olives. In an official report of District Development Assembly (DDA) of Injil district reports that Injil with the population of approximately 600,000 and land area of 1333 square Kilometers is one of the biggest districts, which has only 4-5 kilometer distance from central part of Herat city. This district has 274 villages, of which 213 are covered by DDA programs more than 60% of the people in this district are busy with agriculture and get their incomes from this sector, the cultivated land areas in this district are 27,000 hectares. In spite of the recent improvements in this district, the people are still suffering from poverty and unemployment, the reported data shows that still more than 30% of the people are living under poverty line (DDA-2012).
Figure 3.1. Map of Injil District of Herat Afghanistan

Source: (Amin 2010)

3.3. Data Collection and Analysis

The data in this study was collected through both primary and secondary methods of data collection, official government reports of relegated sectors, national and international organizations report projects of greenhouse farming, books, academic journals, websites and other reports, which are related to greenhouse farming as agricultural new technology of farming, were used as sources of secondary data collection. However, to find out an extensive image of the study the researcher collected primary data through variety techniques of primary data collection.

Therefore, the researcher did field study for collecting primary data by conducting interviews with government officials, greenhouse project implementers and finally with greenhouse growers. The conducted field research was occurred from August 22 to September 28 in both Kabul and Herat. In Kabul researcher visited
Comprehensive Agriculture and Rural Development – Facility (CARD-F) based on both MRRD and MAIL and conducted short interviews with high ranking officials regarding implemented greenhouse projects overall in most provinces of Afghanistan.

As far as the research site is Injil district of Herat province the researcher conducted interviews with government officials of Heart provincial agricultural department, agriculture extension office, Injil agricultural department and greenhouse projects developers, open-ended questions were asked from greenhouse growers to grab a better understanding of greenhouse farming advantages, impacts and challenges that both government and farmers are currently facing and positive influences on recent implemented projects by international organizations such as CRS, USAID and other extension services on improvement of greenhouse farming techniques in this province especially in Injil district.

Moreover, the smooth method of interviews and focus group discussions were carried out with greenhouse growers, and personal observations were used to let the researcher to observe personally from the greenhouses that farmers built by themselves. During interviews from the greenhouse growers researcher asked different open-ended questions since when, how, and what influenced them to establish greenhouses, during the interviews most of them were complaining from their current challenges that they are facing at the moment.

Researcher used electronic devices to record for later further analysis. In this study both videos and audios recorded during interviews from respondents and
were willing to respond the questions and sharing their success stories while recoding. Meanwhile researcher got the opportunity to take pictures with them and from their greenhouses. Furthermore, important issues were noted in the notebook by researcher, in overall researcher tried to collect the data in different techniques of data collection for future amylases.

In order to analyze the collected data in a qualitative research, Caudle, (2004), defines “Qualitative data analysis means making sense of relevant data gathered and responsibly presenting what the data reveal”. Meanwhile Gibbs (2002) defines “Qualitative Data Analysis is the range of processes and procedures whereby we move from the qualitative data that have been collected into some form of explanation, understanding or interpretation of the people and situations we are investigating”. The collected data from both primary (the field research) and secondary data analyses through descriptive method to obtain the importance, advantages, impacts of greenhouse farming and income changes of farmers comparing to open-field growing as transfer of new technology and means of employment within rural community and in over all their impacts on rural livelihoods in a war-torn developing country like Afghanistan.

3.4. Limitation to the Research

There were some limitations while researcher was conducting the research and the two main challenges were very notice-able. First there is still lack of security in most parts of Afghanistan especially in the rural areas, which makes it difficult to commute freely in those areas and the fear of being abducted is very high. Due to this reason researcher could not visit many villages and farmers in this district.
The second challenge was the selecting the villages randomly, before prior communication it was very difficult to find greenhouse growers in different villages among hundreds of villages. Therefore, this was another big problem that researcher faced during field research and conduction of interviews.

3.5. Summary

This chapter described the method of data collection, which is used while carrying out the research; the data in this study was collected based on available secondary data, the methodological techniques that are used in this research clearly described the study personal interviews, observations, focus group discussion and storytelling techniques were used in this research study for further data analysis.
CHAPTER FOUR: OVERVIEW OF AGRICULTURE IN AFGHANISTAN

Afghanistan is a highly dependent agricultural country. As the majority of Afghan populations are engaged in this sector, it contributes to the real GDP and plays an important role in the livelihoods of the people. This chapter briefly describes the current economic and mainly agricultural situation of Afghanistan that has recently recovered after decades of wars and droughts. It also describes the recent developments in agriculture sector in Afghanistan.

4.1. Brief overview of Afghanistan

The Islamic Republic of Afghanistan is a landlocked country located in South Asia. It is bordered by China, Iran, Pakistan, Tajikistan, Turkmenistan and Uzbekistan. Afghanistan has a 2,340 km long border with Pakistan and with smallest border of 76 km with China; Afghanistan's population is estimated by World Bank to be 30.55 million (WB, 2013). The total land area of Afghanistan is 652,000 km2, which this number shows Afghanistan is 41st largest country in the world (Library of Congress, 2002).

Afghanistan is still counted as lower income country, in World Bank (2013) report Afghanistan with Gross National Income (GNI) per capita of USD 690 appointed as one of the poorest country in the world. Although Afghanistan is placed among countries that are having plenty of natural resources such as copper, gold, iron, and variety of precious stones, uranium and natural gas. Almost three past decades of war has destroyed the vital socio-economic infrastructure of the
country. Hence, this country still remains as one of the poorest countries not only in Asia but also in all over the world with less GDP per capita (NRVA, 2008).

After collapse of the Taliban regime in 2001, establishment of new government and engagement of international community, the socio-economic, reconstruction and development of Afghanistan have totally shifted to a new era of improvement in most parts and in different sections both in urban and rural areas. Even rapid changes have appeared in many socio-economic reconstructions of the country and changes in different sectors in Afghanistan. But, there are major problems that Afghans still facing are such as high rate of insecurity, poverty, unemployment, lack of investment, gender discrimination against women, and other socio-economic problems has led the country to still remain as one of the poorest countries in the world (Roberts, 2009).

Afghanistan was ranked as less developed country, which faces poverty and lost all economic infrastructures, agricultural basis, and education system entirely damaged as results of unwanted ruinous war that Afghans endured for the past two decades. But, the recent developments in different sectors especially in economic had inspired Afghans to a brighter future. The data in table 4.1 below shows that from 2002 - 2013 Afghanistan witnesses stunning improvements comparing to the early years of prior development stages. The table below shows the economic growth rate and GNI per capita increased from US$ 210 in 2004 to US$ 700 in 2013 and as well as shows that life expectancy increased from 55.67 to 60.51 in the past years between 2004 and 2013.
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<td>Adjusted net national income per capita (current US$)</td>
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<td>199.35</td>
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</tr>
<tr>
<td>GDP growth (annual %)</td>
<td>NA</td>
<td>1.06</td>
<td>5.55</td>
<td>3.61</td>
<td>8.43</td>
<td>14.43</td>
<td>4.23</td>
</tr>
<tr>
<td>GDP per capita growth (annual %)</td>
<td>NA</td>
<td>-2.74</td>
<td>2.38</td>
<td>0.99</td>
<td>5.8</td>
<td>11.68</td>
<td>1.75</td>
</tr>
<tr>
<td>GDP per capita, PPP (current international $)</td>
<td>867.83</td>
<td>921.29</td>
<td>1077.75</td>
<td>1260.4</td>
<td>1605.76</td>
<td>1926.17</td>
<td>1989.61</td>
</tr>
<tr>
<td>GNI per capita, Atlas method (current US$)</td>
<td>NA</td>
<td>210</td>
<td>270</td>
<td>370</td>
<td>510</td>
<td>690</td>
<td>700</td>
</tr>
<tr>
<td>Life expectancy at birth, total (years)</td>
<td>55.67</td>
<td>56.57</td>
<td>57.57</td>
<td>58.61</td>
<td>59.6</td>
<td>60.51</td>
<td>NA</td>
</tr>
<tr>
<td>Rural population (% of total population)</td>
<td>78.09</td>
<td>77.44</td>
<td>76.76</td>
<td>76.05</td>
<td>75.31</td>
<td>74.53</td>
<td>74.13</td>
</tr>
<tr>
<td>Poverty headcount ratio at national poverty lines (% of population)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>36.3</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Net ODA received (% of GNI)</td>
<td>31.79</td>
<td>43.67</td>
<td>41.71</td>
<td>47.64</td>
<td>40.17</td>
<td>32.63</td>
<td>NA</td>
</tr>
<tr>
<td>Net ODA received per capita (current US$)</td>
<td>58.99</td>
<td>96.24</td>
<td>115.55</td>
<td>180.34</td>
<td>226.3</td>
<td>225.49</td>
<td>NA</td>
</tr>
<tr>
<td>-----------------------------------------</td>
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<td>--------</td>
<td>--------</td>
<td>-------</td>
<td>--------</td>
<td>----</td>
</tr>
<tr>
<td>Mortality rate, infant (per 1,000 live births)</td>
<td>90.60</td>
<td>86.2</td>
<td>82</td>
<td>78.5</td>
<td>75.3</td>
<td>72</td>
<td>70.2</td>
</tr>
<tr>
<td>Maternal mortality ratio (national estimate, per 100,000 live births)</td>
<td>1600</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Household final consumption expenditure, etc. (% of GDP)</td>
<td>112.2</td>
<td>123.78</td>
<td>112.81</td>
<td>104.9</td>
<td>102.72</td>
<td>104.4</td>
<td>111.72</td>
</tr>
<tr>
<td>Unemployment rate total</td>
<td>8.3</td>
<td>8.5</td>
<td>8.5</td>
<td>8.6</td>
<td>8.7</td>
<td>8.4</td>
<td>8.7</td>
</tr>
</tbody>
</table>

Source: (Karimi, 2014)

The majority of Afghan populations are living in rural areas with having less access to social resources, and unemployment and poverty are the main challenges that currently Afghans are facing. In order to overcome these challenges the government is aiming to empower communities and foster economic through creating social opportunities in the rural areas. Ministry of rural development (MRRD) as one poverty alleviator has been concentrating on providing social activities for the rural people through building social capital, empowering women to take part in all social activities, creating job opportunities and focusing on providing education and health services (MRRD SI, 2010).
In a public survey that was conducted in June 2014 by the Asian Foundation through gathering people’s views on wide range of issues to the country’s development and growth among the Afghan people, it was declared that currently Afghan people are facing different challenges and enduring social problems on both national and local level. The survey shows that lack of security, corruption, unemployment, current low economy and access to education are the top problems that Afghans currently are facing in the national level. Whereas, the public survey identifies unemployment is the very top problem that Afghans are facing in local level, following lack of services (electricity, roads, drinking water supply) is the second biggest problem after unemployment, access to education and health care are also the main important problems existing at the local level, the survey claims that the most common current problem that Afghan people are facing is unemployment or lack of job opportunities both in urban and rural areas in all regions of Afghanistan. The survey declares that women as part of this society has less social activities and are facing with problems such as education and illiteracy, unemployment, violence, and lack of right (Warren, 2014).

Afghanistan is still an aid-dependent country and such aid dependency is highly important in socioeconomic indicators of the country. The long-term financial supports by international communities for reconstruction and security assistance have been one of the major economic growth indicators for the last fifteen years. Currently Afghanistan is ranked as one of the poorest countries in the world with gross domestic product (GDP) US$ 15.9 billion and GDP Per capita of US$ 528 in 2010 (Hogg et al., 2013). Despite major socio-economic challenges in this
country, the nonstop growth in recent years indicates that there is still an increase in economy sector of Afghanistan. The World Bank data declared the country’s GDP is US$ 20.04 and GDP per capita of US$ 633.6 in 2015, which shows a rapid growth economic in Afghanistan (World Bank, 2016).

After collapse of Taliban since 2001, Afghanistan has been growing rapidly the real data shows that the country’s average economic growth (GDP) was 9.1 percent. Hogg, et al, 2014 in the book of Afghanistan in transition beyond 2014 believes that the post-conflict countries due to massive destructions in both physical and human capital is needed to be recovered and this helps them to a financially aid recovery by international allies and foreign aid assistance to generate big returns on capital accumulation.

Therefore, the average growth rate increases higher than expected percentage Afghanistan has been evolving greater than any other post conflict countries the financially aided assistances by foreign allies have highly impacted positively on both economic growth and as well as reconstruction basements in Afghanistan, it comes from almost 100 percent disbursed aid, the total aid have been disbursed on both military and domestic services for empowering security forces and construction of the country (World Bank, 2016).

Afghanistan’s security transition from international forces to Afghan National Security Forces (ANSF) and their withdrawal in 2014 have somehow negatively impacted on economy growth of the country. Afghanistan’s economic growth was lower comparing to the previous years, Special Inspector General for Afghanistan Reconstruction (SIGAR) in a report says “every south Asian economy except
Afghanistan grew faster in 2014 than in 2013” (SIGAR, 2015, pp. 163-164). The Word Bank indicates a significant decrease to the Afghan GDP from 3.7 % in 2013 to 2% in 2014 and states the current security problems and instability in most part of the country has led to sharp decrease in investment segment of other than agriculture sector and mentioned that the main causes of private investments in Afghanistan is lack of security. Increase in private investments directly impacting on economic growth as well as poverty reduction and other socio-economic activities in Afghanistan (Cordesman, 2016).

Moreover, the Asian Development Bank (ADB, 2015) prospects in a report that Afghanistan’s economic growth is based on stability and better security situation of the country that can create better investment environment. The report indicates that economy of Afghanistan cannot grow fast enough to fulfill the country’s requirements and covers the costs spend on security affairs of the country. Furthermore, the report suggests that Afghan government has to reduce costs on security for future economic stability. However, the World Bank projects that the GDP of Afghanistan grew only 1.9% in 2015 comparing to 3.7% in 2013, WB suggests more on government’s reforms in which insists on ability of human capital to create more job opportunities in order to stem the country to a better future (Cordesman, 2016). Afghanistan’s GDP is accumulated from the three major sectors of Agriculture, services and industry, the following figures show the sectors growth rate and their contribution to the GDP of the country and the graph below shows the Afghanistan’s real GDP growth from 2004 to 2014.
After 2001, new Afghan government established the economy of the country has been growing rapidly due to influx of international aids. The graph 4.1 shows that real GDP has been increasing each year and the annual growth rate since 2003/04 to 2014 increased more than 11 percent, which shows Afghanistan’s economy is improving by passing each year. The annual growth of GDP is reported by the central statistics organization of Afghanistan (CSO). But, the current political, security and economic uncertainties in Afghanistan have sabotaged the economic growth. However, low progress of reforms in government and low rate of investment have caused slightly fallen down of the economy in 2014 comparing to previous years; overall slowdown of international aids, lack of infrastructures, existence of corruption and less investments in none agriculture sectors have hampered to slow down the growth of real GDP in Afghanistan.

In addition, agriculture sector in Afghanistan has shifted to one of the three major contributors of Afghanistan’s GDP since 2004 and its total share in overall...
employment of the country was 59% in 2010 (MAIL, 2012). This sector has been playing the key factor to the revival of economy and well-being of the people in Afghanistan. The figure 4.2 indicates that agriculture is the main contributor to the GDP of Afghanistan after services, and agriculture is the second and industry is the third largest GDP contributor.

Figure 4.2. Sectors contributing to the real GDP of Afghanistan

Source: (CSO, 2015)

4.2. Agriculture in Afghanistan

4.2.1 Current situation

Afghanistan’s agriculture is highly dependent on erratic winter snows and spring rains, and the income sources of majority of Afghans are heavily related in this sector. Moreover, this sector is one of the most country’s GDP contributors. Economic development indicators of Afghanistan and most people’s livelihoods are strongly dependent in agriculture sector. It improves the well-being of poor Afghans in the rural areas and helping in reducing illicit agricultural threats.
Afghanistan’s future growth is based on improvement of agriculture set-ups pushing toward recovering its bases for its huge past destructions.

Afghanistan’s agriculture economy market was strong enough that not only could be able to fulfill the internal requirements to food security of the people, but also was able to export surplus agricultural productivities to many international countries. Afghanistan had one the largest fruit markets in 1960, which brought significant wealth for government and large incomes to the farmers. Nonetheless, the past three decades of civil war has destroyed the major parts of agriculture system of the country. This heavy damage consisting of irrigation systems, seed processing factories, the full damage of transportation roads and unavailability of seeds for planting have slowed down agriculture growth in the country. In addition the traditional methods of farming and agricultural practices in Afghanistan have remained unchanged for many years.

The challenges such as conflict, poor governance, droughts and the country's geopolitical location have made Afghanistan to remain one of the poorest countries in the world. More than 80 percent of Afghan people are relying on agriculture sector, showing that agriculture growth is the key factor for poverty reduction and livelihood improvements of the people in the country. Existence of agricultural problems (lack proper irrigation system, soil fertility and knowledge constraints) have hampered to the low productivity. Afghanistan as an agrarian country with more than 75 percent-scattered populations in the rural areas is dependent in agriculture sector of farm productions and none farm employment. Cereals and livestock are largest contributors of agriculture economy, wheat is the most
important sources of food, it has the highest-level production among cereals cultivation in Afghanistan. Despite the current large wheat cultivation in the country, it still cannot fulfill the requirement of the people in food consumption. Therefore, this deficiency makes them to import tons of wheat each year from the neighboring countries (Yusufi, 1998).

The Food and Agriculture Organization of the United Nations (FAO) declared that Afghanistan has the potential to cover the needs of the people for food security by its own internal production. Though, the key factor to achieve all these results is to rebuild the destroyed agriculture system of the country particularly the irrigation system. The documents show that after Soviet Union invasion in Afghanistan the irrigated land areas dropped from 2.5 million hectares to 1.5 million due to mass destructive wars (FAO, 2008).

The arable agricultural resource base of Afghanistan is estimated about 8 million hectares, only 12% of total land areas of Afghanistan, out of which 3.9 million hectares are cultivated from which 2.6 million hectares are irrigated areas and the rest 1.3 million hectares are non-irrigated or rain fed areas, more than 85 percent of all agricultural products are obtained from those areas where proper irrigation system is existed (Qureshi, 2002).

Economic growth has been recognized as the vital key factor for poverty reduction in Afghanistan by the government. Therefore, agriculture is known as the significant means of economic growth and plays important role in the process of development. Enlarging agriculture sector by increasing productivity heavily impacts on economic growth and poverty reduction especially in the rural areas.
Shifting from traditional agricultural practices to more advanced system needs farmers to adopt new technologies of farming by providing wide agriculture extension and research services to transfer the knowledge to the poor rural community and farmers (Miller, 2006).

Agriculture sector contributes greatly to the GDP of Afghanistan. Reports show that 25 percent of Afghanistan’s GDP which becomes $4.5 billion out of $18 billion is contributed by this sector; agriculture contributes the major part of employment more than 4.5 billion workers are engaged in this sector, which consists of 60 percent of the total work force in Afghanistan and most farmers are producing for their own consumption or own subsistence method. The latest improvements in most sectors have positively impacted on agriculture growth in the country; agriculture has been one of the major sectors that have been greatly improving since 2003 up to now (World Bank, 2014).

Decades of war and destructions have ruined the country’s agriculture infrastructures and irrigation system. But, the latest years of recoveries especially agriculture and irrigation system had inspired the people for a brighter future. The figure 4.3 below shows that agriculture sector has been improving dramatically in and it indicates that the GDP of the country has direct relation with agriculture sector. The figure indicates that development in agriculture in Afghanistan is the growth in real GDP.
Afghanistan faced many challenges to restore its economic prospects and tackling formidable development problems; the Afghan new government specified vision and reforming programs to the development of economy. Though, agriculture has been playing the vital role for stabling the economy, the figure 4.3 indicates the agriculture development verses the country’s real GDP growth, it shows that growth in agriculture is growth in economy.

4.2.2. Afghanistan’s agricultural approaches, policies and strategies

Agriculture is the core overall development in Afghanistan and has wider role in improving livelihoods and reducing poverty in rural areas. Afghanistan’s agriculture master plan spotlights the development of this sector as vital means of food security, poverty reduction, economic growth, women’s empowerment, improving horticulture sector, and focusing on livestock and provider of staple
crops in order to contribute significantly to the development of rural communities. However, providing financial assistances, managing the natural resources, organizing farmers’ cooperatives and organizations, research and extension and community supports are from prior activities of Afghan government toward agriculture improvements.

The World Bank has proposed a review strategy for the development of agriculture in Afghanistan to boost productivity, livelihood improvement, poverty reduction and employments within the rural areas. The agriculture sector review was carried out in 2014, the proposed strategy has been taken in to account to a wide diversity of agriculture activities, which contains two significant sections (World Bank, 2014)

Taking into consideration the significant prioritized value chains that consists of horticulture products, available irrigated wheat and highly intensive livestock, which these three sub-sectors provides the major part of agricultural GDP, it is estimated that prioritizing this value chain by proper investment policies and strategies the production will be increased to double and to create more jobs for more than a million people in the next ten years.

Concentrating on requirements of the rural poor, this prospect is mainly focusing on providing basics needs of those people for whom accessing extensive farming system is limited and important productivity profits in rain-fed areas and this proposed review focuses more on those areas where less cultivable lands and livestock are available. Moreover, the interventions to support these people
include community development, different training programs, relief and social supportive programs.

The development of agriculture policy is the important goal of MAIL; this ministry has done several identity changes since 2001 to improve this sector in all over the country and has launched several programs and policies. The first Afghanistan’s agriculture policy developments elaborated in 2002 National Development Framework (NDF) and later on the Asian Development Bank (ADB) project “Rebuilding Afghanistan’s Agriculture Sector”. The policy statement of agriculture was prepared in 2003 and thereafter Cabinet members approved this policy after several revisions in 2004, similarly ADB sector prepared documents on program of Securing Afghanistan’s future and applied on agricultural strategy, in 2006 after years of recovering MAIL started working on preparing its own master plan and announced as MAIL’s Master Plan. In 2006 the ministry declared agricultural development policy in two tracks, which the development of implementation and providing investment plans and the second path addresses focusing on these two huge programs Afghanistan National Development Strategy (ANDS) and Agriculture and Rural Development Strategy (ARDS) (Pain & Shah, 2009).

Agriculture policy in Afghanistan has very wide span, the aims of implemented and currently on going policies are agriculture’s vital role in the development of economic, its wide scope on poverty reduction, keep maintaining food security for the poor people, applying on how to manage the available natural resources and establishing the opportunities of widening the agriculture extension and research
services for the purpose of providing knowledge and training to the rural communities who are involving in agricultural practices. The policies that have been taken in to consideration are to assess the role of agriculture on poverty reduction, job creation, obtaining social objectives, food security and as well as providing steps to the agriculture growth and supporting the economic development of the country to integrate the agricultural products in the country and to provide the opportunities to be integrated in international markets. Furthermore, agriculture research extensions and transmission of knowledge and new agricultural technologies to the farmers are the fundamental keys to the Afghan agriculture development; relevantly the farmers are crucial for whole system because they are the final decision makers to adopt new technologies and varieties of new agriculture methods to the improvement of their livelihoods. Hence, the more investment on farmers by providing knowledge, research services and information generates high productivity and leads to the development of agriculture in the country.

|Afghanistan Research and Evaluation Unit (AREU) indicates in a report that the three important categories of developmental programming in agriculture sector are for the purpose of improvement and more strengthening agriculture sector in Afghanistan. Community Development, Technology Transfer and Market Promotion are the important prospects for the development of agriculture sector. The promotion of market is related to the available farming capacity and product availability and the weak market suffers from the low capacity and lack of proper market channels (Pain & Shah, 2009).
The bulk efforts on technology transfer has occurred through different segments of agriculture sector, which distribution of new improved seeds to farmers, adoption of new technologies of farming through launching projects on greenhouse farming for farmers, distribution of greenhouse structures, distributing new advanced machineries to agricultural cooperatives by the government and lunching training programs on how to use from these machineries, improving extension services in different parts of the country and launching different projects and training programs for the farmers in the rural areas. “Hence, community development efforts might be expected to provide a basis for integrating initiatives to develop services, markets and new technologies. Community development, using participatory and institutional development methods should be a method of raising attention on how farmers perceive the qualities and relevance of the varieties that are being released by research institutions and/or distributed by NGOs” (Christoplos, 2004 p, 36).
CHAPTER FIVE: REVIEW OF GREENHOUSE FARMING
AGRICULTURE IN HERAT PROVINCE

Agriculture is the fundamental means of livelihood in Afghanistan, where more than 80% of the people directly or indirectly depend on agriculture products. The good climate, vast land areas and low labor are the important indicators of well-suited condition for agriculture and farming business in Afghanistan. As a whole, agriculture sector highly contributes to the national income and livelihoods of the rural communities, where the majority of Afghan population is living in the rural areas. Furthermore, evidence shows that investment has increased in the agro-business and agriculture areas in Afghanistan that had a direct positive impact on the lives of Afghans. Investment in agro-business and agro-processing makes a positive impact on the economic development of Afghanistan and encouraged Afghans to produce and purchase local Afghan products.

Though the last three decades of war has destroyed the agriculture system and the production base of the country, agriculture production had helped the farmers to improve farming, production and marketing of agriculture products in good and reasonable prices in the national and international markets. However, Afghan agriculture is facing a lot of problems, which are not easy to be solved in a short period of time. Lately, national and international organizations, donors, Non-Governmental Organizations (NGOs) and the Afghan government assistance have been very effective to the rebuilding of agriculture infrastructure in the country.
Agriculture sector as the backbone of the country’s economy needs more support and attention to be paid for improvement of this sector. However, one of the best ways for reduction of poverty, solving unemployment problem, and raise the overall economic situation is to highly focus on agriculture improvements through using appropriate technology. The traditional way of agricultural activities is still the only option for farmers in many parts of the country. That is why farmers have no or less knowledge in the related areas, including promoting farming through using the new technologies, institutional support, improving the extension services, and supporting the farmer’s organizations to increase the agricultural products.

Recently, after devastating war and droughts that destroyed the infrastructure system in Afghanistan, farmers are highly encouraged to access new technology of farming and modernizing the agriculture sector by utilizing of the new methods and technology innovations. Thus, the Government of Afghanistan has also paid attention on the farmers for the purpose of yield increase and income opportunities for people in the rural areas. For the beginning, rehabilitation of a productive agricultural system was vital for the improvement of food security as well as improving the livelihoods of the rural communities.

Introducing the method of farming in the greenhouses or plastic tunnels encouraged farmers to promote this method of farming in Afghanistan. However, this technology transfer of greenhouse farming in the plastic tunnels has proved effective for the increase in the yield and income for the farmers. Greenhouse farming brought invaluable chance for many farmers to cultivating the high value
crops and variety types of vegetables in the plastic tunnels more efficient comparing to the open field cultivation. Therefore, farmers have accepted greenhouse farming, as the new method of farming, which is highly valuable to increase the amount of product, income generation source of the families and improving the livelihoods of rural communities.

Based on the conducted interviews with the provincial agriculture extension office of department of agriculture, irrigation and livestock of Herat city (DAIL), financial cooperation, training programs, and building greenhouses for the first time by international organizations to the very poor farmers in different villages in Injil district, has persuaded farmers to improve and adopt greenhouse farming. Moreover the United States Agency for International Development (USAID), Catholic Relieve Services (CRS), and Danish Committee for Aid to Afghan Refugees (DACAAR) have been the main originations and extension servicers, which have helped and assisted farmers in terms of financial and capacity building by holding training programs in Injil district, Herat province.

Historically, repatriation of Afghan refugees from the neighboring countries especially Iran has been one of the main reasons that farmers in the rural areas of Injil district turned in building greenhouses and cultivate in the plastic tunnels especially in off-season winter. Based on the conducted interviews with the farmers, thousands of Afghan people returned back to the country from Iran and brought the experiences of working on lands in the rural communities of Iran. After conducting interviews with farmers in Injil district I found that many farmers, before going to Iran, didn’t know anything related to greenhouse
farming. However, when the situation of Afghanistan got worse and war started in the country they couldn't stay home due to war and low economy, poverty and no promoted agriculture system in Afghanistan caused them to migrate to Iran. So, the farmers have had the experience of working on lands they had to go to the rural areas and work with the farmers in the rural communities working with more experienced farmers and better agricultural system and farmers in Iran could learn many new technologies of farming. Therefore, after fall of Taliban regime and establishment of new government in Afghanistan, farmers with the new technologies of farming in the greenhouses areas returned back to the country and started farming on their own lands.

Enhancing licit agriculture productivity, creating incentive for non-farm investment, developing rural infrastructure, and supporting access to skills development and financial services will allow individuals, households and communities to participate licitly and productively in economy. As agriculture represents the major source of income of the households in this district, rural development will be a key element of progress in Injil district, Herat, Afghanistan. The recent researches show that poverty and unemployment, due to no proper agriculture system, shortages of high agriculture technologies, and relaying on the traditional system causes to decrease the level of products. On the one hand, the farmers due to low economy, low income, and lack of knowledge of new technologies of farming are still using from animals as agricultural machinery on their farming lands. On the other hand, lack of proper irrigation system, improper agricultural infrastructures, lack of agricultural machineries, no market facilities
for the farmers, shortage of cold storages, and professional personnel in a agriculture area highly caused directly on farmers and the amount of the products being produced and waste the human resources and time for the farmers in this district.

5.1. Description on Greenhouse Farming in Heratt Province

Greenhouse Technology is the technique of providing favorable environment condition to the plants. It is used to protect the plants from the adverse climatic conditions such as wind, cold, precipitation, excessive radiation, extreme temperature, insects and diseases. This is possible by erecting a greenhouse, where the environmental conditions are modified so that one can grow any plant in any place at any time by providing suitable environmental conditions with minimum labor.

This chapter finds out and describes the collected data of greenhouse farming in Injil district of Herat Afghanistan. The data shows that greenhouse farming spread among farmers in very short time in this district and the farmers prefer to cultivate plants and vegetables in the plastic tunnels for increasing products and higher income. Currently, there are 860 greenhouses in all over Herat city among the 15 districts of this city and 250 greenhouses in Injil district, which has the highest number of greenhouses.\(^1\) Among other districts, varieties of vegetables are being cultivated in these greenhouses; cucumber is the most cultivated due to high returns and being cultivated in all four seasons of the year in this district.

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\(^1\) Interview with Hamidullah Nasiri Head of Agriculture promotion department of provincial of DAIL Herat city
Hamidullah Nasiri mentioned that: “Based on current investment on greenhouses and vegetable production costs, the profitability as well as labor, land, water and use efficiency were estimated for making comparison between open field and greenhouse returns on one acre of land, in regarding of adequate area.” (Hamidullah Nasiri, personal communication, August 2015).

It can be estimated that 6 greenhouses can fit on 1 acre of land. It is also assumed that open field cultivation uses at least more times the volume and amount of water required under greenhouse production. He added that the growers are eagerly interested in structuring greenhouses on their lands as they see the profit and increasing the volume of the products. Greenhouse farming generates high profits and creates job opportunities, especially in the off-season winter from one side, the farmers became busy with the farming and cultivating on their own lands and on the other side, they can generate money to fulfill the necessity of the livelihood and family expenses in their daily life.

Greenhouse farming has encouraged farmers in Injil district to be more developed. The greenhouse farming technology has shown the effectiveness, advantages and profits of producing vegetables comparing to the open field. Greenhouse farming is now highly significant to the development of the people in the rural areas, which created job opportunities for the people as well as contributed to the economic development.

Recently, greenhouse farming has improved in Injil district by the help of international organizations, government and the people itself. Nasiri stated that: “In the past, greenhouse farming was not promoted among farmers in this
province because they didn't have greenhouse farming knowledge and experience. But, since Herat agriculture department’s international donor partners cooperated with farmers and distributed greenhouse structures for few of them and held several training programs on greenhouse farming technology most farmers could learn the knowledge and methods of protected agriculture in greenhouses. For this reason new farmers are encouraged by other greenhouse growers to start doing greenhouse farming for the increasing of the production and more income generation.” (Hamidullah Nasiri, personal communication, August 2015).

The collected data by conducted interviews with farmers in different villages show that they are very satisfied with structuring greenhouses either in their farming lands or in the yard of their houses. They are cultivating varieties of vegetables, especially cucumber and tomatoes due to high volume of products, durability and sustainability and year-round cultivation. The greenhouse farming growers were very happy and they were saying that from the greenhouses we own, can earn a lot of money that provide the daily life expenditures, no more idle time anymore, even the members of our family are involved and take part to work in the greenhouses. Moreover, the farmers mentioned during their interviews that in the past one or two young members of our family, even the father, had to migrate to Iran by starting winter season, due to no work in the village and cold weather. So they had to go to Iran to work and send money for the rest of family. But, now we don't have to go abroad in all seasons especially in the winter season, which is very difficult to go abroad and work. So, greenhouse farming has facilitated them the path of success and one can both earn money and being in
their own home and home country, which paved the way to stay and work at home.

5.2. Reasons behind extension of greenhouse farming in Enjil district

Greenhouse farming has the ability to contribute to both the improvement of rural communities and play an important role in providing fresh products to the local markets. In addition, it creates jobs and employments opportunities for the local communities, which helps the women who are not able to work outside their houses or the disadvantaged women who are unable to find employment has persuaded them to start greenhouse farming in rural areas. The data shows that women that are the disadvantaged part of the Afghan society especially in rural areas have been encouraged to start greenhouse farming with donating small greenhouse structures by government and international donors to build in the yards of their houses in order to create incomes for their families.

5.2.1. Cooperation of International Organizations

Greenhouse farming or protected agriculture was an unknown word in the past for Afghan farmers because they didn't know about cultivating vegetables or high value crops in the plastic tunnels. But the latest improvements in the agriculture sections has caused the farmers to familiarize themselves with the new technologies of farming by the help of international donors, Herat city, one of the most improved cities of Afghanistan bordered with two countries of Iran and Turkmenistan, imports the necessities of the people from these two countries especially from Iran. This city is an agricultural city of the country, which more than seventy percent of the people and residents of this city live in the rural areas.
However, the agriculture products of this city do not fulfill the requirements of the people because of traditional agricultural models and low products. For this reason residents of Herat province import their needed products from neighboring countries even, the fruits and vegetables. But, for the first time “USAID” introduced the new technique of protected agriculture or greenhouse farming in 2006 in three districts of Herat city including Injil district and distributed greenhouse structures for the farmers and familiarized them with greenhouse farming and cultivating in the plastic tunnels. The USAID-funded initiative to improve greenhouse-farming technology was developed through the demonstration project called as “Income Grows as Afghans Warm To Greenhouses”. The project had four distinct aims and strategic advantages. First off season income, usually the farmers in the off-season, which is cold can not cultivate in the open fields, the aims of the project was to help farmers to generate income in off-season. And the second aim of the project was import substitution, while improving this method of farming. The greenhouses products can substitute to the products being imported from the neighboring countries. The third aim of the project was the low-startup costs, which would allow most farmer to start the investment from the low costs to adopt this new technology of farming and the last aim of this project was the sustainability and durability of the greenhouse structures to the farmers by returning a high amount of income for the developer of greenhouse farming.

The main objective of this project was to promote the adaption of affordable, durable and sustainable greenhouse farming to the farmers in three districts. The
first target was Injil district to increase the production of vegetables and generate net incomes to the farmers. The project aim was to a wider adoption of protected agriculture by other farmers who have no idea of this farming technique in other villages of this district and other districts in this province. After distribution of greenhouses structures for the few farmers in Injil district, USAID evaluate the efficiency and profitability of the project for the farmers. MullaShoGool, a farmer in Injil district pointed out “I earned US$ 660 from my greenhouse during the winter season. I planned to build more greenhouses for a small cost and I can gain a good income and they are easy to water from shallow wells, common in this dry area”.

5.2.2. Selective initiative earning livelihood project

Most farmers in Afghanistan have less or no income during the winter season due to the harsh and cold weather. One of the important goals and strategic plan of MAIL is to increase the agricultural productivities of farmers per unit of land. Greenhouse farming as a new technology of farming has the potential to be cultivated in cold weather under the plastic tunnels, delivering much higher volume of products comparing to open field cultivation. The Catholic Relieve Services organization (CRS) had initiated to distribute greenhouses structures for the farmers with loan money and cheap costs to promote greenhouse farming among the farmers in Injil district.

The project has been impressively useful and brought positive results to the farmers and growers of greenhouse cultivator and had impacted on other farmers
to be attracted to the greenhouse technology and willingness to adopt this method of farming.

Yasser Salem\(^2\) mentioned that: “there are clear indications of advantages of greenhouse technology to the farmers from the project in terms of land, income generation for the families and water efficiency in Injil district. He added that the project provided facilities for the farmers to persuade others to a wider adoption of this technology. Moreover both farmers and stakeholders have very good perceptions of greenhouse farming for the promotion of this technique, the future of farmers, income generation and the contribution of agriculture of the country, which is the backbone of economy. Therefore, protected agriculture or greenhouse farming is a new updated and developed technique of farming in Afghanistan and the wider adoption of this technique demonstrate the potentials to other farmers to the cultivation of high-value crops. In addition, the success of this technology will specify the future of agriculture and contribute to the maximum goals of increased productivity.

\(^2\)Mohammad Yasser Salem the staff from CRS and one of the implementer of greenhouse farming projects in Injil district.
The aims of the project were to assist farmers to a wider adoption of this technique among farmers in all over districts of Herat. The project has three vital distinct first distributions of greenhouse structures in very cheap prices for loan for the farmers. In Injil district, many farmers were able to get greenhouses with all equipment and structures from CRS office project implementers, which was a great cooperation for the farmers who were interested in establishing greenhouses. Farmers in Afghanistan always face financial problems due to less cooperation of government and shortage or lack of financial institutions. Therefore, this initiative from CRS office made farmers in Injil district promote greenhouse farming. The second feature of the project was to train farmers on familiarizing and training how to cultivate in the plastic tunnels. Since this technique of farming was new for them and they needed to be fully trained in this area, the project aims were to
improve greenhouse farming in order to increase the income of the families by selling their products to markets. Moreover, the purpose of holding training programs was to teach new methods of farming in all seasons, such as using less water, methods of irrigation in greenhouses, and teaching of fast growing vegetables to the farmers. The project intended not only to help the farmers to understand that this was one of the way to create job opportunities and eradicate unemployment for the farmers and their families especially in the winter season. The third important goal of the project was to provide market opportunities for the products of the farmers, teaching the new methods of packaging and dispatching to the market, connecting the farmers with the market consumers and training the farmers on irrigation system of greenhouses such as drip irrigation which needs less water, especially for those places where there is shortage of water. On the other hand the project motivated the farmers to promote this technology in all over Injil district and other places in Herat city.

5.2.3. Repatriation of Afghan Refugees to the country
The three decades of war, instability, security, deterioration and drought caused Afghan people to migrate and move from Afghanistan to other countries. This crisis emerged after Soviet Union’s invasion in 1979 and this movement of the people was mainly due to instability and insecurity situation of the county which burdened the Afghan people. Most of the populations in Afghanistan are living in the rural areas and agriculture is the main source of incomes for the people and after invasion of USSR and occurring of civil wars the irrigation system, which was highly crucial for agriculture, was destroyed and life became more difficult
for the people and farmers in the rural areas, which have lost everything. So, they were forced to move out and leave the country to Iran and Pakistan and later on Afghanistan has witnessed one of the biggest repatriation processes after fall of Taliban regime and establishment of new government. Since 2001, the operation of repatriation was accelerated after 2001 and since then more than 5 million refugees have returned back to the country, as the United Nation High Commissioner for Refugees UNHCR report says that from 2001 to 2012, 5.7 million refugees returned back to Afghanistan (UNHCR, 2012).

The Afghan repatriated refugees from the neighboring countries especially from Iran mostly were from the rural areas, which were busy with agriculture industry. During stay in Iran experiencing new environment, more facilities, better technologies and improved agriculture system. The returnees have brought new knowledge and professions during the time of being refugees; they brought new ideas and values to the society, which is less familiar to Afghan society. In addition, the knowledge and expertise that the returnees have brought with them and could apply in the home country for the development of own society and community. One of the these expertise was understanding new knowledge of agriculture and becoming familiar with new technologies of farming they have gained during their stay in the host country. Greenhouse farming has not been very new technology for the Iranian farmers. But, this method of farming was totally new technology that the Afghan farmers have gained while working in Iran.
Ramathan Ali pointed out that:

“I migrated to Iran due to war and security deterioration in Afghanistan. I had no choice except to work with the farmers due to working and having experiences in this field and to earn money for my family in Iran, as soon as I started working with them I felt the farmers here are more professional, having better facilities, producing high quality of products and using new techniques of farming. This was my first ever time to have seen they are cultivating agriculture products in the plastic tunnels. I became more curious to know more about this technique of farming in Iran. There are more facilities and the government of Iran supports the farmers and provides them subsides, gasoline for warming the inside of greenhouses. Whereas, after we came back from Iran to our homeland to start our agriculture activities I found out that still, there is less facilities for the Afghan farmers in Afghanistan, there is less or no government supports and shortage of greenhouse materials and seeds for the farmers” (Personal Communication, August 2015)

So far thousands of farmers have repatriated from the neighboring countries with the hope that there is peace and stability in the country in order to apply their knowledge and experiences for the promotion of agriculture section, which is called as the backbone of Afghanistan’s economy and to motivate other farmers to

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3 Ramathan Ali the farmer from Sarai Now Village of Injil District, who repatriated lately from Iran and started building greenhouse and working on it.
follow them for the purpose of higher income, better quality of products and the easiest ways and methods of farming on their lands.

Moreover, migration and repatriation of Afghans in and from the neighboring countries had played an important role in promoting agriculture section due to learning and carrying the knowledge and experiences of new methods of farming such as greenhouse farming. Based on the conducted interviews with farmers in different villages of Injil district, I found out that most of the farmers who have repatriated from Iran have built small and medium greenhouses on their own lands with less money and they have earned during their stay in Iran and bought greenhouse structures with other equipment by themselves, which is needed for building greenhouses. Jahfar, an official staff from provincial department of Herat Agriculture Department, addressed that:

“The latest migrations and repatriations of the rural communities have caused farmers to build more greenhouses due to having background experiences of greenhouse farming in Iran. He added that on the one hand, they became professional in this area, they know how to deal with the new techniques of farming in the plastic tunnels; they can realize the difficulties, problems, the diseases with the plant and soil for the increase of the products. On the other hand, they are the samples for other farmers to improve greenhouse farming in other villages and districts in Herat city.”
5.2.4. Involvement of Young Agricultural Professionals in Greenhouse Farming

Lack of job and unemployment made the recent young agricultural graduates to be involved in greenhouse farming. Thousands of youths after their graduations from the universities in Afghanistan are unemployed and looking for jobs, but due to current unstable situation of the country including insecurity, no investment, and lack of jobs in government sector, private companies and organizations are the factors increasing unemployment in Afghanistan. According to the Central Statistics Organization (CSO) the unemployment rate has reached to peak of 40 percent, showing the unemployment growing. In addition, according to the Ministry of Labor and Social Affairs, over 1.8 million eligible workers are unemployed in Afghanistan (Zhanmal, 2015).

Unemployment caused the young generation to flee from the country and migrate to Europe. The numbers of young generation who are migrating to Europe are increasing due to deterioration situation of Afghanistan. In addition, yearly thousands of students are graduating from the universities inside and outside Afghanistan and wishing to find jobs. But, they are not succeeding toward their goals.

Therefore, a small number of university graduates prefer and begin considering to start their own business. But, the young graduates from the faculty and institute of agriculture turned in to establishing and building greenhouses in different villages of Injil district, which is close to the main town. This is because they have academic and practical experiences of cultivating in the plastic tunnels during their studies in the agriculture faculty and institute, which shows a very new
creativity for the young generation and now they do their own business. Based on
the conducting interviews with some of these students they were highly satisfied
from their initiatives on building greenhouses by themselves with less money they
had. Moreover, they hire other farmers and rural residents in the village to work
and they create job opportunities for the people of that community. Furthermore,
local farmers and residents can learn many new good techniques of greenhouse
farming in order to start some days their own business in the field of greenhouse
farming. Promoting greenhouse farming from various methods by different people
not only creates job opportunities for the people in this big district (Injil) but also
contribute in reducing imports of fresh vegetables from the Iran and Pakistan.
An official report, which has been done by British Broadcasting Company (BBC,
2011); says that the people of Herat city with population of estimated almost three
millions will not buy fresh vegetables from the foreign countries anymore. The
greenhouse farming is the only factor for increasing the fresh vegetables products.
The report added that the provincial agriculture department in Heart city says
about 95% requirements of the people for fresh products in all four seasons are
being fulfilled by producing fresh products from the greenhouses that farmers
built during the last several years in this city. In the past years, most of the fresh
vegetables requirement of Herat city has been imported from the neighboring
countries especially from Iran, which is very close border with this city. But,
greenhouse-farming promotion had reduced in importing fresh vegetables from
the foreign countries. In the past there were no greenhouses and no one knew this
new technique of farming. Therefore, after while farmers found out the profits
coming from greenhouses and farmers took measure toward improving greenhouse farming for their own profits, despite less or no support of government for the farmers for more extension and development of this new technique of greenhouse farming.

5.2.5. Investment of businessmen and rich people on farmers

An important and fundamental challenge that people in Afghanistan are facing today is ensuring millions of people living under poverty and suffering from unemployment especially in the rural areas. Currently more than 80% of Afghan populations are living in the rural areas where agriculture is the main source of income and primary activity of the people in the rural areas, which contribute 40-50% to the GDP of Afghanistan. The majority of the rural communities are jobless and the percentage of poverty is increasing every day in rural areas, which is 36% comparing 29% in urban areas (NRVA, 2014).

Lack of permanent financial institutions, less support of government and the daily increasing of poverty in the rural areas caused the people to adopt new initiatives for developing new businesses for generating incomes to the rural communities and profits for the businessmen. Currently, the rich people and businessmen are investing on poor farmers to build greenhouses in Injil district because the farmers in the rural areas are not able to start greenhouse farming for the high cost that farmers are not affordable to establish and create plastic tunnels by their own. Therefore, other rich people are investing on farmers in Injil district for the
generating profits for both farmers and investors; Abdul Shokoor\textsuperscript{4} an official from DAIL provincial department, mentioned that:

\begin{quote}
"Nowadays most of the farmers are familiar with greenhouse farming technique but due to high cost that farmers are not able to do on their own. They have lands and human power and just they are looking to find some other people to invest on them. Fortunately, due to high profit is sensed from the products of greenhouses in all seasons. The investors are highly induced to invest for the benefit of both sides (Personal Communication, August 2015)."
\end{quote}

\textsuperscript{4}Abdul Shokor an official expert of greenhouse farming field of Heart Provincial agriculture department
CHAPTER SIX: REAL FIELD PRACTICES AND HAPPENINGS OF GREENHOUSE FARMING

In the conducted interviews with farmers in different villages of Injil district during the field visit, the farmers who built greenhouses and started this technique of farming were asked how they started greenhouse farming. They were asked what kind of changes on their livelihoods, do they feel changes in their incomes and how did they improve since starting of greenhouse farming in their villages. Below are the success stories of the farmers in Injil district of Herat province.

6.1. Individual Case Studies

6.1.1. Individual Case 1: The Story of Asghar Ali and His brother

During the field visit in August and September 2015, researcher conducted several interviews with farmers and listened to the successful stories of them from the time that farmers have started greenhouse farming. On September 5th 2015 researcher visited Asghar Ali in Sarai Now of Injil district. Asghar Ali is from the Hazara Shia\(^5\) tribe of Afghanistan. The Hazaras are the third largest ethnic group in Afghanistan that constitutes 10 - 19% of all Afghan population. This tribe can be differentiated easily from other ethnic groups due to having East Asian faces types (Frantzel, 2011). The Hazara people have historically experienced discrimination and have been as the low-level class people in Afghan society (Lamer, & Foster, year). Hazara people have experienced the worst situation of life during the Taliban regime. Thousands of them were massacred and killed.

\(^5\)Almost all Hazara ethnicare Shia Muslim and Shia forms minority population of Afghanistan
The head of Taliban justified killing of Hazara and later on looked house to house searching for Hazara and killing them in front of their children and families (Frantzel, 2011). Asghar Ali was one of the repatriated ethnic Hazara who migrated to Iran during the Taliban regime, while these people had less chances to live and work during the Taliban regime in Afghanistan. He narrated that:

“Because of the tyrannical rule of the Taliban and fear of being killed, economical problems and worst situation of the country I had to migrate with my family and brothers to Iran to have better life and stay safe. After doing so much effort we sold all our household objects and appliances to provide some money for traveling expenses. So, we accepted so much trouble and finally reached to host country of Iran but unfortunately the government of Iran didn't support us and we neither had chance nor money that we can stay and reside in the urban areas of Iran due to high life standards and without having any profession except doing farming. Therefore, due to having agricultural experiences we had to reside in the suburbs and rural areas of Tehran city. After settling and finding home for my family I started to work with Iranian farmers in farms and fruit gardens for monthly salaries. This was only the starting point of my new job and career in a different situation of life. But, farming and doing agriculture activities in a better and more improved country like Iran, for us who have never experienced with the new high technologies and provided the opportunities to be exposed and required facilities paved the way
toward having more enthusiasm and interest in doing agriculture activities in the field”.

In addition, Asghar Ali said, “This was my first time to see cultivating vegetables in the plastic tunnels, which are called greenhouses. In first days I was so curious asking more about this technique of farming. But later on gradually, I was learning this method of farming, which is totally new way of cultivating in the cold weather. I felt this method of farming is not very difficult except caring and monitoring the plants properly. To do greenhouse farming in the plastic tunnels needs high investment, which came to be my dream that one day I can start my own in my homeland on my own lands. So, I decided to save more money for my future. So, that some days finally we would go back to our home country and will start my own business on my own lands in my village. This was my wish that one day I will be able to establish greenhouse and do farming in home country. Therefore, I could support not only my family but other people in my community”.

After the collapse of Taliban regime and Installment of Afghan Interim Administration was good news for the refugees who lived in exile and this was the time for the Afghan refugees who were abroad to repatriate to home country. From February 2002 to October 2010, more than two million Afghan refugees have repatriated on both voluntarily repatriation program and spontaneously from Iran (Ahmadi, 2013). Asghar Ali was one of the repatriated migrations that returned back home. He added to continuation of his narration that “The idea of greenhouse farming is my first priorities to start on my own farmlands due to the
ideas and experiences I have gotten during my stay in Iran. Before planning to return back to my homeland I bought some greenhouse materials and structures that were easily available for me to bring to my home country easily, so we bought and brought some greenhouse materials and structures such as plastic, seeds and fertilizer with the less money I saved before coming to my country from Iran.”

Therefore, Asghar Ali started to erect a greenhouse from woods, greenhouse plastics that he brought from Iran while coming back to Afghanistan and other primary materials that were available in the village. At first, he provided the main materials for the main structure of the greenhouse, he was unable to bring or buy steel greenhouse structural material due to not having sufficient money, and he just bought only greenhouse plastics and seeds from Iran. Both Asghar Ali and his brother were looking to erect as large greenhouse as possible on their own land, but their budget allowed them to build for the first step a greenhouse to the size of 600-m² portion of land, which was not easy to build a large greenhouse from the primary materials. Asghar Ali said to the researcher that: our greenhouse is not standardized, comparing to the greenhouses I saw and worked in Iran. So, this was my own initiative to build a large greenhouse with the less money I had in hand, my working experiences made me to think and create new ideas on making a greenhouse with low cost.” (Personal communication, August 2015)
Asghar Ali narrating his success story to author

Source: Taken by Mohammad Asif a friend of author in August-2015

Asghar Ali prepared the greenhouse for cultivation on the bases of experience and knowledge he has gotten from abroad. He knew that what type vegetables in which season should be cultivated to harvest more and generate good profit.

“According to my experiences cultivation of cucumber is the best choice for the reason that from one side it can be cultivated in all seasons except in the time that the weather is intensively cold. From the other side once we get the first product then it can be harvested every other day and transfer the products to the market. Due to this reason cucumber cultivation is more profitable and has good market,” said Asghar Ali.

Asghar Ali had an idea that the main principles cultivating in the plastic tunnels are to keep the vegetables warm and cultivate even in the off-season of cold weather. Greenhouses that are made of the wood with the lower ceiling structures have two important aspects, which increase the amount of the products. Making a
greenhouse with lower ceiling and wooden structural materials is easy to make it warm on the one hand and on the other hand does not lose its warmness easily and keeps the heat taken from the sun for a longer time. So, the wooden greenhouse structures are good when there are no or less heating facilities available.

Photo 6.2. Asghar Ali ‘greenhouse made of wood and other simple materials

Source: Taken by author in August-2015

After the successful installation, cultivation and profitable products of the first greenhouse of Asghar Ali and his brother, they decided to make one more greenhouse and they succeeded to make another greenhouse with the same size close to the first one from the profit of the first greenhouse they built.

Mohammad NaserAmiri head of agriculture department of Injil district said that:

“We try to promote greenhouse farming more in Injil district and persuade the farmers and greenhouse growers to establish more greenhouses for their own benefit. In order to persuade other non-greenhouse growers to approach this method of farming Amiri mentioned that while doing field observation in the villages of Injil
district we found out Asghar Ali has made two large greenhouses from the very primary materials with low cost that it is a very good step and initiative for the none greenhouse grower to be persuaded by seeing such cases. Furthermore, he added that the government has been facing many problems and is not able to financially support all the farmers, but we, the authorities of Injil agriculture department, have always been telling the farmers that we can help you technically and here always be consulted and give you good advice in taking steps toward establishing greenhouses.” (Mohammad Nader Amiri, Personal communication, August-2015).

Asghar Ali said “I thank God that I was able to learn and get the experiences of this technique of farming while I was abroad. Establishment of these greenhouses were a very good step towards betterment of my livelihood. Our new initiative has caused that officials from agriculture department of Injil district, farmers and other individual people come and visit our greenhouses, which it is a new initiative sample for other farmers and none greenhouse grower to decide to build their own greenhouses on their own lands for a better income, better livelihood and development of country’s economy.” (Asghar Ali, personal communication, August2015).

6.1.2. Individual Case 2: The Story of Mohammad Rahim

Mohammad Rahim, a farmer, lives in Jaghara village of Injil district; he is fifty years old and has been busy with agriculture activities since he was young. Mohammad Rahim is a traditional farmer that has been using old methods of
farming like animals for plowing his farming lands for several years. It has not been long time since he became familiar with the new technologies of farming especially greenhouse farming technology. He said that: “I have heard of greenhouse farming for its best quality products and high profit several times from the people and friends in other villages. But, I didn't have much information about this new technique of farming. He added that he looked and observed greenhouses structures in other villages and became aware of the profit of greenhouse farming from the people and friends. I was aware of its high cost of first establishing. But, I was not able to build greenhouse by my self because of my weak economy”. (Mohammad Rahim, personal communication, August-2015).

Therefore, he decided to look for money that can be found to start and build greenhouse. He has been looking for many times and different places to find any financial institution to get loan from. But, unfortunately, despite a lot of pressures and so many efforts, he couldn’t succeed to find any financial institution to get loan to start his new business of greenhouse farming. Even though he didn't succeed to his aim to get money, he didn't stop trying to look around to find money to build greenhouse. Investment in Afghanistan has become tough for the investors due to unstable current situation of the country, they prefer to go outside of and invest in foreign countries. During the last ten years many cases of capital flight were seen from the country to the United Arab Emirates, particularly Dubai and other countries, which is the indication of uncertainty about the future of Afghanistan. However capital flight can be deleterious to the economic
development of Afghanistan (TSG, 2014). Afghan businessmen have been worried with less or lack of safe investment in Afghanistan. Therefore, the investors do not trust on current deteriorated situation of Afghanistan to invest in the country. Moreover, more than 75% Afghan people are living in the rural areas and they are highly dependent to the agriculture industry. But, the less improved and traditional agriculture industry sector of Afghanistan does not fulfill the requirement of the people for a better livelihood. Moreover, poor villagers plagued by the poverty have prevented them from the agriculture sector development. Strong agriculture as well as strong agriculture market can be resulted in rise of income for the farmers. This can be possible by implementation of some changes from the traditional agriculture system in a modern industry sector and agriculture has been the means of livelihood of the families in Afghanistan. Hence, the supports of government and the businessmen is the path toward shifting from the traditional agriculture system in to modern farming technologies.

Mohammad Rahim added that: “It is very difficult that someone trusts on someone else to lend money or to take part in the business, which is still not improved much. So far, after looking around to find someone to support my new business of greenhouse building I finally found a relative of my wife who was staying in the main city of Herat and asked him to help me financially. So he told me that he only gives money only if he can be the sharing partner of me for the new business of greenhouse farming. Therefore, I accepted his purpose and took
part with him in establishing greenhouse in partnership”. (Mohammad Rahim, personal communication, August-2015).

The first thing Mohammad Rahim did, was to ask from Herat provincial agriculture department to help and support him technically unless his land has any technical problem regarding soil or other harmful disease.

Photo 6.3. Mohammad Rahim is showing the way of letting fresh air in to the greenhouse

Source: Taken by Author in August-2015

Mohammad Rahim told beyond his efforts toward building greenhouse and successes, he said “Cultivating in the plastic tunnels, comparing open field cultivation to my years of experiences, the product returns is completely different especially for vegetables, which need warmer temperature”.

He is now cultivating cucumber, tomatoes and squash for its high volume of products and high income under moderate temperature. By decreasing temperature and the weather getting colder he cultivates other types of vegetables
that can accommodate with the temperature in the greenhouse. Before, he was not able to make the maximum use of his farming lands but, since establishing this greenhouse can make it possible to cultivate different vegetables types in the very cold weather that can resist against coldness like, spinach. Every two or three days a week he harvests the products and makes them ready to be carried to the market. For harvesting the products and other simple works in the greenhouse his family members including women are also taking part and helping him to decrease huge burden of work from his shoulders, such as sorting, bundling, grading and packing to increase the speed of products harvesting and soon carrying to the market.

Photo 6.4. Author with Mohammad Rahim next to his greenhouse

Source: Taken by Waheed Ahmad friend of author in August-2015

Usually women in the rural areas are at home and doing only housework, so taking part in activities with men are not only helping the male partner, but also strengthening the Role of Women in Agriculture sector and enabling them to learn new technologies of farming. This could be one of the creative ways devised to others, which helps Afghan women earn living expenses from their own plots of
land. Mohammad Rahim doesn't pay to carry the harvested products to the market, he is the member of an agricultural cooperative in his village, the cooperative authorities are responsible to collect all the products of the members every day from the villages even from greenhouses or lands after being packed and transferring them to markets to sell for the designated whole sellers in better prices by less transferring fees from the farmer members. So, the agricultural cooperatives have direct positive impacts on farmer members to the promotion of agricultural activities, establishing training programs and cooperation with the farmer members from the cultivation stage to harvesting stages. Furthermore, agricultural cooperatives are responsible to support members in most agricultural activities. They portage the products after collecting, bundling and packing to both markets and “Herat great industrial park” to the factories of related products. Tomatoes were carried to the tomato paste factory; the processing factories have contract with agricultural cooperatives to purchase from the cooperatives in good prices and this is profitable for both farmers and the factories from one hand farmers make the products prepared to be carried on the other hand the factories receive the products on time with no troubles by involvement of agricultural cooperatives.

Mohammad Rahim said that: “I am very happy now that my income has increased comparing to open field farming and can get a lot of profits especially during the winter season. Before introduction of greenhouse farming I was idle and had no

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6 Herat Industrial Park inaugurated in 2003 in Gozera district of Herat, which is also close to Injil district. There are hundreds of producing factories in this park and is counted as one of the economic centers of Afghanistan.
income at all during these cold months. He added, greenhouse farming has changed my livelihood status and cooperatives have brought so much facility for us. Currently I am saving money to give back the money I borrowed to my partner in order to become independent and looking forward establishing more greenhouses by my own money from the income of my greenhouse.”

6.1.3. Individual Case 3: The Story of JaweedMohammadi and His partner

Jawed Mohammadi and Ahmad Amiri are two friends who graduated from agriculture faculty of Herat University in 2012 with four years bachelor degree. But due to unemployment and lack of jobs they couldn't get appropriate job. They planned to start their own business with a new initiatives, the interest they had toward working and doing business related to their studies was their first main goal and to make use of their studied knowledge during four years study in university. They also wanted to create a business with less money they had in hands, and eventually they came to an idea to establish greenhouse to cultivate vegetables. This was a new initiative for them to do greenhouse farming. Their awareness on high level of products, great profit and the interest they had in working in the field where they can apply their studied knowledge. So, the agriculture field that they studied four years in university made them to take firm stripes toward doing greenhouse-farming business. Furthermore, the four years academic knowledge and having practical experiences persuaded them to be more confident in the strides they had taken in establishing greenhouse farming.

Jawed said “First of all we needed to find a piece of land for lease or rent that should be in a village or area close to the city in order that we can communicate
easily” (Jawed, personal communication, August-2015). Therefore, after looking around to the villages close to the city they found an area in a village called KhaajSurma where exists large lands owned by the state, very close to the city and to the Herat large fresh vegetable market. They could rent a portion of land from the government in a better price than the private land leasing; on the other hand they needed to provide greenhouse-structuring materials such as plastic covering, which was not available in Herat city. So they decided to go to Iran, which has border close to Herat province to purchase the standard materials for greenhouse structuring, seeds and other material and equipment. Jaweed said “I went to Iran and purchased all needed materials from Mashhad city of Iran, but while dispatching them to Herat, the Iranian government wanted to prevent from exporting of the material to Heart city. Finally, with the efforts and cooperation of Afghan authorities we could solve the problem” (Jaweed, personal communication, August 2015).
Photo 6.5. Author with Jaweed, while tying cucumber shrub with cord in his greenhouse

Source: Taken by Mir Ahmad Friend of Author in August-2015

In the mean time they hired people and farmers to work and cooperate with them from the rural community of the same village and started structuring the greenhouse to the volume of 1000 sq. meter. This was very difficult responsibility to build such a large greenhouse, but having knowledge, experiences, researches and visiting other greenhouses paved the way for them to continue to their successes and started to erect the greenhouse. By the end of winter season 2013 they completed structuring, soil checking, seeding, and installing the new model of drip irrigation system.

“Drip irrigation is sometimes called trickle irrigation and involves dripping water onto the soil at very low rates (2-20 litres/hour) from a system of small diameter plastic pipes fitted with outlets called emitters or drippers. Water is applied close to plants so that only
part of the soil in which the roots grow is wetted, unlike surface and sprinkler irrigation, which involves wetting the whole soil. With drip irrigation water, applications are more frequent (usually every 1-3 days) than with other methods and this provides a very favorable high moisture level in the soil in which plants can flourish and nowadays this technic of irrigation is one of the advanced and newest technic of irrigation system in the world, where a few farmers use this type of irrigation system that avoids from exceeding water and other technical performances” (Brouwer, et al., 1988 p103).

Photo 6.6. Showing the system of drip irrigation in Jaweed’s greenhouses

Source: Taken by Author in August 2015

Furthermore, they decided to build a living room next to the greenhouse so that they can stay there to care more for the betterment of the greenhouse products, as they have gotten some information and have done researches in order what to cultivate to get high amount of products and more profit. So they finally decided
for the first time and testing, to cultivate cucumber for the huge volume of its products and higher profit. In the first six months of their greenhouse they got a lot of profits, which made them to become more interested in the business that started. Jawed said “doing a business needs a strong decision and having knowledge of the field to be successful, during two and half years of greenhouse farming. We got so much profit; we improved a lot and couldn't anticipate that we are going to improve so much in a short period of time in the field of establishing greenhouse farming.” (Jaweed, personal communication, August- 2015)

Photo 6.7. Showing the bulk productivities of cucumber in Jaweed’s greenhouse

Source: Taken by Author in August-2015

On the one hand, the distance between Jawid’s greenhouse and Herat large fresh market is very short, and they can carry the products to the market easily with less carrying expenses and sell the products for the wholesalers. Every other day they harvest the products from the greenhouses and transfer them to the market. The profits they gained from establishing greenhouse have persuaded them to expand
their greenhouse from one to two larger greenhouses. Now they own the two largest ever greenhouses in all over Herat province with the land area of 2000m$^2$ and 4000m$^2$ that currently cultivate varieties of vegetables and fruits based on the seasons including melon and watermelon.

On the other hand, Ahmad Amiri, his partner, said to researcher that: “During the last two years we hired many farmers from this community and other villages to work with us. Not only do they get paid monthly for their work to generate income for their families, they also learn so many new technique and knowledge from our experiences. So, most of them work with us for some months and learn new greenhouse farming technologies and later on looking forward to establishing own greenhouses to the extent they are able to do. He added that currently more than ten people are working with us and we are so proud that we could establish these greenhouses and created job opportunities not only for ourselves, but also for many other poor people, and everyone can get benefit from greenhouse farming business.” (Ahmad Amiri, Personal Communication, August 2015)
CHAPTER SEVEN: DISCUSSION AND INTERPRETATION

7.1. Overall Discussion

Based on the survey done by World Bank (June 2014), agriculture forms one quarter of national GDP and it is the second largest sector after services in Afghanistan. Nearly 90 percent of the poor are living in the rural areas, and agriculture is the main source of incomes and plays a significant role in the livelihood of the poor in the rural areas. Agriculture is one of the sectors that have great potential to have direct impact on improving the economic growth of Afghanistan in the future. It is recognized that agriculture is crucial for the development of Afghanistan; furthermore agriculture offers significantly great potential for creating jobs, labor productivity and poverty reduction in the rural areas, since more than 80 percent of Afghan population are living in the rural areas and their livelihoods are heavily depended in agriculture sector.

However, Afghanistan has had one of the strong agriculture markets in the world, and in 1960 Afghanistan was counted as one of the largest dried fruit exporter in the world, which resulted to bring wealth for the people in most part of the country (Christoplos, lan-2004). But, decades of conflict have ruined the agriculture system in the country; Afghanistan has suffered mass destruction in all bases especially in agriculture sector, which is the main source of livelihood for most of the Afghan population. The war has damaged most of the arable lands, seeds processing factories, and laboratories, and over half of irrigation system of the country was destroyed in all over the country (Jackson, 2009).
Moreover, the old traditional or medieval agriculture system, which is subsistence based, agriculture technologies that the Afghan farmers have been using for several years, remained unchanged for centuries. This situation caused to the technical backwardness with low-income farming and low agricultural productivities, which is insufficient to fulfill the requirements of the Afghan people to a sustainable food security comparing to the lately increasing population both in the rural and urban areas. Most farmers are producing their own consumption subsistence, which doesn't satisfy the domestic needs to the agricultural products. Therefore, Afghanistan as a developing country whose populations highly rely on agricultural productivities needs to advance agriculture system with new technologies. Afghanistan’s agriculture is the significant source of country’s economic development. The World Bank notes that: “Significant increases in agricultural productivity are a critical early step” in economic growth for most countries (Lavin, 2009, P. 15).

Furthermore, to improve agricultural productivity, agriculture growth as well as increasing of farming incomes, to bring positives impacts on livelihoods of the rural communities and to create jobs for them, it is needed to articulate some policies and programs to the supporting of rural communities. For instance, increasing the level of yields in agriculture and promoting agriculture activities by accepting new technologies of farming are necessary for a long-term productivity increase. Agriculture growth and productivity enhancement has the relevance to the reduction of poverty and on the other hand it is a means of job creation for the rural community.
In order to achieve these opportunities successfully and to overcome to the challenges situated on the way of Afghanistan agriculture system, the Afghan farmers needed to shift from the old traditional model of farming to the new generation of agriculture. Furthermore, agricultural cooperatives can be one of the means to the improvement and shifting of traditional agriculture system to the new technologies of farming, greenhouse farming or cultivation of crops and vegetables in the plastic tunnels, which were introduced in some parts of Afghanistan to the farmers lately. This new technology of farming has shown the benefits and advantages from the high yield of products being cultivated in the plastic tunnels with marketable prices, comparing to the open fields cultivation products. By doing so, it brings high yielding periodically several times per year and good incomes for the farmers, and having reasonable market have caused to promote this high value technology to improve in Injil district of Heart Afghanistan.

According to Nasiri “The lately improvements to the greenhouse farming have brought major changes to the livelihoods of rural communities in most districts of Heart province especially the farmers in Injil district have, which tried to promote this technology of farming in most villages” (Nasiri, Personal Communication, August 2015).
Table 7.1. Summary of Greenhouse Farming

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Activities</th>
<th>Outputs</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-financial source</td>
<td>Establishment of greenhouses.</td>
<td>Produce fresh vegetables,</td>
<td>Income generations</td>
</tr>
<tr>
<td>Self-manpower</td>
<td>Sharing knowledge and experiences with other farmers.</td>
<td>including cucumber, tomato, squash, spinach, melon, watermelon, and a variety of other daily demanded fruits and vegetables.</td>
<td>Job opportunities</td>
</tr>
<tr>
<td>Donor’s support</td>
<td>Holding capacity building trainings.</td>
<td>Access to the market.</td>
<td>Better livelihoods</td>
</tr>
<tr>
<td>Government’s attention</td>
<td>Providing of some primary equipment for farmers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Author

As a whole, after completion of field research in Injil district of Herat province I realized that there are three main perspectives behind establishment of greenhouses. These perspectives are as follows:

- Technology Transfer
- Job opportunities
- Livelihood and income changes
Based on the conducted interviews with farmers, I found that greenhouses as new technology of farming and transferring technology in agriculture sector of Afghanistan, which has positively impacted on farmers’ livelihoods. On the one hand, using new techniques of farming has positively changed their incomes after starting greenhouse farming; farmers responded that, since establishing greenhouses in their villages, the job opportunity condition has increased as well.

The Figure 7.1 is pointing out that each of these perspectives is vital for the people in this district and has positively impacted on all aspects of their livelihoods, and the greenhouse technology transferred has brought new hopes to farmers in this district. Furthermore, the technology has created job opportunities and workforce to the improvement of their own livelihoods by generating more incomes through greenhouse farming technology especially in off-seasons in order to prevent them from migration to the neighboring countries.
International Center for Agricultural Research in the Dry Areas (ICARDA) has the experiences of using greenhouse projects in different provinces of Afghanistan to the farmers with high positive results on generating more incomes comparing to the open fields cultivation due to high yield productivities. The table 5.2 below shows the comparison of incomes from both greenhouse and open-field cultivation, which was conducted by ICARDA in different provinces of Afghanistan.

Table 7.2. Comparison of profitability of cucumber production under greenhouse and open field in Afghanistan (one jerib7)

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Unit</th>
<th>Greenhouse Production</th>
<th>Open field production</th>
<th>Net Change GE over of %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production2</td>
<td>Kg</td>
<td>19,500</td>
<td>3700</td>
<td>427</td>
</tr>
<tr>
<td>Production price3</td>
<td>Afs/Kg</td>
<td>24</td>
<td>18</td>
<td>33</td>
</tr>
<tr>
<td>Material input cost</td>
<td>Afs</td>
<td>118.200</td>
<td>4,650</td>
<td>2,442</td>
</tr>
<tr>
<td>Labor costs</td>
<td>Afs</td>
<td>76,800</td>
<td>18,000</td>
<td>184</td>
</tr>
<tr>
<td>Depreciation/season</td>
<td>Afs</td>
<td>60,000</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Total production cost</td>
<td>Afs</td>
<td>255,000</td>
<td>22,650</td>
<td>913</td>
</tr>
<tr>
<td>Total income</td>
<td>Afs</td>
<td>468,000</td>
<td>66,600</td>
<td>603</td>
</tr>
<tr>
<td>Net income/return to land</td>
<td>Afs</td>
<td>213,000</td>
<td>43,950</td>
<td>443</td>
</tr>
</tbody>
</table>

7 One Jerib is equal to 2000 m² of land area, The Afghan currency abbreviation Unit is called Afs, which 1US$= 68Afs
According to the data provided in the table 5.2, it can be said that greenhouse farming is more suitable and profitable in Afghanistan. Since there are high demands for fresh fruits and vegetables in most part of Afghanistan, then will be a good opportunity for many farmers to be involved in greenhouse farming. Taking part in greenhouse farming creates job opportunities for landowners as well as for daily labor forces, which help both beneficiaries for having better livelihoods. The data in the above table shows that comparison between greenhouse farming and open-field based crop production costs, profitability; land, labor as well as water and efficiency estimated that greenhouse farming is quite favorable in most regions in Afghanistan and the income generated from the greenhouses is much higher, comparing to open field vegetable cultivation.

7.2. Summary
This chapter analyzed and discussed that greenhouse farming as new technology of farming has positively impacted on rural livelihoods for its high positive advantageous aspects, the adoption of greenhouse farming technology has been perceived by farmers to producing high yielding and generating more incomes.
compared to open field production, it is identified that farmers and other people in rural areas are eager and showed enthusiasm to a wider adoption of greenhouse farming technology. In order to assess the farmers’ perceptions and their performances on greenhouse farming, three successful cases were chosen to deeply go inside the reality, each case narrated its success story and the changes came in their livelihood status, and it is identified that greenhouse farming improved the livelihoods of the people by increasing yield production, generating more incomes and creating employment opportunities. In addition, it is also identified from other studies and reports that this technology transfer in agriculture has enough evidences that the technology is both economically and socially viable and favorable in the context of Afghanistan for its wider adoption.
CHAPTER EIGHT: CONCLUSIONS AND RECOMMENDATIONS

8.1. Conclusion

Based on the collected data from field research in Injil district of Herat province, government’s documents and extension services, this study described and analyzed how greenhouse farming plays a vital role on farmers, rural livelihoods, rural development and community development. Moreover, this study found out greenhouse farming as a method of new technology of farming is the best alternative in off-season especially during the winter. It also investigated that this new technique of farming creates more employments within the rural areas. In addition greenhouse farming can be extended through round year productivity; it showed that this technique of farming is both affordable and sustainable for the poor marginalized people by using simple structures of greenhouses.

This study found out that greenhouse farming has brought new hopes to the growers in Injil district; this new technique of farming offers more opportunities in generating more incomes to the famers, the returns in profit are much higher comparing to open field cultivation. The study found that the famers have eagerly accepted adoption greenhouse farming successfully and are endeavoring to establish more greenhouses and expand it in a wider adoption of this technique, and also the study assessed impact of greenhouse farming on farmers’ increased incomes after establishment of their greenhouses, it showed a huge income generated to the farmers and this success persuaded them to build more greenhouses.
Based on the field research, previously greenhouse farming has not been practiced in this district, the recent repatriation of migrations from the neighboring countries, government’s assessments along with international extension services and endeavors of the farmers have caused to the improvement of greenhouse farming in Injil district. Before existences of greenhouse farming the people had to import the needed vegetables from the neighboring countries. But, now the greenhouse growers can fulfill the requirements of local markets and it is not needed to import the daily consumable fresh vegetables from other countries.

The study found that women that are the disabled part of Afghan society have less participation in social activities, consisting the major part the country and there are many derelict women that have to work outside of their homes to earn money for their families to be survived, the recent greenhouse structures distribution in this district by donors for the poor rural women have helped them to work inside their houses and generate incomes, a mall greenhouse is both affordable, sustainable and can produce yearly-round products, which is very easy to work inside. So, greenhouse-farming business has paved the way for the women to be involved both in social activities and enabled them to generate incomes from their own business. Moreover, greenhouse farming let the farmers and the women to transfer their daily surplus products to the market; this has contributed in supplying fresh vegetables for the people and became a source of income generation for the poor rural women.

This study discussed three different successful cases from Injil district of Herat province on how they have started their greenhouse business, what encouraged
them to erect greenhouse structures and what were the reasons behind their successes. The farmers have narrated their success stories and the advantages that farmers have gotten from this business, each case has a different success story based on every greenhouse growers’ livelihood conditions, all these farmers were satisfied from the business they have started and were ready to build more greenhouses to get more profits, which were gotten from their current greenhouses, the success stories of farmers showed that greenhouse farming has positively changed their livelihood status, due to more incomes generation, round-year productivities especially in the winter seasons, which they normally were idle and had no incomes.

Moreover, the study found out that greenhouse farming has positively impacted on non-greenhouse growers and other rural community in this district as well, it discussed that before establishing greenhouses, and there were no employment opportunities and less agricultural activities. Though, after establishment of greenhouses in most villages not only the farmers stacked in this activities, but also created jobs for other people in this district, the greenhouse growers need to employ more people to work with them in farming activities, collecting, packaging and transferring the products to the market. Furthermore, the high incomes generated from greenhouses have encouraged other non-greenhouse growers to start establishing greenhouses in their villages.
8.2. **Recommendations**

Based on the conducted research on field by asking questions from the government officials and farmers and according to the finding and discussion of this study, the followings are the main recommendations for the Afghan government for betterment of greenhouse farming technology in Afghanistan.

- The majority of Afghan populations are living in the rural areas and their main jobs are agriculture practices, they earn money for own livelihood security and most portions of these people are poor and doing agriculture practices only for preserving own subsistence, the old agriculture tradition system doesn’t have the capabilities of increasing productivity to sell the surplus products to the markets. But, the recent improvements in this sector by applying new agricultural technologies of farming have abled them to increase productivities. Therefore, only few of the farmers that financially are able can use from the new farming technologies such as greenhouse farming for their high costs. In this study it showed many farmers eagerly want to establish greenhouses. Yet, they need to be financially supported by government and financial institutions. The Afghan government must provide long and short term loans to the farmers and encourage other people to invest on farmers, which financial problem is one of the biggest challenges currently farmers in Afghanistan are facing and for improvement of agriculture sector the government has to provide financial assistances for further adoption of greenhouse farming in the country.
One of the vital aspects of agriculture growth is good market that farmers can sell their products to the markets on times and at proper prices, based on the finding of this study, there are few national markets and no international markets for greenhouse products to be sold in and out of Afghanistan, the farmers have to sell their products only in local markets for cheap prices. Currently market problem is also another big challenge for the greenhouse growers in Injil district, the farmers had to accommodate with current markets, the government of Afghanistan must provide the opportunity that farmers can export the greenhouses products to national markets in other provinces that there is less opportunity of erecting greenhouses and provide the field of exporting to international markets, due to the fact that Afghanistan can provide low cost agriculture products for having low labor costs. However, there are only few large cold storages to keep the products for longer time, for this reason the greenhouse growers have to sell the products at low prices in order not to be spoiled or damaged. Furthermore, few products processing factories in this city cannot fulfill the demands of farmers. Hence the government must provide big cold storages for the farmers to keep products from being wasted and organize the investment conditions for people to be encouraged to construct agriculture product processing factories, which are advantageous for both development of the country and helping in providing more job opportunities for thousands of unemployed people.
Greenhouses have special designs and structures require building supplies such as polyethylene, plastics, panels greenhouse films and special greenhouse seeds for cultivation that Afghan farmers import these equipment and materials from the neighboring countries in very high prices, with high transporting charges and difficult to carry them, from other side the greenhouse growers face difficulties in finding good quality seeds and pesticides from the markets. So, the government for the betterment of greenhouse farming to a wider adoption of this technique of farming is required to motivate people for investing on constructing greenhouse manufacturing factories that can produce basic materials in the country and farmers can easily install them. On the other hand, the government has to help farmers in providing high quality of seeds and other required pesticides.

The greenhouse and non-greenhouse growers need to be trained technically to empower them for better understanding of greenhouse farming on production of high quality crops with less water, the training courses can improve the knowledge of the areas of them such as types of greenhouses, methods of installment, the way of using modern irrigation system for water saving, protection, production and seedling, environmental and biological control, identifying of major diseases and pest and other important issues related to greenhouse farming. Therefore, the government with cooperation of extension services and other international organizations must organize such training programs to farmers for better understanding of greenhouse farming.
8.3. Summary

This chapter summarized the main outcomes, impacts, and important aspects of greenhouse farming in Injil district of Herat province. It indicated the positive significant roles of greenhouse farming in increasing farmers’ income in this district and showed that this technique of farming has changed the livelihood of rural communities by generating higher incomes. This study provided some recommendations for the government on challenges that greenhouse growers currently are facing in this district to be applied on other studies and reports to the further improvement of greenhouse farming in other districts of this city and as well as other parts of the country.
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